



Jordan University of Science & Technology
Faculty of Computer & Information Technology

Curriculum for the Bachelor's Degree
In

Health Information Systems

(Computer Information Systems Department)

2023-2024



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About the Program

The program is designed to enhance theoretical and practical learning in health informatics systems. This program includes a comprehensive and advanced curriculum consisting of diverse and specialized topics in health informatics. The program provides students with scientific and practical experience in some important skills such as: visualizing, analyzing, and processing health data and medical images, using artificial intelligence applications in health care, developing cellular applications, and telemedicine.

The program is accredited by the Higher Education Accreditation and Quality Assurance Commission and also complies with international standards ABET and the qualifications placement system in the Jordanian national framework.

Vision

To be a local, regional, and global leader in education and scientific research, and to prepare and qualify graduates with the highest levels of competence and professionalism .

Mission

Providing high-quality educational and research services in the fields of computer and information technology, theoretical and applied, to create and disseminate knowledge, lead, and develop human societies, and create a technological and scientific environment that stimulates excellence, creativity, and innovation through effective local and global partnerships.

Objectives

The program educational objectives (PEOs) of the Health Information Systems program at JUST are to prepare and qualify graduates who are:

1. **[Professionalism]** Productive and practitioner-oriented professionals, researchers and future leaders who contribute to the development and innovation of the Health Information Systems fields.
2. **[Community Support]** Become a productive member of society who can undertake leadership roles and make innovative decisions to contribute to the Health Information Systems, and economic growth.
3. **[Lifelong Learning]** Lifelong learners who can always improve their professional knowledge in the Health Information Systems technology.



Outcomes

Graduates of the bachelor program of Health Information Systems will have an ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Support the delivery, use, and management of Health Information Systems within a Health Information Systems environment.



Course Numbering Convention

Digit	Meaning	Explanation	
Hundreds	Course Level	1	First year
		2	Second year
		3	Third year
		4	Fourth year
Tens	Course Subject	0	Basic Principles
		1	Programming
		2	Database
		3	-
		4	Networks
		5	Hardware
		6	Artificial Intelligence
		7	Systems and Systems Software
		8	Miscellaneous
9	Special topics and training		
Ones	Course Sequence	Course sequence number within subject area	

The University Codes are as follows:

Code	Department
CIS	Computer Information Systems
CS	Computer Science
SE	Software Engineering
HI	Health Informatics
NUR	Nursing
HMP	Health Management and Policy
BT	Department of Biotechnology and Genetic
PH	Public Health
MATH	Mathematic

Study Plan of Bachelor's Degree in Health Information Systems

The *Bachelor's Degree* in **Health Information Systems (HI)** is awarded from the Computer Information Systems Department at the faculty of the Computer and Information Technology in Jordan University of Science & Technology (JUST) after the successful completion of 132 credit hours distributed as shown in Table (1).

Table (1): Credit Hours Distribution for Health Information Systems Program

Requirements	Compulsory Hours	Elective Hours	Total
University Requirements	16	9	25
Faculty Requirements	18	0	18
Department Requirements	80	9	89
Total	114	18	132

After fulfilling the requirements stipulated in the instructions for granting a bachelor's degree (revised edition) at the Jordan university of Science and Technology issued by the Dean's Council abiding by the regulation concerned with issuing scientific degrees and diplomas at the Jordan university of Science and Technology for 1987.

1. University Requirements (25 CHs) classified as:

- Compulsory University Requirements (16 CHs).
- Elective University Requirements (9 CHs).

2. Faculty Requirements (18 CHs) as shown in Table (2):

Table (2): Compulsory Faculty Requirements

Course Number	Course Title	Credit Hours	Weekly Hours		Prerequisite
			Theoretic	Lab	
MATH 101	Calculus I	3	3	0	-
HSS241MATH	Discrete Mathematics	3	3	0	-
HSS101CS	Introduction to Programming	3	2	2	CIS 99 OR Concurrent
HSS112SE	Introduction to Object-Oriented Programming	3	2	2	Passing HSS101CS
HSS211CS	Data Structures	3	3	0	HSS241MATH AND Passing HSS112SE
HSS103SE	Introduction to Information Technology	3	3	0	HSS101CS OR Concurrent

3. Department Requirements (89 CHs) classified as:

a. Compulsory Department Requirements (80 CHs) as shown in Table (3):

Table (3): Compulsory Department Requirements

Course Number	Course Title	Credit Hours	Weekly Hours		Prerequisite
			Theoretic	Lab	
HI 102	Introduction to Health Information Systems and Management	3	3	0	-
HI 284	Visual Programming for Health Information Systems Students	3	3	0	HSS211CS
HI 321	Healthcare Data Analytics	3	3	0	HI 284
HI 332	Data Visualization and Exploration	3	3	0	HI 284
HI 335	Developing Mobile Applications and Telemedicine	3	3	0	HI 284
HI 341	Information Security and Networks Technology and Policies	3	3	0	HI 284
HI 391	Practical Training	3	0	6	Passing 90 CHs
HI 413	Deep Learning	3	3	0	HI 321
HI 420	Applications of Artificial Intelligence in Healthcare	3	3	0	HI 321
HI 421	Medical Image Processing	3	3	0	HI 321
HI 491	Graduation Project 1	1	1	0	Passing 90 CHs
HI 492	Graduation Project 2	2	2	0	HI 491
CS 284	Analysis and Design of Algorithms	3	3	0	HSS211CS
CIS 201	Introduction to Web Design	1	0	3	CS 112 SE
CIS 221	Fundamentals of Database Systems	3	3	0	HSS211CS



CIS 332	System Analysis and Design	3	3	0	CIS 221
CIS 341	Web Applications Development	3	3	0	CIS 201
CIS 421	Database Applications	3	3	0	CIS 221
CIS 441	Data Communication and Computer Networks	3	3	0	HSS211CS
SE 230	Fundamentals of Software Engineering	3	3	0	-
HSS103BT	General Biology	3	3	0	-
HMP 204	Medical Terminology	2	2	0	-
HMP 332	Management of Medical Records	3	3	0	HI 102
HMP 342	Financial Management in Healthcare Sector	3	3	0	-
HSS 105 NUR	Quality Control, Infection Control and Patient Safety	3	3	0	-
NUR 310	Communication and Health Education	2	2	0	-
NUR 316	Biostatistics	3	3	0	MATH 101
MATH 140	Elements of Linear Algebra	3	3	0	-
PH 360	Epidemiology	3	3	0	-

b. Elective Department Requirements (9 CHs) as shown in Table (4).

A Student may select at most (3 CHs) from other departments in the faculty (400 level or above) upon department approval.

Table (4): Elective Department Requirements (9 CHs) *

Course Number	Course Title	Credit Hours	Weekly Hours		Prerequisite
			Theoretic	Lab	
HI 203	Introduction to Hospital Information System and Management	3	3	0	-
HI 338	Research Methods and Analysis in the Field of Health Care	3	3	0	HI 102
HI 410	Information Technology in Healthcare Systems of The Future	3	3	0	HI 102
HI 411	Big Data and Data Warehouse for Healthcare	3	3	0	HI 335
HI 412	Project Management in Healthcare	3	3	0	HI 321
HI 414	Digital Marketing in Healthcare	3	3	0	HI 102
HI 432	Internet of Things	3	3	0	HI 335
HI 433	Modeling and Simulation in Healthcare	3	3	0	HI 335
HI 434	Cloud Computing in Healthcare	3	3	0	HI 335
HI 436	Innovation and Change in Health Information Systems	3	3	0	HI 102
HI 493	Special Topics in Health Information Systems (1)	1	1	0	Department Approval
HI 494	Special Topics in Health Information Systems (2)	2	2	0	Department Approval
HI 495	Special Topics in Health Information Systems (3)	3	3	0	Department Approval
-	Any faculty course at level 400 or above	3	3	0	Department Approval

*Student may be waived from up to (6 CHS) from elective courses (Table 4) upon department approval if the student obtains an internationally accredited certificate for a technical training course, provided that the training hours for that course exceed 150 hours for each (3 CHS).



Guidance Plan

1st Year

1 st Semester			
Course Number	Course Name	# CH	Prerequisite
MATH 101	Calculus 1	3	-
HSS101CS	Introduction to Programming	3	CIS 099 OR Concurrent
HSS101CS	Introduction to Programming(Lab)	0	Concurrent with HSS101CS
HSS103SE	Introduction to Information Technology	3	HSS101CS OR Concurrent
LG 101	Communication Skills in English	3	Passing LG 99 OR Passing the Placement Test of English Skills
HI 102	Introduction to Health Information Systems and Management	3	-
Total		15	

2 nd Semester			
Course Number	Course Name	# CH	Prerequisite
NUR 310	Communication and Health Education	2	
HSS110	Leader and Social Responsibility	3	-
HSS112SE	Introduction to Object-Oriented Programming	3	Passing HSS101CS
HSS112SE	Introduction to Object-Oriented Programming(Lab)	0	Concurrent with HSS112SE
HSS 119	Entrepreneurship and Innovation	2	-
HSS241MATH	Discrete Mathematics	3	-
LG 103	Life Skills	2	-
Total		15	



2nd Year

1 st Semester			
Course Number	Course Name	# CH	Prerequisite
HMP 204	Medical Terminology	2	-
MATH 140	Elements Linear Algebra	3	-
ARB 102	Communication Skills in Arabic	3	-
HSS211CS	Data Structures	3	Passing HSS112SE AND HSS241MATH
HSS103BT	General Biology	3	-
CIS 201	Introduction to Web Design	1	CS112SE
Total		15	

2 nd Semester			
Course Number	Course Name	# CH	Prerequisite
HMP 332	Management of Medical Records	3	HI 102
MS 100	Military Sciences	3	-
HI 284	Visual Programming for Health Information Systems	3	HSS211CS
CIS 221	Fundamentals of Database Systems	3	HSS211CS
SE230	Fundamentals of Software Engineering	3	-
-	University Elective	3	-
Total		18	

3rd Year

1 st Semester			
Course Number	Course Name	# CH	Prerequisite
NUR 316	Biostatistics	3	MATH 101
PH 360	Epidemiology	3	-
CS 284	Analysis and Design of Algorithms	3	HSS211CS
HI 332	Data Visualization and Exploration	3	HI 284
HI 341	Information Security and Networks Technology and Policies	3	HI 284
-	Department Elective	3	-
Total		18	

2 nd Semester			
Course Number	Course Name	# CH	Prerequisite
HMP 342	Financial Management in Healthcare Sector	3	-
HI 321	Healthcare Data Analytics	3	HI 284
HI 335	Developing Mobile Applications and Telemedicine	3	HI 284
CIS 341	Web Applications Development	3	CIS 201
-	Department Elective	3	-
-	University Elective	3	-
Total		18	

Summer Semester			
Course Number	Course Name	# CH	Prerequisite
HI 391	Practical Training	3	Passing 90 CHs
Total		3	



4th Year

1 st Semester			
Course Number	Course Name	# CH	Prerequisite
HI 413	Deep Learning	3	HI 321
HI 420	Applications of Artificial Intelligence in Healthcare	3	HI 321
HI 421	Medical Image Processing	3	HI 321
HI 491	Graduation Project 1	1	Passing 90 CHs
CIS 332	System Analysis and Design	3	CIS 221
CIS 421	Database Applications	3	CIS 221
Total		16	

2 nd Semester			
Course Number	Course Name	# CH	Prerequisite
HSS 105 NUR	Quality Control, Infection Control and Patient Safety	3	-
HI 492	Graduation Project 2	2	HI 491
CIS 441	Data Communication and Computer Networks	3	HSS211CS
-	University Elective	3	-
-	Department Elective	3	-
Total		14	



Description of Courses

HI 102: Introduction to Health Information Systems and Management (3 C.H=3Th , 0P)

Prerequisite: None

This course is intended to help students gain a general understanding of various physiological systems as well as the medical terminology used by healthcare professionals and Health Information system professionals during the delivery of healthcare. Students will be exposed to and learn about the functions of each major system in the human body and how its performance is assessed from laboratory results and vital signs. Aspects of clinical decision-making including evidence-based practice will be studied. Students will understand how healthcare professionals use diagnostic findings in developing their clinical decision and how to use computing and technology to improve this process. Students will understand how healthcare professionals use diagnostic findings in developing their clinical decision and how to use computing and technology to improve this process. Public organization schemes in the field of healthcare, especially government systems in Jordan, will be discussed, as well as ways to improve these programs using health information systems. Jordan's public and private healthcare policies and regulatory frameworks will be highlighted. Students will also learn basic concepts of health economics and management and how to reduce expenses and improve management.

HI 203: Introduction to Hospital Information System and Management (3 C.H=3Th , 0P)

Prerequisite: None

This course is designed to briefly introduce the basics of Hospital Information Systems (HIS). Here, you will learn about the important solutions in digitizing the healthcare industry. The student will understand the concept and components of the hospital as a system and the supporting role of hospital information. After this course, you will have a deeper understanding of how vital HIS is and how you can take advantage of its many functions and applications.

HI 284: Programming for Health Information System (3 C.H=3Th , 0P)

Prerequisite: HSS211CS

This course introduces programming and problem-solving using Python. Topics include data types, methods, conditional statements, iteration, recursion, lists, dictionaries, strings, an operational model of procedure and methods calls, exceptions, and object-oriented programming. Also, this course introduces data analysis and visualization using python. The following python packages are covered: numpy, pandas, Matplotlib, Pillow, SciPy, and scikit-learn.

HI 321: Healthcare Data Analytics (3 C.H=3Th , 0P)

Prerequisite: HI 284

This course aims to provide the student with the needed requirements to use and analyze health care data. This will help to patient's health-related outcomes, through improving patient's treatment plans or use in research studies. This will be done using various AI and deep learning tools and applications.

HI 332: Data Visualization and Exploration (3 C. H=3Th , 0P)

Prerequisite: HI 284

This course provides fundamentals of information visualization. Topics include data and image models, multidimensional and multivariate data, design principles for visualization, hierarchical, network, textual and collaborative visualization, the visualization pipeline, data processing for visualization, visual representations, visualization system interaction design, and impact of



perception. Emphasizes construction of systems using graphics application programming interfaces (APIs) and analysis tools.

HI 335: Developing Mobile Applications and Telemedicine (3 C.H=3Th , 0P)

Prerequisite: HI 284

This project-oriented Problem-Solving course covers intermediate and advanced topics for designing and developing mobile applications on the Android platform. Topics will include a review of all previous core topics as well as data processing; Network technologies, URL loading, and working with some phone specifications such as GPS and motion sensors. Students are expected to work on a project that produces a professional quality mobile application. Projects will be deployed in real-world applications. Course work will include project conception, design, implementation, and beta testing of mobile software applications. Also, in this course, students will be introduced to the key components and considerations needed to design and implement a successful telemedicine program at both the practice and health system levels. The course emphasizes operational design principles and highlights a team-based approach. Key content areas include clinical considerations, patient safety, technology needs, patient satisfaction, legal, government affairs, regulatory and compliance, and billing considerations.

HI 338: Research Methods and Analysis in The Field of Health Care (3 C.H=3Th , 0P)

Prerequisite: HI 102

This course raises scientific research methods and practical issues related to conducting research. It also covers the qualitative and quantitative methods used in conducting research. This course will cover all stages related to scientific research, including research ethics, proposal submission, formulation of goals and objectives, research design, credibility and reliability, sampling strategies and measurements, research application, methods and means of data collection, analysis and interpretation of data, dissemination and skills of evaluating scientific research and provide criticism.

HI 341: Information Security and Networks Technology and Policies (3 C.H=3Th , 0P)

Prerequisite: HI 284

This course defines a range of current approaches, technologies, and issues related to the security and privacy of health information. It will cover common methods used in cyberattacks; Such as viruses, Trojan horses, computer worms, and storage memory exploits. The course will include information security techniques, including access control and information flow theory. Basics of encryption process and data encryption standards, advanced encryption standards and encryption algorithms such as hash function, password systems and intrusion detection systems will be covered. The course will also raise software security systems, internet security, and ethical and legal issues in computer security. The course will introduce students to the importance of professional and ethical best practices, roles and responsibilities, teamwork, communication methods, public ethics and cooperation as a means of improving the quality and safety of patient care.

HI 391: Practical Training (3 C.H= 0Th , 6P)

Prerequisite: Passing 90 CHs

This course provides students with the chance to experience the work environment before graduation. Students are required to spend a period of 60 working days as an intern in an institution approved by the CIS department. During this period, students need to get engaged in business practices with their mentors and observe and experience the business conduct of these institutions.

HI 410: Information Technology in Healthcare Systems of The Future (3 C.H=3Th , 0P)

Prerequisite: HI 102

This course aims to understand the information technology (IT) components available in the healthcare system as well as how IT applications may be utilized in the field of health and healthcare. Students in this course will learn how IT are reshaping and redefining the healthcare market through improved economies of scale, greater technical efficiencies in the delivery of care to patients, advanced tools for patient education and self-care, and the emergence of e-commerce in health care. Finally, students are introduced to the challenges associated with the application of IT in the institutional context of health service providers.

HI 411: Big Data and Data Warehouse for Healthcare (3 C.H=3Th , 0P)

Prerequisite: HI 335

Manipulation, storage, and analysis of large-scale data with respect to issues involving volume, velocity, variety and veracity; design of large-scale databases; use of large-scale distributed file systems; design of algorithms to analyze large data sets using parallelized processing tools. Also, the course provides principles of Data Warehousing, Data Warehouse techniques, Data Warehouse design, Extract-Transform-Load (ETL), Data Cubes, and Data Marts.

HI 412: Project Management in Healthcare (3 C.H=3Th , 0P)

Prerequisite: HI 321

In this course, the student learns about the concept of project management, its importance, its objectives, how to plan and implement it, how to organize it, its relationship with departments, and how to make decisions in it, as well as to clarify the concepts and tools of project design, management and oversight, and broaden students' perceptions of the contemporary risks they face.

HI 413: Deep Learning (3 C.H=3Th , 0P)

Prerequisite: HI 321

An introduction to deep learning methods including Deep Neural Networks, Recurrent neural networks, Convolutional neural networks, and Unsupervised deep learning with applications to computer vision and natural language understanding. The course teaches programming using packages such as Pytorch, Tensorflow, and Keras.

HI 414: Digital Marketing in Healthcare (3 C.H=3Th , 0P)

Prerequisite: HI 102

The course presents the constituent elements of e-marketing in terms of emphasizing the appropriate tools and techniques for designing and managing an actual e-marketing process. Currently, digital technologies have become more important for marketing. For example, digital advertising currently accounts for nearly half of all global ad spending. The course provides an applied understanding of the digital technologies available for e-marketing and how they should be used, such as social media and video marketing. Topics include strategy, content, and understanding customer behavior. search engine optimization; Search Ads, Internet Ads, Social Media Ads, Content Marketing Strategy, Social Media Strategy Direct Marketing: Email and Mobile. Video marketing.

HI 420: Applications of Artificial Intelligence in Healthcare (3 C.H=3Th , 0P)

Prerequisite: HI 321

The course covers topics related to Artificial Intelligence (AI) applications in healthcare (e.g. radiology, laboratory tests, patient monitoring, medical diagnosis, treatment plans, modeling disease progression, and predicting patient outcomes). This course gives students a comprehensive picture on how AI technologies support administrative tasks, clinical workflow, data analytics in health care. It also provides the student with opportunities to apply AI applications in healthcare through the use of relevant algorithms.

HI 421: Medical Image Processing (3 C.H=3Th , 0P)

Prerequisite: HI 321

This course includes processing, construction and analysis, registration, classification and image segmentation in healthcare. It se aims to provide basic knowledge in the field of imaging in healthcare, with emphasis on magnetic resonance imaging, X-ray computed tomography, ultrasound imaging, nuclear imaging, and optical imaging and how to deal with and analyze data derived from these medical images, aiming to provide diagnoses or use in research studies.

HI 432: Internet of Things (3 C.H=3Th , 0P)

Prerequisite: HI 335

This course provides an understanding of IoT technologies in healthcare. Students will learn IoT device programming (e.g., Arduino and Raspberry Pi), sensing and actuating technologies, IoT protocol stacks, networking backhaul design and security enforcement, and cloud based IoT platforms such as AWS IoT.

HI 433: Modeling and Simulation in Healthcare (3 C.H=3Th , 0P)

Prerequisite: HI 335

This course encompasses the aspect of utilizing high fidelity simulation in health education. It covers the following topics: (1) the purpose of using simulation in health education; (2) curriculum simulation integration; (3) types of simulation (low, moderate and high fidelity simulation); (4) developing, designing, and implementing clinical simulation scenarios; (5) different ways of an effective briefing and debriefing (the key to learning in simulation); and (6) evaluating healthcare simulation.

HI 434: Cloud Computing in Healthcare (3 C.H=3Th , 0P)

Prerequisite: HI 335

The course presents cloud computing, cloud infrastructure, security and privacy, and cloud models such as Infrastructure-as-a-service, Software-as-a-service, platform-as-a-service, etc. The course introduces cloud solutions provided by Google, Amazon, and Microsoft.

HI 436: Innovation and Change in Health Information Systems (3 C.H=3Th , 0P)

Prerequisite: HI 102

Many of the technologies have a short shelf life because most information technologies come in 18- to 36-month cycles. This course covers the aspect of establishing, leading, and managing innovation in order to thrive the culture in their markets. It introduces students to the key skills needed to generate an innovative culture that leads to relevant product and service offerings. In addition, this course exposes students to the requirements for introducing successful change initiatives and how to develop a culture that is change-capable.



HI 491: Graduation Project 1 (1 C.H=1Th , 0P)

Prerequisite: Passing 90 CHs

This course requires students to gather in groups and decide on a project that needs to be carried out under the supervision of a faculty member. The “Graduation Project Guidelines” set by the department council regulates the steps and the time frame for starting and completing this course. Students must consider the local and global impact of the project on individuals, organizations, and society.

HI 492: Graduation Project 2 (2 C.H=2Th , 0P)

Prerequisite: CIS 491

This course is a continuation of HI 491 and is also subject to the regulations in the “Graduation Project Guidelines”. The project must provide solutions to individuals, organizations, and society issues.

HI 493: Special Topics in Computer Information Systems 1 (1 C.H=1Th , 0P)

Prerequisite: Department Approval

This course grants the HI department flexibility in offering courses not included in the curriculum at basic levels.

HI 494: Special Topics in Computer Information Systems 2 (2 C.H=2Th , 0P)

Prerequisite: Department Approval

This course grants the HI department flexibility in offering courses not included in the curriculum at intermediate levels.

HI 495: Special Topics in Computer Information Systems 3 (3 C.H=3Th , 0P)

Prerequisite: Department Approval

This course grants the HI department flexibility in offering courses not included in the curriculum at advanced levels.