



Master's Program in Information Systems

*The Department of Information Systems
College of Computer and Information Sciences
King Saud University*

Academic Year 2016-2017
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1 – INTRODUCTION

The college of Computer and Information Sciences (CCIS) was created under the issued Royal Order No. 7/1558/m in the year 1404 H. The Department of Information Systems was one of main departments of the CCIS. Thus, the Information Systems Department has been serving students for more than twenty five years, during which a large proportion of Saudis cadres and leaders of information technology in the Kingdom of Saudi Arabia were graduated to meet the growing needs in the information technology sector. Fast and continuous developments and changes in information technology disciplines require a review of this program every few years to cope with rapid changes.

The department of Information Systems contributes strongly in many research activities of the CCIS. Its members participate on a regular basis in scientific seminars and conferences held within and outside of the Kingdom in addition to publishing in many journals and edited books. The research areas of the department include: e-business, database, enterprise resource planning(ERP) systems, decision support systems (DSS), geographic information systems (GIS), knowledge based systems, data warehouses, data mining, and information technology project management. Members of the department have published more than 300 papers and articles, a good number of them are ISI indexed.

2– NAME OF THE PROGRAM

Master of Science in Information Systems.

3– OBJECTIVES

- a. Deliver a solid curriculum in information Systems, which conforms to guidelines laid down by the Deanship of Graduate Studies at King Saud University.
- b. Prepare qualified students for further higher education opportunities.
- c. Prepare students to conduct applied research that has direct impact on the concerns of the local community.
- d. Supply local industries and educational systems with a qualified IT workforce.
- e. Providing varieties of topics to students so that they can pick and choose from the various elective topics and emphasis areas that best fit their future career endeavors.

4- ADMISSION REQUIREMENTS

- a. Applicants to the master program in Information Systems should comply with the rules and regulations of graduate studies in Saudi Universities.
- b. Bachelor degree of applicants must be from a computing background.
- c. A minimum of a very good GPA in the BS program is a must.
- d. Applicants must have A TOEFL (or equivalent exam) score of 450 at least.
- e. A GRE score of 144 at least in the quantitative section of the exam or 70 in "القدرات العامة للجامعيين" quantitative section.

5- REQUIREMENTS FOR FULFILLING THE DEGREE

There are two options that an applicant can choose from: Thesis option and Non-Thesis option

- a. To fulfill the Thesis Option degree the student must:
 1. Complete 26 credit hours:
 - i. 21 required credits.
 - ii. 3 elective credits.
 - iii. Complete 1 credit hour for research proposal preparation and 1 credit hour for thesis
- b. To fulfill the Non-Thesis Option degree the student must:
 2. Complete 42 credit hours:
 - i. 33 required credits.
 - ii. 9 elective credits.

6- GENERAL STRUCTURE OF THE PROGRAM

The general structure of the thesis track program is:

Course Code	Course Name	Credits
a. Core courses		
IS 522	Enterprise Applications Development	3
IS 524	Advanced Information Systems Analysis & Design	3
IS 533	Advanced Topics in Databases	3
IS 536	Information Security Governance	3
IS 537	Artificial Intelligence and Knowledge-based Systems	3
IS 541	Data mining and Knowledge Discovery	3
IS 550	Information and Requirements Engineering	3
b. Elective course		
	Elective Course 1	3
c. Master Thesis		
IS 596	Research Proposal Preparation	
IS 600	Thesis	
Total Number of Credits Thesis Option		24

The general structure of the non-thesis track program is:

Course Code	Course Name	Credits
a. Core courses		
IS 522	Enterprise Applications Development	3
IS 524	Advanced Information Systems Analysis & Design	3
IS 532	Advanced Enterprise Resource Planning	3
IS 533	Advanced Topics in Databases	3
IS 536	Information Security Governance	3
IS 537	Artificial Intelligence and Knowledge-based Systems	3
IS 541	Data mining and Knowledge Discovery	3
IS 542	Business Process Management Systems	3
IS 550	Information and Requirements Engineering	3
IS 595	Research Project (1)	3
IS 597	Research Project (2)	3
b. Elective courses for non-thesis option only		
	Elective Course 1	3
	Elective Course 2	3
	Elective Course 3	3
Total Number of Credits Non-Thesis Option		42

7- STUDY PLAN

The study plan of the thesis track program is:

First Semester

Course Code	Course Name	Credits
IS 522	Enterprise Applications Development	3
IS 533	Advanced Topics in Databases	3
IS 537	Artificial Intelligence & Knowledge-based Systems	3
IS 550	Information and Requirements Engineering	3
SUM		12

Second Semester

Course Code	Course Name	Credits
IS 524	Advanced Information Systems Analysis & Design	3
IS 536	Information Security Governance	3
IS 541	Data mining and Knowledge Discovery	3
	Elective Course 1	3
SUM		12

Third Semester

Course Code	Course Name	Credits
IS 596	Research Proposal Preparation	1
SUM		1

Fourth Semester

Course Code	Course Name	Credits
IS 600	Thesis	1
SUM		1

The study plan of the non-thesis track program is:

First Semester

Course Code	Course Name	Credits
IS 522	Enterprise Applications Development	3
IS 533	Advanced Topics in Databases	3
IS 537	Artificial Intelligence & Knowledge-based Systems	3
IS 550	Information and Requirements Engineering	3
SUM		12

Second Semester

Course Code	Course Name	Credits
IS 524	Advanced Information Systems Analysis & Design	3
IS 536	Information Security Governance	3
IS 541	Data mining and Knowledge Discovery	3
	Elective Course 1	3
SUM		12

Third Semester

Course Code	Course Name	Credits
IS 532	Advanced Enterprise Resource Planning	3
	Elective Course 2	3
IS 595	Research Project (1)	3
SUM		9

Fourth Semester

Course Code	Course Name	Credits
IS 542	Business Process Management Systems	3
	Elective Course 3	3
IS 597	Research Project (2)	3
SUM		9

8– ELECTIVE COURSES

The elective courses of the thesis track program are:

Course Code	Course Name	Credits
IS 526	Knowledge Management Systems	3
IS 531	Document Storage & Retrieval Systems	3
IS 532	Advanced Enterprise Resource Planning	3
IS 534	Information Systems Quality Assurance	3
IS 540	Software Project Management and Quality	3
IS 542	Business Process Management Systems	3
IS 544	Distributed and Mobile-Based Information Systems	3
IS 548	Enterprise Cloud Computing	3
IS 549	Human Computer Interaction	3
IS 551	Health Information Management	3
IS 552	Geographic and Spatial Data Management	3
IS 554	Enterprise Content Management	3
IS 560	Big Data Analytics	3
IS 562	Modeling and Simulation in Decision	3
IS 563	Information Security Management & Audit	3
IS 564	Advanced topics in Data Science	3
IS 565	Advanced Quantitative Methods for Information Systems	3
IS 566	Advanced Topics in Cyberspace and Cybersecurity	3
IS 567	Secure Software Development	3
IS 591	Selected topics in Information Systems	3
IS 592	Selected topics in Enterprise Information Systems	3
IS 593	Selected topics in E-Commerce	3
IS 594	Selected topics in Information Security	3

The elective courses of the non thesis track program are:

Course Code	Course Name	Credits
IS 526	Knowledge Management Systems	3
IS 531	Document Storage & Retrieval Systems	3
IS 534	Information Systems Quality Assurance	3
IS 540	Software Project Management and Quality	3
IS 544	Distributed and Mobile-Based Information Systems	3
IS 548	Enterprise Cloud Computing	3
IS 549	Human Computer Interaction	3
IS 551	Health Information Management	3
IS 552	Geographic and Spatial Data Management	3
IS 554	Enterprise Content Management	3
IS 560	Big Data Analytics	3
IS 562	Modeling and Simulation in Decision	3
IS 563	Information Security Management & Audit	3
IS 564	Advanced topics in Data Science	3
IS 565	Advanced Quantitative Methods for Information Systems	3
IS 566	Advanced Topics in Cyberspace and Cybersecurity	3
IS 567	Secure Software Development	3
IS 591	Selected topics in Information Systems	3
IS 592	Selected topics in Enterprise Information Systems	3
IS 593	Selected topics in E-Commerce	3
IS 594	Selected topics in Information Security	3

9- COURSES DESCRIPTIONS

IS 522 Enterprise Applications Development 3(3+0)

Key concepts and principles involved in the development of enterprise applications. Essential emerging topics such as the service-oriented architectures and enterprise applications integration. Web services technologies and the role they play today in the development and integration of enterprise application. Key technologies, standards, protocols, and platforms being used in the design and implementation of modern enterprise applications.

IS 524 Advanced Information Systems Analysis & Design 3(3+0)

This course provides advanced concepts and techniques of information systems analysis and design. It provides coverage of advanced Unified Modelling Language (UML) notations used for structural and behavioral modeling. Topics in this course include also: modern information systems methodologies, process of communication, advanced design patterns, trends in systems design and systems architecture including service-oriented architecture, design strategies for large systems and cross-platform design. Other advanced topics are: analysis and design of complex information systems, systems thinking and modeling and Soft Systems Methodology.

IS 526 Knowledge Management Systems 3(3+0)

Knowledge concepts, Types of knowledge, Knowledge life cycle and the ways to identify, create, represent and distribute knowledge in organisations, Ubiquitous Knowledge Management, Knowledge Management in the cloud, Social Network, Tools for KM, Case studies (real-life cases and experiences of implementing KM in organisations)

IS 531 Document Storage and Retrieval Systems 3(3+0)

Information Systems types–An overview: Information Retrieval Systems, DBMS, MIS, Decision Support Systems, Dialog Systems. Fundamentals of Retrieval Systems: Adjacency and term frequency features, Text analysis and automatic indexing, Thesaurus rules and construction, Retrieval evaluation. Document storage technology and techniques. Emerging technology: Hypertext systems, Multimedia and hypermedia systems, Hardware requirements.

IS 532 Advanced Enterprise Ressource Planning 3(3+0)

Enterprise Resource Planning (ERP), organization, business processes, and integration, ERP implementation, Change Management (CM), Customer Relationship management, Supply Chain Management.

IS 533 Advanced Topics in Databases 3(3+0)

Database Systems: Semantic data modeling, Object-oriented databases, Query optimization, Semantic Integrity. Distributed Databases (DDB), Data fragmentation and distributed transparency, Distributed query processing, Concurrency control methods: Serializability in a DDB and the two-phase locking method, Concurrency control based on timestamps, The two-phase COMMIT protocol. Recovery management.

IS 534 Information Systems Quality Assurance 3(3+0)

How quality can be maintained and assured throughout the entire information system's project phases from system's selection and implementation all the way to system's decommissioning. Students will be exposed to the modern methodologies and standards being adopted in the industry, including TQM, COBIT, ITIL, CMMI, etc. Modern project management methodologies and concepts such as project management office, project portfolio management, maturity models, and IT governance will also be covered in this course.

IS 536 Information Security Governance 3(3+0)

Overview of skills, knowledge, techniques, and tools required by information-technology security professionals. Topics include security and risk management, physical security, access control, cryptography, security architecture and design, security for networks and telecommunications, application security, and legal considerations.

IS 537 Artificial Intelligence and Knowledge Based Systems 3(3+0)

Artificial Intelligence (AI) problem-solving concepts, Knowledge-based systems (KBS) defined, KBS domain of applications. Problem formulation and state space search. Knowledge representation: Rules, semantic nets, and frames. Knowledge acquisition techniques. Deduction with formal logic. Rule-based systems. Inexact reasoning. Expert systems (ES) Development. Building a business ES: A case study.

IS 540 Software Project Management and Quality 3(3+0)

Preparing for project: Project financial analysis and risk evaluation, Procurement models, Proposal strategies, technical, management and cost proposal. Project planning. Managing the project design effort and team: Preparing the system design, functional, and program specification; Technical quality assurance, Managing the project's implementation and acceptance phases. Post-completion analysis. Advanced project management techniques. Software quality assurance and control, Software metrics.

IS 541 Data mining and Knowledge Discovery

3(3+0)

This course equips students with the knowledge and skills needed in designing and implementing data mining systems. It covers the broad topics of data mining and warehousing and illustrates the knowledge and value that can be gained out of these technologies. The course focuses on the advanced data mining techniques and algorithms applied in association, classification, clustering. It also discusses modern modeling techniques used in designing data warehousing and OLAP systems. Students will also be exposed to modern data mining software tools and products.

IS 542 Business Process Management Systems

3(3+0)

The main principles and technologies applied in the domain of business process and workflow management systems. It discusses the background, origins, and evolution of business process management systems. It also covers the full lifecycle of business process management systems including modeling and design, and also highlights the key relevant technologies, standards, and frameworks. In particular, it explores the evolving role played today by web services technologies and service-oriented architectures, in the composition, choreography, execution, and management of business processes.

IS 544 Distributed and Mobile-Based Information Systems

3(3+0)

Architectural models for distributed systems, server techniques, remote procedure call and multicast communication, RFID technology, Distributed transactions, concurrency control, reliability and security issues. Mobile Computing Platform, Wireless Network Principles, Wireless LAN and PAN, Cellular and Satellite Networks, Wireless Architectures, Wireless Security, Mobile Computing Strategic Planning, Mobile Computing Management and Support. Mobile Applications (M-Business, M-Government, M-Life, Positional Apps).

IS 548 Enterprise Cloud Computing

3(3+0)

This course will present the state of the art in cloud computing models, techniques, and architectures. Cloud computing has evolved as a very important computing model, which enables information, software, and other shared resources to be

provisioned over the network as services in an on-demand manner. Students will be exposed to the current practices in cloud computing. Topics may include evolution of the cloud, enterprise cloud drivers and adoption trends, typical cloud enterprise workloads, architectural models for cloud computing; cloud computing platforms and services including Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), virtualization, security, privacy, and trust management; resource allocation and quality of service; cloud economics and business models; pricing and risk management; interoperability and internetworking; legal issues; advanced cloud programming paradigms such as Hadoop's MapReduce, concept of modern Big Data analysis on cloud platforms, different cloud computing standards, best practices and other advanced and research topics in cloud computing.

IS 549 Human Computer Interaction	3(3+0)
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Through this course, student will learn new trends in Human Computer Interaction including: Human sensors, Brain Computer Interaction, Models of Interaction, Interface Design, Metrics, Cognitive aspects of Human Computer Interaction.

IS 550 Information and Requirements Engineering	3(3+0)
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Foundations of Information Engineering; Information Planning Components; Requirements Engineering; Meta-modeling and Modeling; Method Engineering; Method Engineering Support.

IS 551 Health Information Management	3(3+0)
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The management activities that health care professionals will perform on information such as the electronic health records and coding. The business and domain of health care that give the opportunity to analyze requirements and data structure before the start of developing the IT application. While Health Informatics mainly deals with the application of technology to health care business, health information management is rather concerned with the management of personal health information in health care organization to deliver a quality health care. records management, terminology, coding, transaction and the business of health care related to medical records management. Types of health care information systems such as hospital management system, labs and imaging systems, treatment, billing and prescribing systems.

IS 552 Geographic and Spatial Data Management	3(3+0)
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Geographic Data manipulation, Representation of spatial objects, Vector model, Network and topological models, raster model, Computational geometry of GIS,

Spatial Access Methods, Terrain modeling, GPS systems, Commercial systems: ArcInfo, ArcView GIS.

IS 554 Enterprise Content Management 3(3+0)

An introduction to enterprise content management, ECM components, document imaging, electronic content capture, indexing and classification. document management (DM), records management (RM), business process management (BPM) and collaboration, XML and meta data, Web Content Management (WCM), Web services, Web content delivery and RSS, WCM trends.

IS 560 Big Data Analytics 3(3+0)

Through this course, students will gain advanced knowledge on analyzing Big Data. The course covers Big Data storage, processing, analysis, visualization, and Big Data Algorithms, Graph Big Data, Graphical models and Bayesian Network, Cognitive Mobile Analytics.

IS 562 Modeling and Simulation in Decision 3(3+0)

Principles of simulation: Model building, Handling time in models, Model attributes and parameters. Simulation languages and systems. Business application: Finance, Production, Inventory. Simulation of human decision-making, AI and simulation. Corporate simulation models and case studies.

IS 563 Information Security Management and Audit 3(3+0)

Processes associated with governance, policy, monitoring, incident management and management of the information security function, processes associated with the implementation of security configurations, processes associated with the selection and maintenance of security technologies. In addition, the following audit/assurance reviews will be covered. They are: Identity management, security incident management, network perimeter security, systems development, project management, IT risk management, data management, and vulnerability management.

IS 564 Advanced topics in Data Science 3(3+0)

The course will provide a deep overview of data science methodologies and technology, including data understanding, modeling and analysis in big scale. basic algorithms and software tools dealing with data. The topics covered are: Data understanding, Data cleaning, Data modeling, Data access analysis and interaction,

Exploratory Data Analysis, Data Dimension Reduction, Data diagnosis, Deep learning, KNN, Naive Bayes, Linear and logistic regression, Trees and forests, Scaling up analytics.

IS 565 Advanced Quantitative Methods for Information Systems 3(3+0)

Quantitative analysis and the decision making process, Principles of modeling, Data gathering Model solution, Dynamic Programming, Multi-criteria Decision Making, Simulation, Game theory, Principal Component Analysis, Linear and Non Linear Discrimination, Optimization Techniques.

IS566 Advanced Topics in Cyberspace and Cybersecurity 3(3+0)

This course will cover state of the art advances in the cybersecurity field, with particular emphases on emerging trends, threats and cyber areas, such as cyber war, espionage, and crime, in the domain. Topics to be covered include current topics in information assurance, advanced digital forensics, new approaches to management of cybersecurity and new threats, advanced vulnerabilities analysis. Students will learn how information security control mechanisms are implemented in the cyber space, examining contemporary security guidelines, practices, and applications in the real-world computing environments.

IS 567 Secure Software Development 3(3+0)

Principles of developing secure applications. Common programming errors that lead to software vulnerabilities, how these errors can be exploited, and effective mitigation strategies for preventing the introduction of such errors. Common programming vulnerability causes such as buffer overflows, dynamic memory management, integer overflows, sign errors, truncation errors, I/O vulnerabilities, etc. A specific programming language will be used throughout the course to demonstrate discussed concepts.

IS 591 Selected topics in Information Systems 3(3+0)

Special topics of current interest of IS/IT. Topics covered in this course will be determined by the department and may be conducted by more than one instructor.

IS 592 Selected topics in Enterprise Information Systems 3(3+0)

Special topics of current interest in Enterprise Information Systems, students will develop, an in-depth understanding of the role of semantics and ontology in the enterprise, new patterns for enterprise architectures, Enterprise Application Integration. Enterprise Messaging, new Artificial Intelligence techniques and trends for Enterprise Information Systems.

IS 593 Selected topics in E-Commerce 3(3+0)

Covering and discussing the recent trends, technologies, systems, and emerging topics, in all key matters concerning E-commerce such as new trends for Electronic Payment Systems, Internet Marketing, Customer Relationship Management, Web services. Recent Data Mining Techniques for E-Commerce could be studied.

IS 594 Selected topics in Information Security 3(3+0)

Recent trends in knowledge, techniques, and tools required by information-technology security professionals. Selected Topics may include topics related to security and risk management, new security architectures and designs, security for networks and telecommunications, new security applications.

IS 595 Research project (1) 3(3+0)

A survey of the theoretical and technical aspects of a research topic to be agreed Upon with the student's advisor. An oral presentation and a written report are required.

IS 597 Research project (2) 3(3+0)
Pre-requists: IS 595

Bridging the gap between the academic study and training needed by industry and businesses. Students are initiated to work under close faculty supervision on real-world problems of sufficient magnitude. Project implementation and documentation are main concerns. The final report should be comprehensive, well written and organized to reflect an effective approach to carry out the work involved.

IS 596 Research Proposal Preparation

In this course the student will specify a research topic under the supervision of a faculty membe and prepare a thesis proposal to be approved.

IS 600 Thesis
Pre-requists: IS596
