University of Moratuwa

Faculty of Information Technology

Curriculum for B.Sc. in Information Technology Degree Programme as Amended in September-October 2008

Level 3 Curriculum and Syllabi

Level 3			Lectures hrs/wk	Labs hrs/wk	Credits
IT 3000	Industrial Training (Non GPA)	C	-	18	6
IT 3104	Advanced Software Engineering	E	2	3	3
IT 3106	Internet Programming and Web Services	E	2	3	3
IT 3107	Automata Theory	E	2	-	2
IT 3205	Computer and Network Security	E	2	3/2	2.5
IT 3206	**Microcontrollers for IT Applications Development**	E	1	9/2	2.5
IT 3305	Design and Management of Networks	E	2	3/2	2.5
IT 3306	Information Systems Security	E	2	3/2	2.5
IT 3307	Wireless Communication and Networks	E	2	3/2	2.5
IT 3402	Neural Networks and Genetic Algorithms	E	2	3	3
IT 3403	Artificial Intelligence	E	2	3/2	2.5
IT 3504	Human Resource Management	E	2	-	2
IT 3505	Professional Practice	C	2	-	2
IT 3506	IT Quality Assurance	C	1	-	1
IT 3507	IT Enabled Marketing	E	2	-	2
IT 3603	Human Computer Interaction	E	2	3/2	2.5
IT 3604	Digital Image Processing	E	2	3/2	2.5
IT 3704	Statistics and Probability	E	2	3/2	2.5
IT 3707	Operational Research	E	2	3	3
IT 3802	Advanced Data Management Systems	E	2	3/2	2.5
IT 3803	e-Business Technologies	E	2	3	3
IT 3902	Independent Study	C	-	6	2
IT 3903	Bio Informatics I	E	2	3	3
IT 3999	Project	C	-	18	6

Credit Requirement:

		Offered	Required
Compulsory *(17 Credits)*	GPA	11	11
	Non GPA	6	6
Elective		49	14

Module Code	IT 3000	Title	Industrial Training			Compulsory (Non GPA)
Credits	6	Hours / Week	Lectures	-	Pre-requisites	
			Lab / Tutorials	18		

Learning Objectives

To help students to gain necessary knowledge on new technologies, methodologies that industries are using and to help them head start their final year project in a methodical way. Also it aims to help students to make necessary connections with the industry in order to gain suitable employment after graduation.

Module Code	IT 3104	Title	Advanced Software Engineering			Elective (GPA)
Credits	3	Hours / Week	Lectures	2	Pre-requisites	IT 2104, IT 2105, IT 2503
			Lab / Tutorials	3		

Learning Objectives

To provide an understanding of the formal modelling and advanced system design techniques and their application in critical system development

Outline Syllabus

- Formal specification
- Distributed systems architectures
- Real-time software design
- Design with reuse
- Reengineering of Systems
- Version Management
- Critical systems Development

Module Code	IT 3106	Title	Internet Programming and Web Services			Elective (GPA)
Credits	3	Hours / Week	Lectures	2	Pre-requisites	IT 1102, IT 2302
			Lab / Tutorials	3		

Learning Objectives

To provide students with advanced knowledge and skills in Internet Programming and Web Services.

Outline Syllabus

- Overview of Web-based Systems
- Theory and Practice of Internet Application Development
- Hyper Text Transfer Protocol (HTTP)
- Web Servers, Browsers, Downloading Utilities, Proxy Servers, Caching
- User Tracking, Sate Maintenance
- Client-side programming
    - JavaScript, AJAX, etc.
- Server-side programming
    - ASP,JSP, PHP, etc.
- eXtended Markup Language (XML)
- Web Services
    - SOAP,WSDL,UDDI, etc.
    - Programming Web Services

Module Code	IT 3107	Title	Automata Theory			Elective (GPA)
Credits	2	Hours / Week	Lectures	2	Pre-requisites	IT 1701/ IT1703
			Lab / Tutorials			

Learning Objectives

To understand the relationship between the generation of languages by grammars and their acceptance by machines

Outline Syllabus

- Review of Mathematical Concepts
- Languages
- Finite Automata
- Regular Languages and Sets
- Context-Free Grammars
- Parsing
- Normal Forms
- Pushdown Automata
- Turing Machine

Module Code	IT 3205	Title	Computer and Network Security			Elective (GPA)
Credits	2.5	Hours / Week	Lectures	2	Pre-requisites	IT 1301, IT 1701 / IT 1703
			Lab / Tutorials	3/2		

Learning Objectives

To provide an introduction to nature of attacks in computer networks and how to provide security against such attacks

Outline Syllabus

- Threats to security and privacy in computer networks
- Conventional Cryptography
- Number theory
- Public key cryptography
- One way hashing and message authentication
- Authenticity, integrity and digital signatures
- Authentication protocols and identification
- Electronic mail security
- IP Security and virtual private networks
- Web security and protocols
- Computer viruses, intruders and firewalls
- Secure eCommerce
- Digital Rights Management

Module Code	IT 3206	Title	Microcontrollers for IT Applications Development			Elective (GPA)
Credits	2.5	Hours / Week	Lectures	1	Pre-requisites	IT 1201, IT 1202, IT 2204
			Lab / Tutorials	9/2		

Learning Objectives

To provide a practical understanding of the principles and operations of microcontrollers and using them in the development of IT applications.

Outline Syllabus

- Applications development environment.
- Architecture and features of microcontroller based systems.
- Simulators and emulators.
- Programming of microcontroller based systems.
- Interfacing with microcontroller based systems.
- IT based applications in microcontroller based systems.

Module Code	IT 3305	Title	Design and Management of Networks			Elective (GPA)
Credits	2.5	Hours / Week	Lectures	2	Pre-requisites	IT 1301, IT 1701 /IT 1703
			Lab / Tutorials	3/2		

Learning Objectives

To provide an insight into the topics on the principles, design, implementation, and performance of computer networks

Outline Syllabus

- Network Design in the following Areas:
    - Physical Layer
        - Structured Cabling Standards
        - Introduction to Wireless Networking
    - Data Link Layer
        - Virtual LANs
    - Network Layer Protocols
        - Multicasting
        - Mobile IP
        - Quality of Service (QoS)
    - Transport Layer
        - TCP
- Network analysis and design methodology
- Operational issues in managing heterogeneous networks
- Case studies

Module Code	IT 3306	Title	Information Systems Security			Elective (GPA)
Credits	2.5	Hours / Week	Lectures	2	Co-requisites	IT 3205
			Lab / Tutorials	3/2		

Learning Objectives

To provide an in depth knowledge in concepts and practices to deal with security problems in organizations

Outline Syllabus

- Security Trends
- Security Management Practices
- Security Principles
- Security Models and Architecture
- Physical security
- Telecommunication and Networking Security
- Cryptography
- Disaster Recovery and Business Continuity
- Laws, Investigation and Ethics
- Operations Security

Module Code	IT 3307	Title	Wireless Communication and Networks			Elective (GPA)
Credits	2.5	Hours / Week	Lectures	2	Pre-requisites	IT 1301
			Lab / Tutorials	3/2		

Learning Objectives

To provide an in depth knowledge to principles, issues and designs of wireless networks.

Outline Syllabus

- Wireless Communication Technology
- Antennae and Propagation
- Satellite Networks
- Cellular Wireless Networks
- Spread Spectrum
- Wireless LAN Technology
- Broadband Wireless Networks
- Personal Area Networks- e.g.: Bluetooth

Module Code	IT 3402	Title	Neural Networks and Genetic Algorithms			Elective (GPA)
Credits	3	Hours / Week	Lectures	2	Co-requisites	IT 3403
			Lab / Tutorials	3		

Learning Objectives

To provide knowledge and skills to solve problems using neural networks and Genetic Algorithms

Outline Syllabus

- Introduction to Neural Networks
- Basic Concepts in Neural Networks
- Single Layer Perceptrons
- Multi-Layer Perceptrons
- Rules of Learning
- Associative Memory
- Function Approximation
- Self Organizing Maps
- Overview of Genetic Algorithms
- Genetic Algorithmic representations
- Mutation and cross over operators
- Scaling Schemes and their Applications

Module Code	IT 3403	Title	Artificial Intelligence			Elective (GPA)
Credits	2.5	Hours / Week	Lectures	2	Pre-requisites	IT 1702/ IT 1704, IT 2401
			Lab / Tutorials	3/2		

Learning Objectives

To give an exposure to artificial intelligence and its application

Outline Syllabus

- Artificial Intelligence
- Machine Learning
- Communicating and Perceiving
- Planning
- Game Playing

Module Code	IT 3504	Title	Human Resource Management			Elective (GPA)
Credits	2	Hours / Week	Lectures	2	Pre-requisites	
			Lab / Tutorials			

Learning Objectives

To provide concepts and principles of Human Resource Management and indicate applicability in both in sourcing and outsourcing operations

Outline Syllabus

- Introduction of HRM as a key management area
- Principles of HRM
- Job evaluation and performance evaluation
- Career planning, career stages,
- Training and continuity of training
- Employee health and safety
- Employee rights privileges and discipline
- Obligations of employer
- Principles of in sourcing and outsourcing
- Labour Turnover

Module Code	IT 3505	Title	Professional Practice			Compulsory (GPA)
Credits	2	Hours / Week	Lectures	2	Pre-requisites	
			Lab / Tutorials			

Learning Objectives

To provide an understanding of the basic forms of legal protection related to IT

Outline Syllabus

- Concept of Knowledge as a property
- Intellectual Property: Issues relating to Rights of Inventor and Public
- Knowledge of Individual and Institution
- Rights and obligations of Employer and Employee
- Rights and obligations of Client and Consultant
- Disclosure of product and details

Module Code	IT 3506	Title	IT Quality Assurance			Compulsory (GPA)
Credits	1	Hours / Week	Lectures	1	Pre-requisites	
			Lab / Tutorials			

Learning Objectives

To provide the students with a knowledge on principles and methods of quality assurance in software systems

Outline Syllabus

- Principles and practices of Quality Assurance
- Work Processes, Standards
- Process engineering standards
- Productivity and quality using measurements and matrices
- Software performance engineering

Module Code	IT 3507	Title	IT Enabled Marketing			Elective (GPA)
Credits	2	Hours / Week	Lectures	2	Pre-requisites	
			Lab / Tutorials			

Learning Objectives

To provide the students with a knowledge on principles of marketing and application of IT in the field of marketing

Outline Syllabus

- Principles of marketing
- Types of markets
- Local and International factors influencing marketing
- Electronic Commerce, Electronic Marketing
- Marketing Research: information and knowledge management
- Customer Relationship management
- New trends in marketing

Module Code	IT 3603	Title	Human Computer Interaction			Elective (GPA)
Credits	2.5	Hours / Week	Lectures	2	Pre-requisites	
			Lab / Tutorials	3/2		

Learning Objectives

To provide the knowledge and skills needed to develop user friendly software packages and evaluate system usability

Outline Syllabus

- Foundations of human-computer interaction
- Human-centered software development
- Human-centered software evaluation
- Graphical user-interface design
- HCI aspects of collaboration and communication

Module Code	IT 3604	Title	Digital Image Processing			Elective (GPA)
Credits	2.5	Hours / Week	Lectures	2	Pre-requisites	IT 1103, IT 1701 / IT1703, IT 1702/ IT 1704, IT 2703, IT 2602
			Lab / Tutorials	3/2	Co-requisites	IT 3704

Learning Objectives

To develop knowledge and skills in the theory and mathematical techniques of image processing, transformations and compression

Outline Syllabus

- Digital Image Representation
- Image Enhancement
- Image Analysis
- Image Transformations
- Image Processing in Frequency domain
- Wavelets and Multiresolution Processing
- Image Compression
- Morphological Image processing

Module Code	IT 3704	Title	Statistics and Probability			Elective (GPA)
Credits	2.5	Hours / Week	Lectures	2	Pre-requisites	IT 2703
			Lab / Tutorials	3/2		

Learning Objectives

On successful completion of the module students will be able to use concepts in Statistics and Probability to solve real world problems through the use of Statistical software packages.

Outline Syllabus

- Introduction to Business Statistics
- Descriptive Statistics
- Probability
- Discrete Random Variables
- Continuous Random Variables
- Sampling Distributions
- Statistical Inference
- Experimental Design and Analysis
- Chi-Square test
- Process Improvement

Module Code	IT 3707	Title	Operational Research			Elective (GPA)
Credits	3	Hours / Week	Lectures	2	Pre-requisites	IT 3704
			Lab / Tutorials	3		

Learning Objectives

On successful completion of the module students will be able to demonstrate the application of Linear programming and Queuing theory for real world applications.

Outline Syllabus

- Overview to the Operational Research Modeling Approach
- Introduction to Linear Programming
- Simplex Method
- Duality Theory and Sensitivity Analysis
- Network Optimization Models
- Queuing Theory

Module Code	IT 3802	Title	Advanced Data Management Systems			Elective (GPA)
Credits	2.5	Hours / Week	Lectures	2	Pre-requisites	IT 2802
			Lab / Tutorials	3/2		

Learning Objectives

To provide students with theoretical and practical understanding of the advanced concepts of design and implementation of databases

Outline Syllabus

- Transaction Processing Concepts
- Concurrency Control Techniques
- Practical Database Design and Tuning
- Database Recovery Techniques
- Object-Oriented Databases
- Emerging Database Technologies and Applications
- Distributed Databases and Client-Server Architecture
- Deductive Databases
- Database Security and Authorization
- Enhanced Data Models for Advanced Applications

Module Code	IT 3803	Title	e-Business Technologies			Elective (GPA)
Credits	3	Hours / Week	Lectures	2	Pre-requisites	
			Lab / Tutorials	3		

Learning Objectives

To provide knowledge in models, ethics, laws, marketing and security issues of e-Business

Outline Syllabus

- e-Commerce
- e-Business strategies and models
- Create a draft e-Business start-up strategy and present it in a professional and concise manner.
- Business and Marketing tools for e-Business
- e-Marketing and e-Ethics
- Security
- e-Business law
- Case studies

Module Code	IT 3902	Title	Independent Study			Compulsory (GPA)
Credits	2	Hours / Week	Lectures		Pre-requisites	
			Lab / Tutorials	6		

Learning Objectives

To provide an opportunity for students to study and present summarised information in an area related to ICT

Outline Syllabus

Depends on the research proposal

Module Code	IT 3903	Title	Bio Informatics I			Elective (GPA)
Credits	3	Hours / Week	Lectures	2	Co-requisites	IT 3704, IT 3604
			Lab / Tutorials	3		

Learning Objectives

To introduce students to the concepts of bio informatics and the role of Information Technology in bio informatics

Outline Syllabus

- Introduction to Bio-Informatics
- Patient Centred Information Systems
- Essential Concepts in Health Informatics
- Introduction to computational Biology
- Genomes and Protein Bio Informatics
- Telemedicine
- Clinical Decision Support
- Medical Imaging
- Medical Imaging Processing

Module Code	IT 3999	Title	Project			Compulsory (GPA)
Credits	6	Hours / Week	Lectures	-	Pre-requisites	
			Lab / Tutorials	18		

Learning Objectives

To provide an opportunity to apply the knowledge and skills gained to design and implement a non-trivial system in a team environment

Outline Syllabus

Students will design and implement a non-trivial system. They will work as a team developing team work and leadership skills. They will produce a dissertation for the project and will make a presentation to a panel. The dissertation and the presentation will be evaluated. Each member will be interviewed and evaluated separately on his/her contribution to the project.