College of Information Technology

MSc in Information Technology

Program Plan - 2014

Semester I

Code	Course Title	Cr.	Prerequisite
IT601	Computer Networks	3	
IT602	Advanced Database Management Systems	3	
IT603	Research Methodology and Professional Issues	3	
	Total Semester Credits	**9**	

Semester II

Code	Course Title	Cr.	Prerequisite
IT604	Mobile and Distributed Computing	3	
IT605	Advanced Software Engineering	3	
IT6XX	Elective I	3	
	Total Semester Credits	**9**	

Semester III

Code	Course Title	Cr.	Prerequisite
IT606	Information Security	3	
IT607	Strategic IT Planning and Governance	3	
IT6XX	Elective II	3	
	Total Semester Credits	**9**	

Semester IV

Code	Course Title	Cr.	Prerequisite
IT699	MSc Thesis	6	Pass 27 credits hours of courses with a CGPA 3.0 or above and others as specified in Graduate Studies Rules
	Total Semester Credits	**6**	

TOTAL CREDITS **33**

List of Elective Courses

Code	Course Title	Cr.	Prerequisite
IT620	Information System Management	3	
IT621	Web and Mobile Application Development	3	
IT622	Enterprise Systems Architecture	3	
IT623	Human Computer Interaction	3	
IT624	Cloud Computing	3	
IT625	e-Business	3	
IT626	Data Mining	3	
IT627	Intelligent Business Systems	3	
IT628	IT Project Management	3	
IT629	Advanced Operating Systems	3	
IT630	Computer Architecture	3	
IT631	Theory and Applications of Metaheuristics	3	
IT632	Advanced Algorithms	3	
IT633	Advanced Digital System Design	3	
IT634	Embedded Systems	3	
IT640	Selected Topics in IT*	3	

Course Description

IT601: Computer Networks

The course covers design and analysis of computer communication networks. Topics include application layer protocols, Internet protocols, transport layer services and protocols, network interfaces, local and wide area networks, wireless networks, bridging and routing, multimedia networks, security, network management and current topics of research and development in computer networks.

IT602: Advanced Database Management Systems

The course provides an in-depth understanding of the theory and practice of database systems. Topics include relational data model, relational algebra and calculus, conceptual database design,

physical database design, query processing and optimization, transactions processing and concurrency, object-relational and object-oriented databases, data warehousing and OLAP, recent trends and research in database systems, use of current DBMS and data modeling software.

IT603: Research Methodology and Professional Issues

The course provides in-depth understanding of research methodology and professional issues. Topics include research methodology, research types, scientific publishing, professional societies in the discipline and their role, legal IT issues and IT regulations, code of ethics and plagiarism, writing scientific proposal, writing research papers, writing master level thesis and presenting a project/paper to audience. Students will conduct research and report their research findings in a research paper. Weakly seminars by the students.

IT604: Mobile and Distributed Computing

This course provides students with a comprehensive knowledge of mobile and distributed computing. Topics include concepts of pervasive computing, mobile and distributed computing architecture, mobile hardware technology, characteristics, location-based services, context-aware computing, service discovery, client/server and distributed computing environment, remote procedure calls, message passing and synchronization, lightweight distributed objects, mobile and distributed application development and recent developments in mobile and distributed computing research.

IT605: Advanced Software Engineering

The course provides students with in-depth knowledge of theory and practice of software engineering. Topics include traditional and agile software processes, software requirements engineering, software design strategies, architecture tradeoff analysis, formal methods, software reuse, testing, verification and validation, client-server and web-based software engineering, COTS architecture, software integration, service oriented architecture, software quality assurance, ISO, CMMI and other models, process improvement, CASE tools, and recent research in software engineering.

IT606: Information Security

The course provides students with in-depth knowledge and techniques required to deal with information security problems. The main topics include notions of confidentiality, integrity, availability, authentication models, protection models, security kernels, secure programming, audit, intrusion detection and response, operational security issues, physical security issues, personnel security, policy formation and enforcement, access controls, information flow, legal and social issues, identification and authentication in local and distributed systems, classification and trust modeling, risk assessment and management, recent trends in information security.

IT607: Strategic IT Planning and Governance

The course focuses on the strategic use and management of Information Technology (IT) from a business perspective at the enterprise level. The course will provide students with essential knowledge concerning strategic management of information systems in addition to skills and capacity to critically analyze IS management issues. The course covers business fundamentals and a strategic framework for aligning organizational strategy, core competencies, and information systems. In addition, it will cover IT strategic management, including IT strategic vision and governance model, gap analysis, enterprise architecture and IT economy, accountability framework, financial analysis, risk management and legal compliance issues.

IT620: Information Systems Management

The course examines the management of information systems and information technology in the organization. Topics includes role and impact of IS/IT in the organizational context, development of IS/IT strategies, implemented and alignment of organizational objectives, justification of IS/IT. The course uses case studies and real world examples to examine the theoretical and practical aspects of IS/IT management in an organization.

IT621: Web and Mobile Application Development

The course examines the systematic and disciplined development of web-based and mobile-based software systems. Topics include advances in the Internet, World Wide Web and mobile technologies, research on the design, implementation and management of web-based and mobile based information systems, web and mobile application development platforms and tools. Students are expected to work in teams on projects involving development of mobile and web applications.

IT622: Enterprise Systems Architecture

The course covers theory, frameworks, principles and best practices of enterprise architecture. Topics include architecture analysis, business/system understanding, business/system planning, restructuring, system integration, system evolution, governance in the context of business requirements, significance of stakeholders, skills of an enterprise architect, enterprise IT architecting methodology, different modeling tools used for modeling enterprise IT architectures, case studies.

IT623: Human Computer Interaction

The course provides in-depth coverage of theory and practice of HCI. Topics include HCI concepts, human information processing, user interface design principles, information presentation, visual, auditory and tactile displays, speech communication, data entry, controls, tools and feedback, human factors in computer programming, workspace design, environmental & legal considerations, and current research in HCI.

IT624: Cloud Computing

The course provides in-depth coverage of cloud computing as the platform for the development and delivery of computing technologies. Topics include: cloud computing concepts, cloud computing architecture, Infrastructure as a Service, Platform-as-a-Service, Software as a Service, cloud computing access and implementation, cloud computing with MapReduce, MapReduce framework, application development using MapReduce on Cloud, examining private cloud solution, creating a Hyper-V private cloud, building a virtual network, customizing storage allocation, monitoring and reporting on private cloud resource utilization and current research in cloud computing.

IT625: e-Business

The course focuses on the information technology applications to manage inter-organizational business processes and the associated complexities and issues. Topics include: concepts of Electronic Commerce (EC), forms of e-Marketplaces, key business processes involved in the exchange of goods and services between trading partners, transaction sharing systems, inventory and replenishment systems, Collaborative Planning and Forecasting systems, standardization of product and shipment numbering including automatic identification of products, data synchronization, role of EC technologies in Just-In-Time replenishment, Vendor Managed Inventory, Electronic Funds Transfer.

IT626: Data Mining

The course introduces data mining from a theoretical and practical point of view. The topics include: data mining & machine learning, data preparation, knowledge representation, data mining algorithms, evaluation, applications, data stream learning, text mining, web mining, decision trees, classification rules, association rules, extending linear models, Bayesian networks, clustering, semi-supervised learning, data mining ethics, applications of data mining in social network analysis and big data, current research in data mining.

IT627: Intelligent Business Systems

The course provides students with in-depth coverage of theories and practices of intelligent business systems. Topics include intelligent systems, expert systems, development and their tools, neural networks, fuzzy logic, hybrid systems, genetic algorithms, classifier systems and genetic programming, neuroevolution, intelligent tutoring systems, intelligent agents.

IT628: IT Project Management

The course provides students with essential knowledge and skills of good project management and project management software. Topics include Topics include identifying project stakeholders and defining roles and responsibilities of the team, defining scope, devising risks and quality plans, mapping-out a schedule, determining a budget and defining a communication strategy, initiating, planning, controlling, executing, monitoring and closing projects, human resource management, evaluating project in post implementation reviews.

IT629: Advanced Operating Systems

The course covers fundamental and advanced topics in operating systems. Topics include structural design aspects of an operating system, process model, inter-process communication, synchronization mechanisms, resource management, scheduling, protection issues, deadlock detection, recovery, and avoidance, distributed operating systems, operating systems for mobile devices, implementation issues of modern operating systems. Case studies.

IT630: Computer Architecture

This course covers topics essential to modern superscalar processor design. A review of pipelined processor design and hierarchical memory design is followed by advanced topics including the identification of parallelism in processes; multiple diversified functional units in a pipelined processor; static, dynamic, and hybrid branch prediction techniques; the Tomasulo algorithm for efficient resolution of true data dependencies; advanced data flow techniques with and without speculative execution; multiprocessor systems; and multithreaded processors.

IT31: Theory and Applications of Metaheuristics

The course introduces students to the theory of metaheuristics and some common applications. Topics include Heuristics and Metahueristics, Optimization, Single-objective vs. Multi-objective optimization, Multi-objective optimization methods, Genetic algorithms, Simulated Evolution, Stochastic Evolution, Simulated Annealing, Tabu search, Ant colony optimization, Particle Swarm optimization, Honeybee colony optimization, Extremal optimization, other algorithms, Hybridization and parallelization.

IT632: Advanced Algorithms

Review of algorithmic concepts, basic design techniques: divide and conquer, greedy, backtracking, dynamic programming, heuristics, parallel algorithms, analysis of algorithms, NP-hard and NP-complete problems, approximation algorithms for NP- complete problems, probabilistic analysis of algorithms and randomized algorithms.

IT633: Advanced Digital System Design

An overview of digital design concepts; structured design techniques of large digital systems with standard SSI, MSI, and LSI. Design methodologies for complex digital systems including the use of high-level design and tools for rapid prototyping; use of hardware description languages and tools for the digital design of a complex system; use of FPGA for hardware implementation of a complex designs; computer arithmetic in digital systems. Use of automated testing techniques; test coverage and economics of testing; enhancing testability; structured design techniques, reconfigurable design of a complex system. Modeling for synthesis; rapid prototyping, Hardware/Software co-design.

IT634: Embedded Systems

This course focus on analysis, design and implementation of embedded systems. Topics include embedded architecture, memory architecture, I/O (analog & digital), embedded software design & development, microcontrollers, embedded system programming, embedded communication & networking, sensors, actuators, case studies.

IT640: Selected Topics in IT

This course will cover new and advanced areas in Information Technology. The course description will be approved by the college council.

IT699: M.Sc. Thesis 6 Cr. Pre-req.: as indicated in course plan

The student has to undertake and complete a research topic under the supervision of a faculty member in order to probe in depth a specific problem in Information Technology.