The master's degree in health informatics

Department of Computer Information systems
Jordan University of Science and Technology
Faculty of Computer and Information Technology

Important Contacts

Jordan University of Science and Technology

P.O. Box: 3030 Irbid 22110 Jordan

Tel: (962)-2-7201000

Fax: (962)-2-7095141

E-mail: prsdy@just.edu.jo

Faculty of Computer and Information Technology

Tel: (962)-2-7201000 Ext. 20000

Fax: (962)-2-7095046

E-mail: cit@just.edu.jo

Department of Computer Information Systems

Tel: (962)-2-7201000   Ext: 23503

Fax: (962)-2-7095046

E-mail: cis@just.edu.jo

Deanship of Students affairs

Tel: (962)-2-7201000 Ext: 23508

Fax: (962)-2-7201043

E-mail: studentaffairs@just.edu.jo

Admission and registration unit

Tel: (962)-2-7201000 Ext: 27134

Fax: (962)-2-7201027

E-mail: register@just.edu.jo

International Students Office

Tel: (962)-2-7201000 Ext: 23040

Fax: (962)-2-7201025

E-mail: iso@just.edu.jo

Vision:

To stand among the pioneers in developing and creating transformational scholars and achievers who are qualified to create and maintain a successful business.

Mission:

Our mission is to nurture a world-class society of faculty and scholars that are devoted to pioneering scientific education and research. A task done via the creation and dissemination of knowledge through collaborative associations.

Brief Introduction

Health care is now highly dependent on information technology, and this requires the presence of specialists and experts capable of processing health data and information, as well as developing and evaluating health information systems. There is no doubt that educational programs in health informatics produce and train qualified graduates to fill the previous need in the labor market and who can fill the gap between professionals in the health care sector and those in the information technology sector. Jordan and the Middle East region are in dire need of educational programs in health informatics. Our proposed program is by nature a multidisciplinary program.

Its worth to mention the establishment of this program comes as a result of a research project supported by the European Union, in partnership with three European universities, the University of Amsterdam in the Netherlands, Stockholm University in Sweden and the University of Alcala in Spain, and all of them have long experience in establishing and teaching programs similar to

the program intended to be developed. Computer and information technology to teach courses related to the intended program.

Program Objectives

The Master's Program in Health Information Systems aims to:

1. Build advanced knowledge in the field of health informatics and realizing current issues in this field.

2. Build knowledge of computer science theories and methods, applied mathematics, epidemiology, biostatistics, and information management related to health informatics.

3. Develop a basic knowledge of health care principles and general procedures to guide health care, including strategic and decision-making processes.

4. Build knowledge about the personal, organizational, logistical, economic, and social implications of applying Information technology in health care.

5. Build a comprehensive knowledge of the theories of analysis, design, development, and evaluation of complex, interactive, and human-centered health information systems that can be applied.

6. Analyze complex real problems in the field of health information systems on the basis of medical informatics methods, and thus advise for concrete organizational actions.

7. Form advanced knowledge of scientific methods and the ability to conduct a comprehensive scientific research project with a theoretical and applied aspect.

Course Curriculum

The master's degree in health informatics is awarded by the Faculty of Graduate Studies at Jordan University of Science and Technology (JUST) upon the fulfillment of the following requirements:

1. Compliance with the J.U.S.T. master's degree regulations approved by the Dean Council (No. 492/2006), dated 8/8/2006.
2. Successful completion of (34) credit hours in one of the following tracks:

Thesis Track

A) Core Courses (16 CHs)

Course No	Course Title	Credit Hours	Prerequisite
CIS 710	Introduction to Health Informatics	3	-
CIS 712	Healthcare Systems Management and Quality Assurance	3	-
CIS 723	Health Data Processing in Clinical Processes	3	-
CIS 724	Structure and Applications of Health Information Systems	3	-
CIS 728	Selection, Development and Implementation of Health Information Systems	3	CIS 724
CIS 782	Seminar in Health Informatics	1	-
	Total	**16**	

B) Elective Courses (9 CHs) selected from the following list

Course No	Course Title	Credit Hours	Prerequisite
CIS 725	Epidemiology and Public Health	3	-
CIS 732	Clinical Decision Making	3	-
CIS 734	Health Data Science for Medical Research	3	-
CIS 736	Strategic Information Management	3	-
CIS 738	Imaging in Healthcare	3	-

CIS 742	Data Security and Patient Safety	3	-
CIS 746	Health Data Integration	3	-
CIS 748	Health Communications	3	-
CIS 752	User Interfaces in Health Informatics	3	-
CIS 754	Evaluation of Health Care Information Systems	3	-
CIS 762	Computational Informatics	3	-
CIS 793	Special Topics in Health Informatics	3	-
C) 9 CHs of Master Thesis Work			
CIS 799 A	Master Thesis	9	-
CIS 799 B	Master Thesis	6	-
CIS 799 C	Master Thesis	3	-
CIS 799 D	Master Thesis	0	-

Non Thesis Track

A) Core Courses (25 CHs)

Course No	Course Title	Credit Hours	Prerequisite
CIS 710	Introduction to Health Informatics	3	-
CIS 712	Healthcare Systems Management and Quality Assurance	3	-
CIS 723	Health Data Processing in Clinical Processes	3	-
CIS 724	Structure and Applications of Health Information Systems	3	-
CIS 725	Epidemiology and Public Health	3	-
CIS 728	Selection, Development and Implementation of Health Information Systems	3	CIS 724
CIS 734	Health Data Science for Medical Research	3	-
CIS 742	Data Security and Patient Safety	3	-
CIS 782	Seminar in Health Informatics	1	-
	Total	**25**	

B) Elective Courses (9 CHs) selected from the following list

CIS 732	Clinical Decision Making		
CIS 736	Strategic Information Management	3	-
CIS 738	Imaging in Healthcare	3	-
CIS 746	Health Data Integration	3	-
CIS 748	Health Communications	3	-

CIS 752	User Interfaces in Health Informatics	3	-
CIS 754	Evaluation of Health Care Information Systems	3	-
CIS 762	Computational Informatics	3	-
CIS 793	Special Topics in Health Informatics	3	-
CIS 794	Project in Health Informatics	3	-
C) Passing the Comprehensive Exam (CIS 798).			

Course Descriptions

CIS 710: Introduction to Health Informatics (3 credit hours)
Prerequisite: None.
This course is designed to help students gain a general understanding of various physiological systems as well as medical terms used by healthcare professionals and health informatics specialists during healthcare delivery. Students will be exposed to the functions of each major system in the human body and how to evaluate its performance from laboratory results and vital signs. Aspects of clinical decision making including evidence-based practice will be studied. Students will understand how health care professionals use diagnostic results in developing their clinical decision and how to use computing and technology to improve this process. Students will understand how health care professionals use diagnostic results in developing their clinical decision and how to use computing and technology to improve this process. General organization schemes in health care, especially governmental systems in Jordan will be discussed, as well as ways to improve these schemes using heath informatics. Health care policies general and specific to Jordan and regulatory frameworks will be highlighted. Students will also learn basic concepts of health economics and administration and how to reduce expenses and improve administration.

CIS 712: Healthcare Systems Management and Quality Assurance (3 credit hours)
Prerequisite: None
The course introduces healthcare quality management and control, including quality assessment and assurance. Students receive instruction in methodologies that help maintain accuracy and efficiency in health information systems. Topics include introduction to healthcare management, risk management and utilization management; management of quality improvement systems; use of data systems in quality assurance; different approaches to quality improvement and evaluation such as Lean Six Sigma, quality measurement and process improvement; tools, techniques, and resources available to health care professionals to measure the overall effectiveness; and study of credentialing, accreditation standards.

CIS 723: Health Data Processing in Clinical Processes (3 credit hours)
Prerequisite: CIS 724
This course helps students to understand the different forms of data that are handled by computer systems in clinical settings and look at the various processes that can be applied to the data in hospitals and health organizations. Several topics are introduced, related to the gathering, administration, management, and manipulation of data for producing meaningful information in clinical processes. The course provides students with knowledge basis and skills for the domain specific and relevant data representation, import/export, validation, integration, transformation, summarization, analysis, classification, and security. Data quality and interoperability are also regarded within the frame of existing standards, vocabularies, quality indicators and usability. Concepts of modeling and simulation and workflow will be studied, in order to make clinical processes easier to define, automate, visualize, understand, test and run.

CIS 724: Structure and Applications of Health Information Systems (3 credit hours)
Prerequisite: None
This course covers the structure, architecture, design and methods of Health Information Systems' implementation and their applications towards improving the quality of health care. Topics include: Electronic Health Record (EHR) and its key role in the quality of health care delivery, discussion of the different types of health information systems including Electronic Medical Record (EMR), Personal Health Record (PHR) and telemedicine. It also describes medical ontologies and vocabularies of data models, and data interoperability and exchange between different units.

CIS 725: Epidemiology and Public Health: (3 credit hours)
Prerequisite: None
This course is an introductory course to the theoretical and practical fundamentals of epidemiology and public health. In this course, emphasis will be placed on principles of designing, interpretation, and analysis of epidemiological studies in public health problems. In addition, the concepts of disease occurrence, association, and causation will be introduced and how bias can be evaluated and avoided. Furthermore, ethical considerations in conducting and disseminating findings of epidemiological studies will be explained. Finally, the application of epidemiology in public health and public health policies will also be covered in this course. Finally, the course will end up by educating students in health literacy.

CIS 728: Selection, Development and Implementation of Health Information Systems (3 credit hours)
Prerequisite: CIS 724
This course introduces health information systems development process to health informatics students. It defines the skills that students need to develop, and implement a health information system. In addition, the course will introduce a number of tools and techniques that students will use in their implementation process. The course teaches students how to design and create highly effective and efficient health information systems.

CIS 732: Clinical Decision Making: (3 credit hours)
Prerequisite: None
This course provides an overview of Clinical Decision Support (CDS) and CDS Systems (CDSS). It enables the students to dig deeper into the nature of clinical decision support, in terms of the ways in which it is or potentially could be used, its design, and its interaction with host environments. Topics Include: CDS Definition, Scope, and Challenges, Features of Computer-Based Clinical Decision Support, Current State of CDS Utilization, Generation of Knowledge for Clinical Decision Support: Statistical and Machine Learning Techniques, Modernizing Evidence Synthesis for Evidence-Based Medicine, Big Data and Population-Based Decision Support, Clinical Decision Support for Personalized Medicine, Decision Rules and Expressions, Ontologies, Vocabularies and Data Models, Formal Representations and Semantic Web Technologies, Adoption of Clinical Decision Support, A Clinical Decision Support Implementation Guide: Practical Considerations, Consumers and Clinical Decision Support.

CIS 734: Health Data Science for Medical Research (3 credit hours)
Prerequisite: None
This course introduces students to Health Informatics, providing basic principles of data science and decision making. It also introduces students to basics of data visualization, data mining, machine learning and computing techniques for health data. This course will train students to extract knowledge from health data and to communicate and share this knowledge.
Specific topics: Introduction to data science, Health information systems and technologies, Data statistics and decision making, Data mining and visualization for health data, Applied regression and machine learning for health data, and computing for big data.

CIS 736: Strategic Information Management (3 credit hours)
Prerequisite: None
This course is designed to cover the topics and challenges related to strategic management of information technology (IT) and information systems (IS) and how they can be leveraged to generate sustainable services in health organizations. The course will also introduce fundamental concepts of IT Strategy, IT infrastructure, enterprise application, and corporation-wide information architecture, the alignment of information services with the corporate environment, intra-organizational systems, strategic alliances, sustaining innovation, and IT for strategic advantage.

CIS 738: Imaging in Healthcare (3 credit hours)
Prerequisite: None
This course aims to provide basic knowledge in the field of imaging in healthcare, with a focus on magnetic resonance imaging, x-ray computer tomography, ultrasound, nuclear, and optical imaging. It will include the processing, construction, analysis, registration, classification and segmentation of imaging in healthcare.

CIS 742: Data Security and Patient Safety (3 credit hours)
Prerequisite: None
This course identifies a range of methods, techniques and current issues of security and privacy problems associated with health informatics. Topics include common attacking techniques such as virus, Trojan, worms and memory exploits; the formalism of information security such as the access control and information flow theory; the basic cryptography, DES, AES, RSA, cryptographic hash function, and password system; network intrusion detection; software security theory; web security; legal and ethical issues in computer security. This course will introduce learners to the importance of best practices for professionalism, roles and responsibilities, teamwork, communication, ethics, and collaborative practice as a means to improve the quality and safety of patient care.

CIS 746: Health Data Integration (3 Credit Hours)
Prerequisite: None
Provides a systematic understanding and experience of foundational concepts and techniques for data integration in healthcare. Topics include: heterogeneous data sources in healthcare, health data interoperability, health communications standards, health data standards, health data integration architecture, and health data integration models and techniques, including data preparation, health data integration tools, and health information exchange.

CIS 748: Health Communications (3 Credit Hours)
Prerequisite: None
This course is focused on community health education and promotion, especially designing and evaluating health communication programs for populations with shared risks, exposures or behaviors. Ways in which the general public receives and assigns meaning to health messages will be reviewed. The strengths and weaknesses of specific health communication initiatives will be analyzed in terms of theoretical constructs, costs and outcomes. Students apply public health principles by designing a substantive health communication piece or educational material.

CIS 752: User Interfaces in Health Informatics (3 Credit Hours)
Prerequisite: None
This course is an overview of theoretical, development, design and assessment models and techniques in the field of intelligent user interfaces, utilizing an interdisciplinary approach (computer science, psychology, cognitive science and artificial intelligence).

CIS 754: Evaluation of Health Care Information Systems (3 Credit Hours)
Prerequisite: None
This course is an overview of methods to evaluate the use of information and information systems in health care. Issues specific to information systems in health care usability, checklist effect, difficulty blinding, knowledge base evaluation, etc. Case studied are used to illustrate concepts.

CIS 762: Computational Informatics (3 Credit Hours)
Prerequisite: None
This course will provide an introductory, hands-on experience for life science researchers in bioinformatics using R and Bioconductor. Emphasis will be placed on accessing, formatting, and visualizing genomics data. Most analyses will deal with "little" data (no mapping or assembly of short reads), but some techniques to work with "big" data (e.g. BAM files) will be covered. Lecture and lab will both be held in a computer lab, so lecture will be "hands-on". Working in small groups is encouraged.

CIS 782: Seminar in Health Informatics (1 credit hours)
Prerequisite: None
This course in research methods focuses on practical issues in conduction of research. The course will cover qualitative and quantitative methods of conducting research. The course will cover all conceptual phases of the research process including research ethics, proposal development, formulating aims, objectives, research designs, validity and reliability, sampling strategies, measurement, research implementation, data collection methods and criteria, data analysis and interpretation, and dissemination. It will also address research critique and critical appraisal skills.

CIS 793: Special Topics in Health Informatics (3 credit Hours)
Prerequisite: None
The contents of this course vary overtime and its purpose is to discuss latest and emerging topics and issues in the Health Informatics field.

CIS 794: Project in Healthcare Information System (3 credit hours)
Prerequisite: Department approval
This course is a project-based course that encompasses all what a student has learned through his/her master period, including the development of health records, Human Computer Interaction, evaluation of health informatics systems, clinical decision making, management, security, Ubiquitous computing, and Internet of Thing (IoT).

CIS 798 Comprehensive Exam (0 CH)
Prerequisite: Dept. Approval
This course consists of a comprehensive exam covering all the material taken by the student during his/her course of study. The exam takes place in the department and is administered by a number of specialized faculty members.

CIS 799 A: Master Thesis (9 CHs)
Prerequisite: None
Individual research under the direction of faculty member(s) and committee leading to the preparation, completion, and oral defense of a thesis.

CIS 799 B: Master Thesis (6 CHs)
Prerequisite: None
Individual research under the direction of faculty member(s) and committee leading to the preparation, completion, and oral defense of a thesis.

CIS 799 C: Master Thesis (3 CHs)
Prerequisite: None
Individual research under the direction of faculty member(s) and committee leading to the preparation, completion, and oral defense of a thesis.

CIS 799 D: Master Thesis (0 CH)
Prerequisite: None
Individual research under the direction of faculty member(s) and committee leading to the preparation, completion, and oral defense of a thesis.

Study Plan (Thesis Track)

Course Code	Course Name	Credit Hours	Prerequisite
1st Semester - 1st Year			
CIS 710	Introduction to Health Informatics	3	-
CIS 724	Structure and Applications of Health Information Systems	3	-
CIS 782	Seminar in Health Informatics	1	-
Total		**7**	
2nd Semester - 1st Year			
CIS 712	Healthcare Systems Management and Quality Assurance	3	-
CIS 723	Health Data Processing in Clinical Processes	3	-
	Elective Course	3	-
Total		**9**	
1st Semester – 2nd Year			
CIS 728	Selection, Development and Implementation of Health Information Systems	3	CIS 724
-	Elective Course	3	
-	Elective Course	3	
Total		**9**	
2nd Semester – 2nd Year			
CIS 799 A	Master Thesis	**9**	
Total		**9**	

Study Plan (Non-Thesis Track)

Course Code	Course Name	Credit Hours	Prerequisite
1st Semester - 1st Year			
CIS 710	Introduction to Health Informatics	3	-
CIS 723	Health Data Processing in Clinical Processes	3	-
CIS 724	Structure and Applications of Health Information Systems	3	-
CIS 782	Seminar in Health Informatics	1	-
Total		**10**	
2nd Semester - 1st Year			
CIS 712	Healthcare Systems Management and Quality Assurance	3	-
CIS 725	Epidemiology and Public Health	3	-
CIS 728	Selection, Development and Implementation of Health Information Systems	3	CIS 724
	Elective Course	3	-
Total		**12**	
1st Semester – 2nd Year			
CIS 734	Health Data Science for Medical Research	3	-
CIS 742	Data Security and Patient Safety	3	-
-	Elective Course	3	-
-	Elective Course	3	-
Total		**12**	
2nd Semester – 2nd Year			
CIS 798	Comprehensive Exam	**0**	
Total		**0**	