A NEW M SC COURSE IN INFORMATION AND COMMUNICATION TECHNOLOGY

K M S Soyjaudah [1] and S. Govinda [2]

Abstract — *This paper presents a new Information and Communication Technology course that has been developed at M.Sc. level, at the University of Mauritius. The course has been tailored to give students adequate theoretical and practical background in both information and communications Engineering, as well as comprehensive work experience in industry. The course requirements, the organisation of the course as well as the structure are described.*

Index Terms ¾ Information and communication Technology, M.Sc Course

INTRODUCTION

With fast growing computer communications networks and development in the field of telecommunications including mobile telephony, computer and communications engineers who are fully conversant with the state–of-the–art technology are becoming more and more required on the work market. For engineers to remain competitive in the industry, they should have a strong background in the design and maintenance of communications systems. Such engineers are currently expected to work in areas such as computer networks, internet security, mobile communications including 2nd and 3rd generation mobile telephone systems, microwave engineering and satellite communications among many others.

Moreover Information and Communication Technology (ICT), which is a powerful tool to serve humanity, is being called nowadays to play a critical role in the socio-economic transformation of most countries and Mauritius is no exception. ICT is revolutionizing life in the world as no other technology has even done before. ICT has deep influence on almost all facets of modern life making it cheaper, more pleasant and more enjoyable. In a surprisingly short time span ICT has 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 and on social interaction amongst many other areas. The need for professionals in Mauritius with advanced knowledge and skills in ICT therefore being felt at all levels and it is in this vein that such a specialized MSc Programme has been designed and is targeting more specifically graduates in IT related fields such as Electrical, Electronic, Science and Mechatronic Engineering

The MSc. programme has been established with the purpose of training professionals so as to make them the society's growing demand for information and Communication Engineers.

AIMS AND OBJECTIVES OF THE COURSE

The main aim of this new MSc. course in ICT is to increase the appreciation and critical understanding of the principles of communication engineering, of information theory and of information technology with a view to allowing the graduates of the programme to effectively design, implement and maintain communication systems, computer networks and related technologies.

It is expected that the programme will fulfil this aim to meet the following objectives by teaching students to:

(i) understand and apply basic theory and practice of data communication, information theory and digital signal processing systems;
(ii) understand the principles of mobile and wireless communication systems;
(iii) understand and design modern communication systems including the maintenance of security, integrity and confidentiality of data;
(iv) 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
(v) Show critical and analytical thinking in the application of knowledge and/or research in a particular communication system.

PROGRAMME STRUCTURE

The programme consists of face-to-face 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

[1] K M S Soyjaudah , Faculty of Engineering, University of Mauritius, Reduit, Mauritius, Email: s.soyjaudah@uom.ac.mu
[1] S. Govinda [2] Centre for Information Technology, University of Mauritius, Reduit, Mauritius,Email:mgovinda@uom.ac.mu

of the semester. The modules are divided into two groups: core and electives. Each student is required to take at least 8 taught modules – out of which 5 must be core modules. These core modules set the framework for information and Communication engineering and are offered during the first two semesters. The elective modules are offered in the third and fourth semester and are aimed at covering particular areas in greater depth. The contact hours for each module are 45 hours (i.e. 3 hours/week) and the proposal is to run the course over the equivalent of 1½ days/week. The total taught contact hours of the course will therefore be 360 hours. The research project involves 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 week day and 3 hours on Saturday). However students have to attend the modules which are being taught on a full-time basis.

A detailed programme structure is shown in table 1.

TABLE I
PROGRAMME STRUCTURE FOR THE MSC IN ICT

CORE MODULES			
MODULE NAME	SEMESTER	Hr/Wk	Credits
Data Communication and Computer	1	3+0	3
Communication Theory	1	3+0	3
Network Administration and Programming	2	3+3	4.5
Digital Signal Processing	2	3+0	3
Mobile and Wireless Communication	2	3+0	3
Project	3 & 4		9
ELECTIVES			
MODULE NAME	SEMESTER	Hr/Wk	Credits
Introduction to Multimedia Communication	3	3+0	3
DSP Application In Communication Systems	3	3+0	3
Network Security and Control	3	3+0	3
Advanced Information Theory	3	3+0	3
Advanced Communication Theory	4	3+0	3
Research Methods	4	3+0	3
Satellite Communications	4	3+0	3
Management Information System	4	3+0	3

An important aspect of the core modules is to give the students the necessary background for designing and simulating communication systems. Moreover they provide a strong foundation in the development of (i) the various layers that constitute computer networks, (ii) administration and security aspects of Internet and intranet systems, (iii) DSP applications in Communications and (iv) satellite technology. The DSP modules are primarily geared towards providing students with intensive theoretical and practical experience in the design of DSP systems and for eventual applications to communications and Information Technology. Since the benefits of using computer aided learning in many fields of Electrical Engineering is well established [1,2], for many modules extensive software based laboratory will be provided. The will make use of simulations in C++, Mathlab^{TM} and Simulink^{TM}. In the process students will acquire hands on experience in the design, testing, and validation of working systems.

Students would be required to work on their research projects during the second year. This will allow students to:

(i) Develop an ability to undertake research analysis, design, simulate and/or implemention of an innovative ICT concepts with an appropriate level of supervision;
(ii) Learn about research methodologies;
(iii) Collect information, assess it and present it in an orderly and coherent form
(iv) Be able to carry out effective literature review and to present a document, clear findings.

PRACTICAL TRAINING

Industries are often faced with engineers who lacks practical competence and who are hardly acquainted with engineering ethics. It generally takes year long internal training before new recruits become fully competent in using an organised approach to problem solving, cooperating with other members, acquiring the necessary communications skills and having a broad perspective on the work environment. The new ICT course is being run on a part time basis to enable students to simultaneously acquire the academic training at the University and the practical experience in industries. Hence students completing this course are likely to be more competitive in the current industry than those who have followed a more traditional programme [3]. As such a desirable entry requirement of the ICT course is employment in an appropriate industry. It is expected that such employment will expose the students to the engineering profession from the technical, managerial, and social points of view and provide them with the opportunity of working on real-life design problems.

COURSE APPRAISAL

The proposed ICT course will be starting in the academic year 2001-2002. As such it is very premature to have any analysis to evaluate the benefits of the course. There is nevertheless significant element of evidence that this proposed course would meet the objectives for which it was designed. The mounting of this course has been well appreciated by people in industry, both by prospective students and employers. One prominent contribution resulting from the mounting of the course is the setting up of the communication research group early this year. A number of research projects have been initiated, among which, the employment of the HF link between Mauritius and Europe to investigate the possibility of trans-equatorial multimedia transmission as well as HF digital broadcasting, combined coding cryptography and modulation for slow fading channels and the development of a telemetry system for acquisition and processing of subscribers' energy meter readings for the billing process at Central Electricity Board. Moreover it is proposed to use course evaluation forms with a view to obtain constructive comments in order to answer the needs of students. Such constructive suggestions will be discussed at the level of the department and will be put in place. It is to be noted that an advisory committee,comprising of academic staff of the University of Mauritius and professionals from industry in the field of ICT has been set up to review the course structure and to help appropriately channel the scope of the research projects.

CONCLUSION

This paper has presented a new MSc. course in Information and Communication Technology that will be introduced at the University of Mauritius in 2001. The course is aimed at training in-service professionals in various engineering fields so that whilst who can quickly get acquainted to dynamic work situations while having a strong foundation in the design and upgrading of information and communication technology tools. The benefits of such a course in boosting research interest at UOM are also highlighted.

REFERENCES

[1] Grayson P. "Educating tomorrow's engineer", IEEE Education society Newsletter, Fall

[2] [2] Masi C. G. "Re-Engineering engineering Education" IEEE Spectrum, September 1995

[3] Bronzoni J. D. ae al. "Design and team work: a must for freshman" IEEE Trans. In Educ., May 1994