



Arab Academy for Science and Technology & Maritime Transport

College of Computing and Information Technology

Department of Information Systems

## **Master of Science in Information Systems**

### **Program Specification**

**(Year 2013- 2014)**

#### **A. Basic Information**

1. Program title: Master of Science in Information Systems
2. Program type: Single
3. Department responsible for the program: Information Systems
4. Date of program approval: 2007

## B. Professional Information

Information systems specialists focus on integrating information technology solutions and business processes to meet the information needs of businesses and other enterprises, enabling them to achieve their objectives in an effective and efficient way. This discipline's perspective on information technology emphasizes information, and views technology as an instrument for generating, processing, and distributing information. Professionals in the discipline are primarily concerned with the information that computer systems can provide to aid an enterprise in defining and achieving its goals, and the processes that an enterprise can implement or improve using information technology. They must understand both technical and organizational factors, and they must be able to help an organization determine how information and technology-enabled business processes can provide a competitive advantage.

The information systems specialist plays a key role in determining the requirements for an organization's information systems and is active in their specification, design, and implementation. As a result, such professionals require a sound understanding of organizational principles and practices so that they can serve as an effective bridge between the technical and management communities within an organization, enabling them to work in harmony to ensure that the organization has the information and the systems it needs to support its operations. Information systems professionals are also involved in designing technology-based organizational communication and collaboration systems.

## Program General Aims

The program provide a high quality education in Information Systems in a research-active environment for intellectually able students from a wide range of backgrounds. After successful completion of the information systems program, graduates should be able to:

- O1. Integrate the knowledge and skills from across modules and demonstrate this through the production of a dissertation.
- O2. Understand the science basis and inter-disciplinary nature of Information Systems.
- O3. Be familiar with a variety of disciplines and with a broad range of information systems knowledge as well as business environment-based and research
- O4. Criticize other research with their enhanced critical reasoning ability.
- O5. Engage in appropriate behavior consistent with professional standards.

- O6. Define and interpret complex problems using qualitative and quantitative methods.
- O7. Communicate effectively with professionals both within and outside the field of information technology.
- O8. Develop evaluative, intellectual, management and personal skills to provide for continuous personal and professional development and entry to higher research degrees.
- O9. Effectively deploy existing information technology and learn to use emerging technologies.

The responsibility of achieving these objectives is carried out by information systems faculty and staff with the required experience.

## 1. Intended Learning outcomes (ILOs)

### a. Knowledge and Understanding

**The graduates of the information systems program should be able to :**

- K1. Work in research and practical activities based on the knowledge of the information systems.
- K2. Appreciate the key issues in the analysis, design and management of information systems.
- K3. Address contemporary information systems issues.
- K4. Understand a specialized subject state of the art through knowledge of the relevant research literature.
- K5. Understand a range of research techniques, both qualitative and quantitative.
- K6. Identify the applications of information system in organizations.
- K7. Discuss different technologies which used to improve decision-making process in institutes/organizations
- K8. Explain various issues and problems involved in building complex systems and organizing information resources.

### b. Intellectual Skills

**The graduates of the information systems program should be able to:**

- I1. Take professional decisions in different scenarios in the organization.
- I2. Assess risks in professional practice of information systems.
- I3. Plan to improve the performance in information systems.
- I4. Analyze and evaluate the information in the domain of information systems.

- I5. Analyze data and evaluate information from a range of sources.
- I6. Analyze information systems issues from a number of perspectives.
- I7. Formulate and develop arguments on information systems.
- I8. Evaluate critically claims made on a range of information systems issues.
- I9. Plan strategic information systems.
- I10. Develop original ideas in a research context.
- I11. Carry out a research study and write a thesis around a research problem in information systems.

### **c. Practical and Professional Skills**

**The graduates of the information systems program should be able to:**

- P1. Apply information technologies for database administration and management, telecommunications management, and software development.
- P2. Undertake research tasks including designing and managing or commissioning work in area of information systems with minimum guidance.
- P3. Design and undertake independently, a major original research project on a topic which relates to the forefront of the academic discipline of information technology security and reflect extensively and objectively on method, process and outcomes.
- P4. Conduct research or advanced technical or professional activity in the area of information security.
- P5. Deal with complex issues of information systems systematically and creatively, makes informed judgments in the absence of complete data, and communicates their conclusions clearly to specialist and non-specialist audiences.
- P6. Build complex systems and organizing information resources.
- P7. Solve business problems related to the organizations/institutes.
- P8. Document and test any type of information system.
- P9. Evaluate current methods and tools in information systems.

### **d. General and Transferable Skills**

**The graduates of the information systems program should be able to:**

- G1. Long-life self-learning.
- G2. Use different recourses to obtain information and knowledge.
- G3. Communicate efficiently by different means.
- G4. Use the information technology to serve the professional practice.
- G5. Develop various arguments in a systematic manner.
- G6. Communicate by information technology to analyze data and make high quality and accessible presentations of complex ideas.

- G7. Demonstrate professionalism in framing and resolving problems involving information systems.
- G8. Persuasively communicate concepts and principles to different audiences.
- G9. Define and design information systems

### 3. Program Academic Standards

- 1- National Academic Reference Standards (NARS) for Computing and Information, October 2010.
- 2- Standards of Higher Supreme Education Council for the Egyptian Universities.
- 3- Standards of ACM/IEEE CS curricula 2013 (Ironman report) .

### 4. Reference indices (Benchmarks)

1. Handbook for Academic Review (QAA 2000): Users Guide to the Academic Review of Subjects in Higher Education Institutions in the Transitional Period, 2002-2005.
2. Handbook of Institutional Audit, England, 2002.
3. Collaborative Provision Audit: Supplement to the Handbook for Institutional Audit : England, December, 2004.
4. Nick Harris, Quality Assurance and Accreditation, Report of Visit, March 2008, U.K.

### 5. Curriculum structure and contents of program

**5.A Program duration:** 4 -10 semesters.

**5.B Program structure:**

Total Credits : 36 credit hours

Mandatory Credits: 27 credit hours

- 1- **Mandatory Major specialization Requirements: (41.67%)**
  - 15 mandatory credit hours.
- 2- **Elective Major specialization Requirements: (25%)**
  - 9 mandatory credit hours.

**3- MsC. Thesis (33.33%)**

- 12 mandatory credit hours.

**5.C Program levels (in credit-hours system):**

**Not applicable**

**5.D Program courses**

**5.D.1. Mandatory Major specialization Requirements (15 Credit Hours = 41.67%)**

Code	Title	Contact Hours			Hours
		re Lectu	ial Tutor	Lab	
IS 701	Decision Support and Intelligent Systems	3			3
IS 702	Advanced Database Management	3			3
IS 703	Information Systems Security	3			3
IS 704	Management Information Systems	3			3
IS 700	Selected Topics in Information Systems	3			3

**5.D.2. Elective Major specialization Requirements (9 Credit Hours = 25%)**

Code	Title	Contact Hours			Hours
		re Lectu	ial Tutor	Lab	
IS 710	Advanced Software Engineering	3			3
IS 711	Networking Applications	3			3
IS 712	Data warehousing and Mining	3			3
IS 713	Knowledge Management for E-Business	3			3
IS 714	Information Systems Design	3			3
IS 715	Multimedia Information Systems	3			3
IS 716	Software Testing and Quality Assurance	3			3
IS 717	GIS and Spatial Database	3			3
IS 718	Quality Management and Assurance of Information Systems	3			3

## 5.D.3. College Requirements (12 Credit Hours = 33.33%)

Code	Title	Contact Hours			Hours
		Lecture	Tutorial	Lab	
IS 730	Master's Thesis Part (I)				3
IS 731	Master's Thesis Part (II)				9

## 6. Contents of Courses

**Course Code: IS701**

**Course Title:** Decision Support Systems & Intelligent Systems

**Course Content:**

An overview of management support systems. Decision-making systems modeling and support. DSS. Modeling and analysis. Business intelligence. Decision support systems development. Group decision support systems (GDSS). Knowledge-based decision support. Inference techniques. Expert systems development. Statistical decision making. Neural networks and DSS applications. Genetic algorithms for DSS. Intelligent software and DSS agents.

**Course Code: IS 702**

**Course Title:** Advanced Database Management

**Course Content:**

This course allows the introduction of material relating to current database research topics, and current advances in database technology. It will thus provide a foundation for understanding advanced topics, such as Distributed Database Systems, Data Warehouse and OLAP, Data Mining, Web Databases and XML, Object Database, Active, Temporal, Intelligent and Deductive Databases, Heterogeneous Databases, Digital Library, Multimedia Databases, and Mobile Databases.

**Course Code: IS703**

**Course Title:** Information Systems Security

**Course Content:**

**The course is an introduction to information systems security. The course encompasses the study of computer security attacks and countermeasures.**

**Topics include basic cryptography and its applications, Identification and assessment of threats facing programs, operating systems, database systems, and networks. In addition, management issues concerning protection of infrastructure and information are presented such as security planning, risk analysis and security policies.**

**Course Code: IS704**

**Course Title:** Management Information System

**Course Content:**

Overview of MIS. Strategic uses of IS. Managers and their information needs. Organizing IT resources. Data warehouse and knowledge management. E-commerce. Developing e-business solutions. Supply chain management. Planning IS. Managing IT outsourcing. Enterprise resource planning. Business models. Work flow management. System availability and cluster configuration.

**Course Code: IS710**

**Course Title: Advanced Software Engineering**

**Course Content:**

This course introduces students to problems that occur in large scale software production. The course examines technical aspects of software development life cycle and stresses a model driven approach to software engineering. Formal (mathematical and logic based) approaches to software modeling are covered and emphasized. A number of advanced software engineering topics will be studied.

This course shows how to apply the main Software Engineering Models in real software projects through a number of case studies. The student will study the latest models in software engineering and how could it be used in his research work. The latest in cost estimation, productivity, quality, reuse and software reengineering models are studied and discussed.

**Course Code: IS711**

**Course Title:** Networking Applications

**Course Content:**

Client/Server model and Socket interface. The Domain Name System (DNS); E-mail architecture and Services (SMTP); The World Wide Web and HTTP including Wireless Web; Multimedia streaming (audio and video); IP Telephony (VoIP); File



transfer and remote file access; Network Management SNMP; Hands-on experience with Java network programming to build a sample client/server application.

**Course Code:** IS712

**Course Title:** Data Warehousing & Data mining

**Course Content:**

This course allows the introduction of material relating to current data warehousing and data mining research topics, and current advances in data warehousing and data mining technology. This module aims to provide a foundation for design and construction of a high performance data warehouse and for understanding fundamentals and methods of data mining.

**Course Code:** IS713

**Course Title:** Knowledge Management for E-Business

**Course Content:**

This course studies knowledge management within the context of large organizations, particularly those that conduct business on the web and over the Internet. Topics include the knowledge management (KM) process model and lifecycle; case studies of effective KM in organizations; e-business frameworks and models, including business-to-consumer, business-to-business, and net marketplaces; the extensible markup language (XML) and its use in e-business transactions and services; the role of standards in effecting inter-enterprise process models and workflows; the intelligent integration and interchange of information among business partners; web service architectures and standards; and security and digital rights management in e-business environments.

**Course Code:** IS714

**Course Title:** Information System Design

**Course Content:**

Overview of distributed information systems (DIS) architecture models. Analysis and design of client / server systems and open system. Object oriented client / server internet environments. Distributed objects for enterprise-wide applications. Distributed information systems management and security. Practical hands-on experience of DIS using state-of-the-art technology.

**Course Code:** IS715

**Course Title:** Multimedia Information Systems

**Course Content:**

This course discusses the past, present, and future of the theory and practice of multimedia information systems. We will explore the concepts and methods of the multimedia production cycle comprising the creation, description, retrieval, editing, management, distribution, and reuse of digital media. Students will gain theoretical background and practical experience to help them design, innovate, critique, and assess digital multimedia information systems.

**Course Code: IS716**

**Course Title:** Software Testing & Quality Assurance.

**Course Content:**

This course introduces students to Software testing , giving them an overview of software validation and verification and testing techniques. The course addresses such important issues as testing principles and test-case design; module testing; domain testing; high-order testing; and object-oriented testing. Other subjects that will be covered during the course include: formal methods; reliability validation; safety assessment; software metrics; quality concepts and quality assurance; software reviews; formal technical reviews; formal approaches to SQA; software reliability; quantity standards; and the SQA plan.

**Course Code: IS717**

**Course Title:** GIS and Spatial Database

**Course Content:**

Spatial databases are database systems that provide the capability to store, retrieve, query, and manipulate spatial information. Spatial databases are usually considered as the 'back end' of a Geographic Information System (GIS). The 'front end' consists of the tools used to display the results of queries on the spatial database, most often to determine if a point is within the geometric boundaries of one of the objects stored in the spatial database. We will consider how spatial databases work within a GIS; how spatial databases can represent objects with uncertain, vague or indeterminate boundaries, such as soil types (fuzzy spatial databases); and how spatial databases can represent data that changes over time (temporal spatial databases). Several commercial GIS and spatial database products, including Oracle Spatial, ArcView, and ArcGIS will be discussed during the course. We will also investigate the state-of-the-art research in the field.

**Course Code: IS718**

**Course Title:** Quality management and Assurance of Information Systems

**Course Content:**

This course introduces the statistical bases of quality control and the application of tools to the design, implementation and analysis of a quality management system, while also addressing the underpinnings of quality theory and quality philosophy. This course also explores the role of information quality assurance in business decision-making, emphasizing the appropriate use of information in sustaining competitive performance.

**Course Code: IS700**

**Course Title: Selected Topics in Information Systems**

**Course Content:**

This course is divided into four parts:

First, the student is introduced to research methodologies in which proposal, paper, and thesis writing as well as mechanisms of conducting successful research are reviewed in details.

Second, a section is dedicated to ethics in computer science where the students understand moral and legal principles of professional practice in the area of specialization and identify the fundamentals of scientific research and its ethics.

Third, a section is dedicated to highlight the main techniques used in statistical analysis and its application in Computer Science

Fourth, a section is dedicated to a topic that varies each semester such as: soft-computing, Smart Agents, Business Intelligence, etc.

## 7. Program admission requirements

Upon accepting the request submitted by the Board of the College of Computing and Information Technology, the Academy awards Master's Degree by the credit hours system in Computer Science and Information Systems.

In September and February of every year, the board of postgraduate studies at the College of Computing and Information Technology reviews the proposals submitted by the boards of the educational departments to determine the number of students to be accepted in Spring and Autumn of every year, the study courses and the schedule of final examinations.

### ***I. Master's Degree Registration Regulations:***

- 1) To register for the Master's degree, the student should be a holder of B.Sc. in the relevant major from Arab Academy for Science & Technology & Maritime Transport, or from any of the corresponding recognized and accredited colleges with cumulative grade point average of "Good" at least, or a holder of Diploma degree with "Very Good" grade at least from the College of Computing and Information Technology or any of the corresponding colleges in the same major.
- 2) A student may register for a major other than the major of his B. Sc. Degree upon a proposal submitted by the board of postgraduate studies. The student can study the required supplementary pre-master courses, in the case of which the student will not be allowed to register for Master's degree except after successfully passing the supplementary courses determined by the educational department board with at least "Good" grade.
- 3) The board of postgraduate studies may accept the transfer of credits of equivalent higher studies the student has already completed in corresponding colleges. Provided he passed the said courses with at least "Good" grade, and with a maximum of two courses, i.e., 6 credit hours, and provided no more than two years lapsed since he passed the said courses.
- 4) The student is not allowed to register for postgraduate studies in any other college or educational institute at the time his application for registration for Master's degree is accepted.
- 5) Registration may be suspended for one year, whether running or not, upon the request of the student, provided the consent of the board of postgraduate studies is granted.

### ***II. Conditions of accepting Master's dissertation:***

The Master's dissertation is equivalent to 12 credit hours, three of which are registered in one semester, and nine in the next semester. The process of accepting a Master's dissertation is as follows:

- 1) The student will be allowed to register for Master's dissertation after successful completion of five courses (15 credit hours) at least with cumulative grade point average of not less than 2.8.
- 2) The board of postgraduate studies will nominate the supervisors of the students meeting the set requirements and stipulations with a view to selecting the field and topic of research dissertations, as well as the required optional programmes the students will study which are of relevance to the field and topic of research.  
M.Sc. Candidates will be supervised by professors (senior lecturers) or assistant professors (second lecturers). Teachers (third lecturers) may participate in supervision. An expert or two experts at most from outside the Academy may also participate in supervising the M.Sc. Candidate. In case either of them is absent for four months and more, supervision will be entrusted to a corresponding counterpart to be nominated by the Educational Department concerned.
- 3) The M.Sc. Candidate will - in cooperation with the supervision committee - makes a presentation with a view to expounding the topic of his research within six months from the date of registration for Master's degree.
- 4) The supervision committee will submit a report to the board of postgraduate studies every year to describe the progress of the candidate's research.
- 5) Upon completion of dissertation the supervision committee will submit to the Educational Department concerned the viva voce examination form. A report to the effect that the dissertation meets the viva voce examination requirements, together with copies of published papers, will be attached to the viva voce examination form. The report will also include the proposed date of the viva voce examination, the names of the members of the viva voce examination board, provided one of them is external.
- 6) The board of postgraduate studies will contact the examiners (after getting the consent of the educational department and the college board) who will assess the dissertation. Each examiner will submit his own individual assessment report.
- 7) To begin the procedures of the viva voce examination, all the individual assessment reports must be to the effect that the dissertation is accepted.
- 8) The viva voce examination board will comprise the assessment committee (a vote for each examiner) and the supervision committee (one vote). The viva voce examination board will have the right to return the dissertation to the M.Sc. candidate to make whatever changes the board may deem necessary within a specified period.
- 9) When the M. Sc. Candidate has successfully defended his research in the viva voce examination, the members of the examination board will write and sign a collective report and submit it to the Postgraduate Studies Department. The decision of the examination board will be by majority vote.

- 10) After the candidate has completed the modifications, the viva voce examination board required, the supervisors will submit the final version of the dissertation to the Postgraduate Studies Department; it will be signed by all the members of the committees.
- 11) The result of the viva voce examination will be approved by the board of postgraduate studies. The report of the board of postgraduate studies will be submitted to the College Board to be approved. The College Board will review the educational standing of the candidate and recommend awarding the degree to the candidate with effect from the date of the meeting of the College Board following the date of approving the dissertation by the board of postgraduate studies.
- 12) Five copies of the dissertation will be submitted.
- 13) The M. Sc. Degree will be awarded by a decree issued by the President of the Academy with effect from the date of the meeting of the College Board.

**III. Canceling the Candidate's Registration for M. Sc. Degree:**

The candidate's registration for M. Sc degree will be cancelled by a decree issued by the College Board after the board of postgraduate studies issues its approval Cancellation will be effected in the following cases.

- 1) If the candidate fails to obtain the degree within five years starting from the date of registration, taking into consideration registration suspension cases.
- 2) If the candidate fails to meet the requirements of the study courses, i.e., if his final cumulative grade point average is less than "Very Good (75%) or GPA = 3.0", or if the number of the courses in which the candidate's grade is "Good (60%) or C" exceeds two courses, or if he failed twice in any of the courses.
- 3) If the supervisor or supervisors submit a report requesting cancellation of registration for reasons accepted by the board of postgraduate studies and the College Board, in which case the candidate will be officially notified.
- 4) If the candidate's dissertation is absolutely rejected by the assessment committee or the viva voce examination board.
- 5) If the candidate requests cancellation of registration in writing or does not pay the tuition fees.

**IV. Evaluation:**

The student's performance is assessed in all postgraduate programs according to the following table:

A	90 % and more
---	---------------

A <sup>-</sup>	85 % and more
B <sup>+</sup>	80% and more
B	75 % and more
B <sup>-</sup>	70 % and more
C <sup>+</sup>	65 % and more
C	60 % and more

The student will fail in a course if he gets less than 60% of the final mark of the course.

## 8. Graduation Requirements:

### *I. Time of Graduation:*

Degrees are conferred in March and August.

### *II. Requirements of Awarding Master's Degree:*

- 1) The duration of study for Master's degree is two calendar years at least and five calendar years at most.
- 2) The student will successfully complete eight postgraduate courses. i.e., 24 credit hours, with cumulative grade point average of not less than 3.00 at least provided the number of the courses in which he gets "good" grade does not exceed two courses.
- 3) The student will successfully complete the requirements of preparing Master's thesis (12credit hours).
- 4) The student will fail in a course if his grade in this course is less than "Good or C", or if his absenteeism percentage exceeds 20% without an acceptable excuse.
- 5) The student will be allowed to re-sit only once for the examinations of the courses he failed in and will get "Good" grade if he succeeds in the second trial even if the grade he got in the second trial was higher.

### *III. Awarding M.Sc. Degree:*

The degree of Master in Science will be awarded with both Educational Department indicated and the title of the thesis.

### *IV. Time Limits:*

Candidate in the master's program is allowed a maximum of five calendar years to complete all degree requirements, from the date of first registration as a degree candidate in prerequisite or graduate courses.

Candidates who do not complete degree requirements within the allowed time will have their degree candidate status terminated.

## 9. Evaluation of Program ILOs

Method	Evaluated ILOS
Written exams including short Quizzes	Knowledge and understanding
Assignments and course term work	Intellectual Skills
Mini projects (single student or team work)	Professional, Practical Skills, General and Transferable Skills
Practical Work	Professional, Practical Skills, General and Transferable Skills
Graduation Thesis	Professional, Practical Skills, General and Transferable Skills

## 10. Methods of Program evaluation:

	Evaluator	Method
1	Students	Questionnaires, surveys, checklists
2	Alumni	Questionnaires, surveys, checklists
3	Employers	Individual interviews, Questionnaires, Meetings
4	External auditors and Examiners	Documentation review, Observation
5	Instructors	Focus groups, Course surveys, Meetings

**Head of Department**

**Name: Prof. Dr. Mohamed Bakr AbdelHalim**

**Sign:**

**Date:**     /     /