Master of Science in Computing Information Systems
Program code: 183020

INTRODUCTION

The Department of Information Science offers a graduate program that leads to the degree of Master of Science in **Computing Information Systems (MSCIS)**. The program features a thesis and non-thesis option. The program allows students to select a group of courses that constitute a career-track. The program offers four career tracks: Information Systems Security, Information Systems Development, Data and knowledge Management, and Health Informatics. Each career track includes a core course and a set of track elective courses. The program is designed to allow its candidates acquire the knowledge, advanced skills, systems development methodologies, and technologies needed to design, manage, evaluate and implement Information Systems (ISs), applications and services within enterprises and organizations.

According to the University Council decision dated 4/2/2007, Thesis students admitted with effect from September 2007 are exempted from the comprehensive examination.

PROGRAM REQUIREMENT (Non-thesis option in parenthesis):

35 (35) TOTAL COURSE CREDITS

20 (20) GENERAL CORE COURSES

1831-506	Advance Database Management Systems	(3)
1831-509	IT Project and Change Management	(3)
1831-511	Information Systems Infrastructures	(3)
1831-512	Information Systems Analysis, Modeling and Design	(3)
1831-515	Enterprise Architectures and Models	(3)
2000-501	Scientific Writing and Communication Skills	(3)
2000-503	Ethics and Professionalism	(2)

6 (12) Track Courses

Student selects courses exclusively from one of the following four tracks as listed below.

<u>TRACK 1</u>: Information Systems Security

3 (3) COMPULSORY COURSES

1831-505	Information Systems Security	(3)

3 (9) **ELECTIVE COURSES (3 credits each)**

A student (in the project option only) who is specialized in one of the following tracks is allowed to take one elective course from the other tracks with the condition that he/she gets the approval of the Program Director.

1831-535 Special Topics in Computing Information Systems
1831-541 Computer and Network Forensics
1831-542 Web Application Security
1831-544 Information Security Strategies and Risk Management
1831-546 Selected Topics in Information Systems
1831-547 IT Contingency Planning and Management
1831-577 Introduction to Machine Learning

TRACK 2: Information Systems Development

3 (3) COMPULSORY COURSES

1831-560 Advances in Information Systems Architecture and Design (3)

3 (9) **ELECTIVE COURSES (3 credits each)**

A student (in the project option only) who is specialized in one of the following tracks is allowed to take one elective course from the other tracks with the condition that he/she gets the approval of the Program Director.

1831-505 Information Systems Security
1831-535 Special Topics in Computing Information Systems
1831-563 Information System Testing, Quality Assurance, and Maintenance
1831-564 Design and Implementation of e-Commerce
1831-565 Selected Topics in Information Systems Development I
1831-567 Human Computer Interaction
1831-568 Design and Implementation of E-Government

TRACK 3: Data and Knowledge Management

3 (3) COMPULSORY COURSES

1831-571 Data Mining and Information Retrieval (3)

3 (9) **ELECTIVE COURSES (3 credits each)**

A student (in the project option only) who is specialized in one of the following tracks is allowed to take one elective course from the other tracks with the condition that he/she gets the approval of the Program Director.

1831-505 Information Systems Security
1831-535 Special Topics in Computing Information Systems
1831-572 Data Warehousing and Enterprise Databases
1831-573 Knowledge Management and Decision Support
1831-575 Selected Topics in Data and Knowledge Management I
1831-577 Machine Learning
1831-579 Data Analytics and Visualization

TRACK 4: Health Informatics

3 (3) COMPULSORY COURSES

1831-580 Health Informatics

3 (9) **ELECTIVE COURSES (3 credits each)**

A student (in the project option only) who is specialized in one of the following tracks is allowed to take one elective course from the other tracks with the condition that he/she gets the approval of the Program Director.

1831-505 Information Systems Security
1831-535 Special Topics in Computing Information Systems
1831-573 Knowledge Management and Decision Support
1831-581 Advanced Health Informatics
1831-585 Selected Topics in Health Informatics I
1831-587 Population and Public Health Informatics
1831-589 Consumer Health Informatics

9 (3) COMPOLSORY COURSES

1831-593 Project (3) (non-thesis option only)
1831-597 Thesis (0)
1831-598 Thesis (0)
2000-599 Thesis (9)

COURSE DESCRIPTION

1831-505: INFORMATION SYSTEMS SECURITY
CR: 3 PR: 1831-511

This course provides an overview of the fundamental concepts of information security. The course covers the principles of confidentiality, integrity, and availability and explores the mechanisms used to secure data and systems. Topics include privacy, risk management, threat modeling, access control, authentication, encryption, and network security. Security standards and frameworks will also be discussed. Ethical and legal issues related to information security will be exposed.

1831-506: ADVANCE DATABASE MANAGEMENT SYSTEMS
CR: 3 PR: 1831-512

The objective of this course is to help students develop their date organization and management skills by introducing them to the fundamentals of data collections, retrieval, storage, and processing. Topics covered include: data organization and management techniques, conceptual data modeling, organizational data implementation issues, data warehousing current and emerging techniques, business intelligence, organization data/information security, data stream management, data management tools, customer relationship management, business performance management, and decision making.

1831-509: IT PROJECT AND CHANGE MANAGEMENT
CR: 3 PR: 1831-512

This course emphasizes managing projects within an organizational context. Topics include the processes related to initiating, planning, executing, controlling, reporting, and closing a project, project integration, scope, time, cost, quality control, and risk management, software size and cost estimation, assigning work to programmer and other team members, monitoring progress, version

control, managing the organizational change process, identifying project champions, working with user teams, training, and documentation. Covered also are the change management role of the IS specialist, the use of sourcing and external procurement, contracts and managing partner relationships.

1831-511: INFORMATION SYSTEMS INFRASTRUCTURE
CR: 3

This course addresses the advanced concepts and practice of acquiring and setting the main building blocks of information systems (ISs) infrastructure for enterprise applications. Topics covered include ISs architecture and classifications, enterprise information infrastructure, enterprise network design & architecture, server architecture, web services, enterprise LAN/WAN services, storage identification and management, wireless technologies, network security, systems platform, and resource management.

1831-512: INFORMATION SYSTEMS ANALYSIS, MODELING AND DESIGN
CR: 3

This course emphasizes modern object-oriented methods for information system analysis and design. Topics covered include: Systems development life cycle, analysis and design techniques, information systems planning and project identification & selection, requirements collection and structuring, process modeling, conceptual and logical data modeling, system design, design of human-computer interface, and system maintenance. The course also exposes students to the use of current generation tools such as rapid application development, prototyping, and visual development. Students are required to complete a term project.

1831-515: ENTERPRISE ARCHITECTURES AND MODELS
CR: 3

This course provides an overview of Enterprise Architecture (EA) and models and their role in the design, implementation, and management of modern organizations. Students will learn the principles and practices of EA and its various components, including business, data, application, and technology architectures. They will also learn about different modeling techniques and tools used in EA and how to apply them in practice. The course will cover topics such as EA frameworks, standards, and best practices, as well as EA governance, strategy, and planning. Through laboratory work, students will practice some ERP tools and develop the necessary skills to analyze, design and manage enterprise-level architectures and models using the tools.

1831-535: SPECIAL TOPICS IN COMPUTING INFORMATION SYSTEMS
CR: 3 PR:1831-512

A set of most-up-to-date topics related to the field of information systems will be studied in the course.

1831-541 COMPUTER AND NETWORK FORENSICS
CR: 3 PR: 1831-505

This course covers cyber-attack prevention, planning, detection, response, and investigation with the goals of counteracting cybercrimes, and making the responsible persons/groups accountable. Topics covered include: fundamentals of digital forensics, forensic duplication and analysis, network surveillance, intrusion detection and response, incident response, anti-forensics techniques, anonymity and pseudonymity, cyber law, computer security policies and guidelines, and case studies.

1831-542 WEB APPLICATION SECURITY
CR: 3 PR: 1831-505

The course provides students with better understanding of web application vulnerabilities, specifically covering OWASP Top 10 and mitigation strategies to ensure applications are tested and secured against the latest threats. Focus will be on practical experience using vulnerability scanners and web proxy tools to detect and prevent input validation flaws. Cross-Site Scripting (XSS), Cross-Site Request Forgery (CSRF), SQL Injection, as well as in-depth understanding of authentication, access control, and session management, their weaknesses, how they can be hijacked, and how they are best defended.

1831-544 INFORMATION SECURITY STRATEGIES AND RISK MANAGEMENT
CR: 3 PR: 1831-505

This course provides an in-depth overview of Business Impact Analysis (BIA) and Risk Management and their role in managing an organization's operations and minimizing disruptions. The course will introduce students to the key concepts, principles, and methodologies of BIA and Risk Management strategies, including the

identification of critical business processes, assets, and functions, as well as potential risks and threats. Through hands-on exercises and case studies, students will learn how to conduct a BIA, develop risk management strategies, and implement risk mitigation plans to protect critical areas of an organization. Additionally, students will learn about best practices and industry standards for BIA and Risk Management, and how to integrate these practices into an organization's overall business continuity plan.

1831-546: SPECIAL TOPICS IN INFORMATION SYSTEMS SECURITY II
CR: 3 PR: 1831-505

A set of most-up-to-date topics related to the field of Information Systems Security will be studied in this course.

1831-547 IT CONTINGENCY PLANNING AND MANAGEMENT
CR: 3 PR: 1831-505

This course provides a comprehensive study of contingency planning and management. The course covers various types of risks, including natural disasters, technological failures, and security breaches, and explore best practices for developing and implementing contingency plans. The course helps students formulate different contingency management plans including incident management, crisis management, disaster recovery and business continuity management plans, and test and implement the plans in the form of a project.

1831-560: ADVANCES IN INFORMATION SYSTEMS ARCHITECTURE AND DESIGN
CR: 3 PR: 1831-512

This course provides a working knowledge of the terms, principles and methods of information system architecture and module design. It explains the constraints on the design and the properties of capacity, response time, consistency, and concurrency. Topics include: architectural styles and patterns, interface isolation, decoupling, reuse, data structures, design simplification and refactoring, generalized design solutions for information system design problems, and the reuse of design patterns.

1831-563: INFORMATION SYSTEM TESTING, QUALITY ASSURANCE, AND MAINTENANCE
CR: 3 PR: 1831-560

This course covers the concepts and techniques for testing an information system and assuring its quality. Topics include software testing at all levels, integration testing, techniques of test data selection, test oracle design, test data analysis, static vs. dynamic analysis, functional testing, inspections, software quality assessment, software maintenance, configuration management, and capacity management.

1831-564: DESIGN AND IMPLEMENTATION OF E-COMMERCE
CR: 3 PR: 1831-560

This course starts by introducing the concepts of e-commerce including nature and scope of e-commerce, success & failure of e-commerce operations and identifying key factors in their success or failure, promotional strategies, monitoring and adjusting e-commerce strategies. The course continues with e-commerce tools, e-commerce design, and e-commerce development. The course helps students to build fully functional web sites using database and client- and server-side technologies.

1831-565: SPECIAL TOPICS IN INFORMATION SYSTEMS DEVELOPMENT I
CR: 3 PR: 1831-560

A set of most-up-to-date topics related to the field of information systems development will be studied in this course.

1831-567: HUMAN COMPUTER INTERACTION (HCI)
CR: 3 PR: 1831-560

This course covers the topics of human characteristics and their impacts on developing human-centered information systems, fit between human, technology, and tasks to achieve high performance and satisfaction within organizational and business context, HCI development processes that concerns the entire lifecycle of the information system, HCI evaluation concerns, techniques, issues, and standards. Covered also in the course are the organizational and business context of HCI, interactive technologies, ergonomic engineering, cognitive engineering, affective engineering, Evaluation issues, concerns, techniques and standards, HCI design principles and guidelines, tasks in organizational context, componential design, HCI development methodology and its

relation to systems analysis and design, impacts of HCI on users, organizations, and society, and business value of HCI.

1831-568: DESIGN AND IMPLEMENTATION OF E-GOVERNMENT
CR: 3 PR: 1831-512

This course addresses the design and implementation aspects of e-Governance. Students will be exposed to concepts and models of e-Government including stakeholders and their rights. Topics includ e-Government infrastructure, m-Government, v-Govemment, public administration & public policy, analysis of standards of e-Governance, transparency and Information Act. Management of e-Governmental database including security issues, integration of distributed systems including heterogeneous databases of different departments and regions are also discussed in the course.

1831-571: DATA MINING AND INFORMATION RETRIEVAL
CR: 3 PR: 1831-506

This course explores web mining as the discovery of knowledge from online resources such as web page content, a hyperlink structure, and a usage log, to mention a few. Using the already learned knowledge in the Data Management course, this course allows students to use web mining techniques to broaden their selection of data sources. In addition, students will learn various online and offline information retrieval models, algorithms, principles, and techniques on data sources such as text.

1831-572: DATA WAREHOUSE AND ENTERPRISE DATABASES
CR: 3 PR: 1831-506

The purpose of this course is to provide a comprehensive in-depth coverage on managing enterprise databases. The main part of this course covers concepts and techniques in the design, implementation, and administration of a data warehouse. Topics covered include: data warehouse architectures, logical and physical design issues, technical factors, and implementation considerations. The course also introduces Online Analytical Processing (OLAP) and multi-dimensional operations. The course also addresses database access standards for enterprise database systems. Special data warehousing concepts for CRM and web-based enterprise databases are also addressed.

1831-573: KNOWLEDGE MANAGEMENT AND DECISION SUPPORT
CR: 3 PR: 1831-506

This course covers knowledge management (KM) in large organizations doing business and/or providing services over the web. The course addresses issues that are involved in creating, organizing, and using knowledge in web applications. The topics include KM life cycle model, ontology modeling, role of standards, resource description framework (RDF), and business rules and automated reasoning mechanisms. The course also covers applications in decision support systems, expert systems, and recommendation systems.

1831-575: SELECTED TOPICS IN DATA AND KNOWLEDGE MANAGEMENT I
CR: 3 PR: 1831-506

A set of most-up-to-date topics related to the field of Data and Knowledge Management will be studied in this course.

1831-577: INTRODUCTION TO MACHINE LEARNING
CR: 3 PR: 1831-512

This course aims to provide students with a comprehensive understanding of Machine Learning in Artificial Intelligence. Throughout the course, students will acquire the skills necessary to construct predictive models using data. The curriculum delves into various types of data and their respective preprocessing techniques, as well as supervised and unsupervised learning algorithms, model selection, evaluation, and deployment. The course covers both traditional Machine Learning methods such as Logistic Regression, Support Vector Machines, and Random Forest, as well as advanced deep learning techniques like Artificial Neural Networks (ANNs), Convolutional Neural Networks (CNNs), and Transformers. Furthermore, students will have ample opportunity to apply these methods to solve complex problems in domains such as tabular data, image recognition, and text prediction, gaining valuable hands-on experience in the process.

1831-579: DATA ANALYTICS AND VISUALIZATION
CR: 3 PR: 1831-506

This course introduces students to the principles of data analytics and visualization. Students will learn

how to extract, clean, and transform data, as well as how to apply data analytics techniques and visualization methods to understand, analyze and interpret the data. The course covers a variety of topics, including data exploration, data preprocessing, data mining, machine learning algorithms, and data visualization tools. The course provides applications from several environments with both real and simulated datasets. Ethical issues related to privacy and fairness in data analytics are also discussed.

1831-580 HEALTH INFORMATICS
CR: 3 PR: 1831-515

Consistent with the interdisciplinary nature of Health Informatics, the course is designed to study people and organizational aspects of health information systems as well as technology and public policy. The course will be focused on exploring the health informatics area including definitions, theory, technologies, and practices. The course will touch upon how people, organizations, healthcare and the use of information technology and systems are coming together to create this recent field and its impact on our drastically changing healthcare system. Some of the topics covered in this course include electronic health records, practice management, health information exchange, data standards, consumer health informatics and mobile health.

1831-581: ADVANCED HEALTH INFORMATICS
CR: 3 PR: 1831-580

This course explores the latest advances in health informatics and the electronic applications in healthcare delivery and management. The course explores the recent impact of IT on the healthcare domain in improving the health related complex decisions, efficient and accurate diagnostics procedure, effective healthcare delivery, and rehabilitation. The topics covered include IT applications in surgical decisions, genetics explorations, cancer detection, medical imaging, and ultrasound.

1831-585: SELECTED TOPICS IN HEALTH INFORMATICS I
CR: 3 PR: 1831-580

A set of most-up-to-date topics related to the field of Health Informatics will be studied in this course.

1831-589: CONSUMER HEALTH INFORMATICS
CR: 3 PR: 1831-580

This course will familiarize students with the field of Consumer Health Informatics (CHI), which gives health care consumers information and tools to facilitate their engagement. Students will become familiar with, and evaluate, a range of CHI applications. They will also assess the needs and technological practices of potential users, generate theory-informed design and implementation strategies, and select appropriate evaluation approaches.

1831-593: PROJECT
CR: 3

The student undertakes an independent project on a research topic of theoretical and/or experimental focus under the supervision of a faculty member listed in the supervisory list of the College of Graduate Studies. The objective is to provide the student with an opportunity to integrate and apply the knowledge gained throughout the course of study in a practical problem. The student must document the project in a scientific report following standard research writing guidelines and give a public presentation to the project examination committee.

1831-597: THESIS
CR: 0

1831-598: THESIS
CR: 0

2000-599: THESIS
CR: 9