Jordan University of Science & Technology

Faculty of

Computer & Information Technology

Curriculum for the Bachelor Degree

In

Computer INFORMATION SYSTEMS

2015-2016

Study Plan for the Computer Information Systems 2015-2016

The Bachelor Degree in Computer Information Systems is awarded at Jordan University of Science & Technology after the successful completion of 132 credit hours distributed as follows:-

Requirements	Mandatory	Elective	Total
University Requirements	16	9	25
Faculty Requirements	27	0	27
Departmental Requirements	68	12	80
Total	**111**	**21**	**132**

and after fulfilling the terms and conditions for awarding the bachelors degree at Jordan University of Science & Technology number (1) issued in 1987 (amended).

1.University Requirements (25 CHs):

1-a) University Mandatory Courses (16 CHs):

Course Number	Course Title	Credit Hours	Weekly Hours	
			Lecture	Lab
ARB 101	Arabic Language	3	3	0
HSS 100 [1]	Culture and University Behavior	1	1	0
MS 100 [2]	Military Science	3	3	0
ENG 111[3]	English Language I	3	3	0
ENG 112 [4]	English Language II	3	3	0
CIS 100 [5]	Computer Skills	3	3	0

NOTE: Non-Arabic speaking students register for the following course instead of (ARB 101):

Course Number	Course Title	Credit Hours	Weekly Hours	
			Lecture	Lab
ARB 101A	Fundamentals of Arabic language for non-Arabs	3	3	0

1-b) University Elective Courses (9 CHs):

Course Number	Course Title	Credit Hours	Weekly Hours		Prerequisite
			Lecture	Lab	
NUR 100	Health Promotion (For Non Nursing & Midwifery Students)	3	3	0	-
NF 177	Food Preservation (For Non Nutrition & Food Technology Students) (in English)	3	3	0	-
ADS 100	Oral & Dental Health (For Non Dentistry & Allied Dental Sciences Students)	3	3	0	-
PHAR 104	Drugs and Medicinal Plants: Uses and Side Effect (For Non-Medicine and Pharmacy Students)	3	3	0	-
PH 104	Human Health and Nutrition (For Non-Medicine and Nursing Students)	3	3	0	-
PH 200	First Aid and Emergency Procedures (For Non-Medicine, Pharmacy and Nursing Students)	3	3	0	-

[1]- The grade for this course is a Pass/Fail grade.
[2]- The grade for this course is a Pass/Fail grade. Non-Jordanian students can take a substitute course from the elective courses, and the grade for the elective course goes into the calculation of the grade point average.
[3]- Prerequisite: Pass (ENG 099) or pass the prelim English exam with no less than 50%.
[4]- Prerequisite: (ENG 111) or pass the prelim English exam with no less than 80%.
[5]- The student who passes the computer skills exam with 50% or more, or has ICDL certificate or Cambridge certificate will be exempted from taking this course.

VM 211	Animal Health (For Non-Veterinary Medicine and Agriculture Students)	3	3	0	-
VM 212	Pet Animals Care (For Non-Veterinary Medicine Students)	3	3	0	-
HSS 112	Hadith Shareef	3	3	0	-
HSS 113	Aqideh	3	3	0	-
HSS 114	Fiqeh	3	3	0	-
HSS 115	Islam & Contemporary Problems	3	3	0	-
HSS 116	Islamic Economic System	3	3	0	-
HSS 121	Principles of Sociology (For Non-English Language Students)	3	3	0	-
HSS 126	Principles of Psychology (For Non Nursing & Midwifery Students)	3	3	0	-
HSS 127	Education Technology	3	3	0	-
HSS 128	National Education	3	3	0	-
HSS 131	Islamic Civilization	3	3	0	-
HSS 132	The History of the City of Jerusalem	3	3	0	-
HSS 133	Civilization and Recent Cultures	3	3	0	-
HSS 141	Principles of Economics (For Non-Computer and Information Systems Students)	3	3	0	-
HSS 142	Library and Information Research	3	3	0	-
HSS 151	Principles of Management (For Non-Computer and Information Systems Students)	3	3	0	-
HSS 161	Contemporary Problems	3	3	0	-
HSS 166	Man and Science	3	3	0	-
HSS 182	Woman Studies	3	3	0	-
HSS 211	Introduction to Sociology (in English)	3	3	0	-
HSS 212	Arab Society (in English)	3	3	0	-
HSS 213	The Individual and Society (in English)	3	3	0	-
HSS 216	Contemporary International Issues (in English)	3	3	0	-
HSS 221	Introduction to Psychology (For Non Nursing & Midwifery Students) (in English)	3	3	0	-
HSS 222	Creativity and Problem Solving	3	3	0	-
HSS 224	Leadership and Communication Skills	3	3	0	-
HSS 231	History of Sciences in the Arab World	3	3	0	-
HSS 241	Economy in the Third World	3	3	0	-
HSS 242	Information and Research (in English)	3	3	0	-
HSS 250	The History of Music (in English)	3	3	0	-
HSS 429	The Science of Children Behavior and Treatment	3	3	0	-
AP 200	Farm Animal Products and Production (For Non Agriculture And Veterinary Students)	3	3	0	-
PT 100	Wellness & Lifestyle (For Non Physical & Occupational Therapy Students)	3	3	0	-
ES 103	Environment Protection (For Non Environmental Sciences Students)	3	3	0	-
ME 211	Fundamentals of Automobile Engineering (For Non-Mechanical Engineering Students)	3	3	0	-
NR 200	Natural Resources and Man (For Non Agriculture Students)			0	
PP 200	Home Gardens (For Non Agriculture Students)	3	3	0	-
PP 201	Bee Keeping (For Non Agriculture Students)	3	3	0	-

2. Faculty Requirements (27 CHs):

Course Number	Course Title	Credit Hours	Weekly Hours		Prerequisite
			Lecture	Lab	
MATH 101	Calculus I	3	3	0	-
MATH 102	Calculus II	3	3	0	MATH 101
MATH 241	Discrete Mathematics	3	3	0	-
CS 101	Introduction to Programming	3	3	0	CIS 100 or Concurrent
CS 102	Programming Lab	1	0	3	CS 101 or Concurrent
CS 112	Introduction to Object-Oriented Programming	3	3	0	Passing CS 102
CS 113	Object-Oriented Programming Lab	1	0	3	CS 112 or concurrent
CS 211	Data Structures	3	3	0	MATH 241 + Passing CS 112
CIS 200	Professional & Ethical Issues in Computing	1	1	0	-
CIS 201	Introduction to Web Design	1	0	3	CS 113
CIS 202	Communication Skills	2	2	0	CIS 200 or concurrent
CIS 221	Fundamentals of Database Systems	3	3	0	CS 211

3. Department Requirements (80 CH) classified as:

3-a) Department mandatory requirements (68 CH):

Course Number	Course Title	Credit Hours	Weekly Hours		Prerequisite
			Lecture	Lab	
CS 181	Linear Algebra	3	3	0	-
MATH 233	Probability & Statistics for CS Students	3	3	0	MATH 102
CIS 151	Introduction to Management	3	3	0	-
CIS 231	Fundemantals of Information Systems	3	3	0	CIS 151
CIS 251	Accounting	3	3	0	CIS 151
CIS 321	Data Mining	3	3	0	CIS 221 + MATH 233
CIS 351	Management Information Systems	3	3	0	CIS 221 + CIS 231
CIS 332	Systems Analysis and Design	3	3	0	CIS 351
CIS 338	Health Information Systems	3	3	0	CIS 221 + CIS 231
CIS 341	Web Applications Development	3	3	0	CIS 201
CIS 335	IT Project Management	3	3	0	CIS 332
CIS 352	Business Process Management	3	3	0	CIS 332 + MATH 233
CIS 381	Human Computer Interaction	2	2	0	CIS 341 + CS 112
CIS 391	Practical Training	3	0	0	Completion of 90 CH
CIS 421	Database Applications	3	3	0	CIS 221
CIS 431	Decision Support Systems and Intelligent Systems	3	3	0	CIS 352 + CIS 321
CIS 432	Enterprise Information Systems	3	3	0	CIS 352
CIS 433	Information Security	3	3	0	CIS 351
CIS 441	Business Data Communication	3	3	0	CS 211 + CPE 236
CIS 451	E-business	3	3	0	CIS 341
CIS 452	Business Planning and Control	3	3	0	CIS 251 + CIS 351
CIS 491	Graduation Project 1	1	0	0	Completion of 90 CH
CIS 492	Graduation Project 2	2	0	0	CIS 491
CPE 236	Digital Logic Design	3	3	0	CS 113

3-b) Department elective requirements (12 CH):

Course Number	Course Title	Credit Hours	Weekly Hours		Prerequisite
			Lecture	Lab	
CIS 401	Fundamentals of Multimedia	3	3	0	CIS 201 + CS 211
CIS 422	Data Warehousing	3	3	0	CIS 221
CIS 423	Big Data Management	3	3	0	CIS 321
CIS 434	Human Resource Information Systems	3	3	0	CIS 251 + CIS 231
CIS 435	Information Retrieval	3	3	0	CS 211
CIS 436	Privacy of Healthcare Information	3	3	0	CIS 338
CIS 437	Geographical Information Systems	3	3	0	CIS 231 + CIS 221
CIS 453	Accounting Information Systems	3	3	0	CIS 251 + CIS 231
CIS 457	Marketing	3	3	0	CIS 151
CIS 475	Principles of Modern Operating Systems	3	3	0	CS 211 + CPE 236
CIS 476	Cloud Computing	3	3	0	CIS 441
CIS 482	Operations Research	3	3	0	CS 112 + MATH 233
CIS 493	Special Topics in Computer Information Systems (1)	1	1	0	Department approval
CIS 494	Special Topics in Computer Information Systems (2)	2	2	0	Department approval
CIS 495	Special Topics in Computer Information Systems (3)	3	3	0	Department approval
-	Any faculty course at level 400 or above	3	3	0	Department approval

Note: The following table contains courses offered by the Department of Computer Information Systems to students in other faculties:-

Course Number	Course Title	Credits Hours	Weekly Hours		Prerequisite
			Lecture	Lab	
CIS 700	Computer Applications	1	0	3	-

Course Numbering Convention:

Digit	Meaning	Explanation	
Hundreds	Course Level	1	First year
		2	Second year
		3	Third year
		4	Forth 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	

Recommended Study Plan

1st Year

Semester 1

Course Number	Course Name	Credits Hours	Prerequisite
CIS 100	Computer Skills	3	-
CS 101	Introduction to programming	3	CIS 100 or Concurrent
CS 102	Programming Lab	1	CS 101 or Concurrent
CS 181	Linear Algebra	3	-
ENG 111	English Language I	3	Pass ENG 099
MATH 101	Calculus I	3	-
Total		**16**	

Semester 2

Course Number	Course Name	Credits Hours	Prerequisite
CIS 151	Introduction to Management	3	-
CS 112	Introduction to Object-Oriented programming	3	Pass CS 102
CS 113	Object-Oriented Lab	1	CS 112 or Concurrent
ENG 112	English Language II	3	ENG 111
HSS 100	Culture and University Behavior	1	-
MATH 102	Calculus II	3	MATH 101
MATH 241	Discrete Mathmetics	3	-
Total		**17**	

2nd Year

Semester 1

Course Number	Course Name	Credits Hours	Prerequisite
ARB 101	Arabic Language	3	-
CIS 231	Fundemantals of information systems	3	CIS 151
CIS 251	Accounting	3	CIS 151
CS 211	Data Structures	3	Pass CS 112 + MATH 241
CIS 200	Professional & Ethical Issues in Computing	1	-
CIS 202	Communication Skills	2	CIS 200 or concurrent
	University Elective	3	
Total		**18**	

Semester 2

Course Number	Course Name	Credits Hours	Prerequisite
CIS 201	Introduction to Web Design	1	CS 113
CIS 221	Fundamentals of Database Systems	3	CS 211
CPE 236	Digital Logic Design	3	CS 113
MATH 233	Probability & Statistics (for CS students)	3	MATH 102
MS 100	Military Science	3	-
-	University Elective	3	-
Total		**16**	

3rd Year

Semester 1			
Course Number	**Course Name**	**Credits Hours**	**Prerequisite**
-	Department Elective	3	-
CIS 321	Data Mining	3	CIS 221 + Math 233
CIS 351	Management Informations Systems	3	CIS 221 + CIS 231
CIS 338	Health Information Systems	3	CIS 221+ CIS 231
CIS 341	Web Application Development	3	CIS 201
Total		**15**	

Semester 2			
Course Number	**Course Name**	**Credits Hours**	**Prerequisite**
-	Department Elective	3	-
CIS 332	System Analysis and Design	3	CIS 351
CIS 381	Human computer interaction	2	CIS 341 + CS 112
CIS 421	Database Applications	3	CIS 221
CIS 441	Business Data Communication	3	CS 211 + CPE 236
CIS 451	E-Business	3	CIS 341
Total		**17**	

Summer			
Course Number	**Course Name**	**Credits Hours**	**Prerequisite**
CIS 391	Practical Training	3	Completion 90 CHs
Total		**3**	

4th Year

Semester 1			
Course Number	**Course Name**	**Credits Hours**	**Prerequisite**
CIS 335	IT Project Management	3	CIS 332
CIS 352	Business Process Management	3	CIS 332 + MATH 233
CIS 431	Decision Support Systems and Intelligent Systems	3	CIS 321 + CIS 352
CIS 491	Graduation Project I	1	Completion of 90 CHs
-	University Elective	3	-
-	Department Elective	3	-
Total		**16**	

Semester 2			
Course Number	**Course Name**	**Credits Hours**	**Prerequisite**
CIS 433	Information Security	3	CIS 351
CIS 432	Enterprise Information Systems	3	CIS 352
CIS 452	Business Planning and Control	3	CIS 251 + CIS 351
CIS 492	Graduation Project II	2	CIS 491
-	Department Elective	3	-
Total		**14**	

Computer Information System
Description of Courses 2015-2016

CIS 100: Computer Skills (3C=3H+0L)

Prerequisite: None

This course provides the very basic computer skills to students who have failed in demonstrating such skills in their college admittance test. The course covers topics such as computer components, computer functions and benefits, computer viruses and measure of protection. Also, introduction to operating systems, application software (including word processing, spreadsheets and presentation applications), Internet, e-mail systems, e-learning systems, e-library systems.

CIS 151: Introduction to Management (3C=3H+0L)

Prerequisite: None

This course provides an introductory coverage of management theory and practice. The topics include application of management theories to practical problems in planning, organizing, and controlling business activity. It focuses on the basic roles, skills and functions of management for effective and efficient decision making. The current issues of business ethics, environmental concerns, international management, women in management and political environment are also reviewed.

CIS 200: Professional and Ethical Issues in Computing (1C=1H+0L)

Prerequisite: None

This course introduces students to the social context of the IT industry and its practices. These include professional and ethical responsibilities in the analysis and design of systems. Also, in ensuring the safety of work environments, risks and liabilities of computer-based systems, intellectual property, computer crimes, and economic issues in computing.

CIS 201: Introduction to Web Design (1C=0H+3L)

Prerequisite: CS 113

This course introduces students to the Internet as an infrastructure to many services. The course then focuses on the WWW as a major Internet-based service. Working in a Lab, students will learn to create and maintain web pages and construct them in web sites. For this end, the students will learn HTML, XHTML and DHTML. Additionally, a brief introduction to XML is provided.

CIS 202: Communication Skills (1C=1H+0L)

Prerequisite: CIS 200 or concurrent

Verbal and nonverbal forms of communication: speaking, listening, and technical writing, essential information to communicate effectively in a variety of business settings.

CIS 221: Fundamentals of Database Systems (3C=3H+0L)

Prerequisite: CS 211

This course introduces the basics of database systems, as well as the modeling, desgin and manipulation of relational databases. At the end of this course, a student will be able to understand and apply the fundamental concepts required for the use and design of database systems. Topics include basic concepts and terminology of the database approach, data modeling (the entity relationship model, relational data model), database design theory (entity relationship to relational mappings, normalization using functional dependencies), data definition and manipulation languages (relational algebra, SQL). The course will enable the students to create and manipulate databases on the Oracle database management system.

CIS 231: Fundemantals of Information Systems (3C=3H+0L)

Prerequisite: CIS 151

This course is designed to introduce students to contemporary information systems and demonstrate how these systems are used throughout global organizations. The focus of this course will be on the key components of information systems - people, software, hardware, data, and communication technologies, and how these components can be integrated and managed to create competitive advantage. Though the knowledge of how IS provides a competitive advantage students will gain an understanding of how information is used in organizations and how IT enables improvement in quality, speed, and agility. This course also provides an introduction to systems and development concepts, technology acquisition, and various types of application software that have become prevalent or are emerging in modern organizations and society.

CIS 251: Accounting (3C=3H+0L)

Prerequisite: CIS 151

This course introduces students to the fundamental concepts of accounting. Students will learn procedures of collecting financial data and how to process such collections according to the generally accepted accounting principles. Students will also learn the accounting of a service firm, and accounting for purchase and sales of merchandise, the recording in the general journal (and the various specialized journals), and how to post data to the ledgers. Finally, the course covers the preparation of the trial balance and financial statements, including the study of the closing entry and adjusting entry.

CIS 321: Data Mining (3C=3H+0L)

Prerequisite: CIS 221 + math 233

In this course students will learn about the advances in computer information systems, machine learning, statistics, intelligent systems and methodologies for the automatic discovery of knowledge from large high-dimensional databases. The course covers basic concepts and techniques, including data cleaning, clustering, classification, association rules mining. Finally, the course surveys data mining tools and applications.

CIS 332: Systems Analysis & Design (3C=3H+0L)

Prerequisite: CIS 351

An introduction to the system development life cycle. Emphasis on strategies and techniques of systems planning, analysis and design, documentation, implementation and evaluation. Students are expected to carry out group projects using the system development life cycle.

CIS 335: Information Technology Project Management (3C=3H+0L)

Prerequisite: CIS 332

This course discusses the processes, methods, techniques and tools that organizations use to manage their information systems projects. The course covers a systematic methodology for initiating, planning, executing, controlling, and closing projects. This course assumes that project management in the modern organization is a complex teambased activity, where various types of technologies (including project management software as well as software to support group collaboration) are an inherent part of the project management process. This course also acknowledges that project management involves both the use of resources from within the firm, as well as contracted from outside the organization.

CIS 338: Health Information Systems (3C=3H+0L)

Prerequisite: CIS 221 + CIS 231

This course covers the sources of health information systems and their relation to health agencies. A study is made of the origin and purpose, content, assembly, analysis and use of medical records. The course will introduce software applications used in HCIS. The student will develop an understanding of the implications of integrated versus interfacing disparate HCIS application, database management and patient privacy issues. The course will examine emerging technology in the areas of rural health care, access to Electronic Medical Records, and Regional Health Information Organizations. Methods of compiling, numbering, filing and retention of health information.

CIS 341: Web Applications Development (3C=3H+0L)

Prerequisite: CIS 201

This course is a continuation to what students have learned in the Introduction to Web Design course (CIS 201). In this course, students learn to construct robust and highly interactive web sites using the latest features of CSS and HTML5 and scripting languages. In this course students should be able to master client-side and sever-side scripting languages. For example, HTML5, JavaScript, Active Server Pages (ASP), DHTML, Ajax, and XML and PHP. A set of laboratory experiments will provide hands-on experience in the forementioned topics (CIS 342).

CIS 351: Management Information System (3C=3H+0L)

Prerequisite: CIS 221 + CIS 231

This course introduces the essential of Management Information Systems (MIS). All phases from long-range or strategic management information systems planning to development and operation (maintenance) are addressed from a management point of view. Impact that MIS has on management decision making, managing computing and communication resources, security of information systems, enterprise applications. Students will learn the terminology used in the field of IT and how IT can help in achieving a competitive advantage and increasing the return on investment.Tools and applications will be used to master management skills on a live project assignment. Information services will be studied as a separate topic.

CIS 352: Business Process Management (3C=3H+0L)

Prerequisite: CIS 332 + MATH 233

In this course, students will be introduced to key concepts and approaches to business process management and improvement. The main focus of this course is both understanding and designing business processes. Students will learn how to identify, document, model, simulate, assess, and improve core business processes. Students will be introduced to process design principles. The discussed issues include as-is model development and simplification, model verification, business process preparation for simulation, business processes performance assessment, design business process improvements, understand the role and potential of IT to support business process management, understand different approaches to business process modeling and improvement. The course lab will allow the students to use a modeling and simulation tool to model and simulate simple business processes and use simulation results in business process analysis.

CIS 381: Human-Computer Interaction (2C=2H+0L)

Prerequisite: CIS 341 + CS 112

This course sheds light on developing human-centered organizational information systems that support users' organizational tasks. Human physical, cognitive, and affective characteristics are discussed, as are organizational tasks and context. Such discussions are oriented toward achieving a good fit between human, technology, and tasks within the organizational and business context, for the purpose of improving usability and acceptance of IS. The students will learn several models explaining adoption of technologies including technology specifications, human factors, and environmental factors.

CIS 391: Practical Training (3C)

Prerequisite: Completion of 90 Credits hours

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.

CIS 401: Fundamentals of Multimedia (3C=3H+0L)

Prerequisite: CS 211 + CIS 201

This course introduces students to the basic elements of multimedia. These include text, sound, images, video and animation. For each element the students will learn about the required hardware and software and the effective utilization of the element in information communication. Laboratory sessions will enable the students to practice the theories and the software they learn in class.

CIS 421: Database Applications (3C=2H+3L)

Prerequisite: CIS 221

This course is an overview of the use of automated information systems in the management system and its various settings. Object relational model, large objects (multimedia objects, large text objects), SQL99, procedural extensions of SQL, Dynamic SQL, language interfaces with databases, XML and databases. Students will work on a team project to design, implement, and develop an IS application.

CIS 422: Data Warehousing (3C=3H+0L)

Prerequisite: CIS 221

This course covers basic topics related to data warehousing. These include building the data warehouse team, developing the business model, tools for data warehouse creation, maintenance and delivery. The course focuses on fundamentals of object analysis for business model creation and using the business model as a foundation for multi-dimensional analysis. The students will learn about the importance of metadata as well as schema designs and its variants. Also, data sources for the warehouse (such as legacy systems, operational systems, and others), multi-level architecture for integrating heterogeneous data and understanding and managing summary data. Finally, students will learn strategies for data validation and production issues for warehouse delivery

CIS 423: Big data management (3C=3H+0L)

Prerequisite: CIS 321

The course will discuss data management techniques for storing and analyzing very large amounts of data. The emphasis will be on columnar databases and on Map Reduce as a tool for creating parallel algorithms that can process very large amounts of data. In addition the discussions will focus on applications of Big Data in internet advertising, healthcare and social network analysis. Topics include: Introduction to the Big Data problem. Current challenges, trends, and applications, Columnar stores, distributed databases, Map-Reduce paradigm and the Hadoop ecosystem, Locality Sensitive Hashing (LSH), Dimensionality reduction, Data streams, unstructured data processing, NoSQL, and NewSQL.

CIS 431: Decision Support Systems and Intelligent Systems (3C=3H+0L)

Prerequisite: CIS 321 + CIS 352

The purpose of this course is to treat the essentials of discrete-event simulation methodology, and does so in the context of a popular Arena simulation environment. The course contains topics on the simulation modeling methodology and the underpinnings of discrete-event systems, as well as the relevant underlying probability, statistics, stochastic processes, input analysis, model validation and output analysis, and more detailed design for organizational operations and their analysis. All simulations-related concepts are illustrated in numerous Arena examples, encompassing production lines, manufacturing and inventory systems, and Health Information Systems Applications. An introduction into the application of Artificial Intelligence techniques in business will be given and the coverage will extend to include major characteristics of KBSs, the knowledge acquisition and representation, inference techniques, Expert System development tools and Case-Based reasoning.

CIS 432: Enterprise Information Systems (3C=3H+0L)

Prerequisite: CIS 352

This course is designed to provide students with an understanding of the theoretic and practical issues related to the application of enterprise systems within organizations. The main focus of this course is to demonstrate how enterprise systems integrate information and organizational processes across functional areas with a unified system comprised of a single database and shared reporting tools. Enterprise systems, by their multi-dimensional integrative nature, offer the depth of functionality and breadth of integration to demonstrate how global operations of organizations are managed. Thus, students will gain an appreciation of the scope of enterprise systems and the motivation for implementing them. Several issues are discussed including business process integration, acquisition and implementation of ES, challenges associated with the implementation of ES, organizational change and change management, governance of processes and data. Hands-on lab training on an ES will support the learned concepts.

CIS 433: Information Security (3C=3H+0L)

Prerequisite: CIS 351

The course covers classic security topics, such as applied cryptography, authentication, authorization and basic security principles. Furthermore, we will cover some recent topics web security and virtual machines security through research paper assignments. The topics that the course covers are listed below:

Overview: Confidentiality, Integrity, Availability. Security policy and mechanism. Basic principles of secure system design. **Cryptography:** Basic crypto primitives, Secret key crypto, Public key crypto, Digital signatures, Message authentication. **System security:** Authentication, Access Control, Discussion of popular systems and security protocols. **Advanced topics:** Virtual machines, Information flow, Privacy, Anonymity.

CIS 434: Human Resource Information Systems (3C=3H+0L)

Prerequisite: CIS 251 + CIS 231

Many managers and organizations now recognize that a critical source of competitive advantage often comes not from having the most ingenious product design, the best marketing strategy, or the most state-of-the-art production technology, but rather from having an effective system for obtaining, mobilizing, and managing the organization's human assets. Although many managers and organizations recognize the importance of managing the work force effectively and even "know" what effective approaches are, it is remarkable how frequently firms fail to implement effective human resource management analysis and practices. Therefore, this course has two central themes: How to think systematically and strategically about aspects of managing the organization's human assets, and what really needs to be done to implement these policies and to achieve competitive advantage through people. The Human Resources Management (HRM) function includes a variety of activities, and key among them is deciding what staffing needs you have and whether to use independent contractors or hire employees to fill these needs, recruiting and training the best employees, ensuring they are high performers, dealing with performance issues, and ensuring your personnel and management practices conform to various regulations. Activities also include managing your approach to employee benefits and compensation, employee records and personnel policies.

CIS 435: Information Retrieval (3C=3H+0L)

Prerequisite: CS 211

The main objective of this course is to provide students with the basic concepts of information retrieval systems, their types and different techniques in storing, manipulating and retrieving data. It covers a range of topics including: Functional view of information retrieval, types of IRS, design issues of IRS (keyword-based retrieval, file structures, thesaurus construction, etc.), IR data structures and algorithms (lexical analysis, stemming, term weighting, associative indexing, Boolean operations, string searching and matching techniques, etc.), relevance feedback and query modification, applications and case studies. The practical part includes applications and exercises that suit the concepts and techniques covered in this course.

CIS 436: Privacy of Healthcare Information (3C=3H+0L)

Prerequisite: CIS 338

This course covers several concepts such as, an introduction to privacy and security of healthcare information systems, how to protect the confidentiality of patient information, types of access and the appropriate availability of healthcare information to health care providers, concepts of limiting unauthorized access, standards and specifications that help keeping patient medical information secure in an electronic environment, common data protection issues, and exchanging clinical information between healthcare organizations need to be addressed. Related case studies will be used and administrative issues will be researched and presented by students as the course project.

CIS 437: Geographical Information Systems (3C=3H+0L)

Prerequisite: CIS 231 + CIS 221

This course provides students the concept and technology of Geographic Information Systems (GIS). GIS science focuses on ways to describe and explain geographical patterns and processes. This includes spatial data, GIS data structure, spatial relationships, data acquisition, and quality. In addition, this course covers geographic database and inventory operations, basic geographic data analysis, and geographic systems output**.**

CIS 441: Business Data Communication (3C=3H+0L)

Prerequisite: CS 211 + CPE 236

This course is an introduction to principles of data communications and networking. It covers the telecommunication systems and different protocols and computer networks required to know by business organizations. The coverage extends to communication concepts, transmission media, signal representation and modulation, packet switching and routing, network topology and architecture, network management and Internet protocols TCP/IP. Finally, basic concepts of security in networks are discussed.

CIS 451: E-Business (3C=3H+0L)

Prerequisite: CIS 341

This course introduces students to the fundamental concepts of electronic business and commerce. It provides an overview of practical uses of the Internet in commercial applications. The topics include navigation of the Internet, designing web applications and publishing web sites. The coverage extends to the concepts of e-retailing, e-stock trading, e-publishing and e-banding. The discussion of these concepts brings in related issues such as security, privacy, new business processes and cross-border commerce.

CIS 452: Business Planning and Control (3C=3H+0L)

Prerequisite: CIS 251 + CIS 351

This course is designed to introduce students to Integrating Strategy, Accounting and People. It presents the core areas of management accounting and business planning. It also explores relationships between strategy, management accounting information, and the design of control systems, taking into account the needs of both people and organizations. It includes an integrative approach to business planning and control, specific focus on the design of planning and control systems, key techniques of strategic management, management accounting techniques for operational, managerial and strategic purposes.

CIS 453: Accounting Information Systems (3C=3H+0L)

Prerequisite: CIS 251 + CIS 231

This course covers the impact of computerized information systems on accounting and finance, and their effects on daily business operations. People, technology, procedures and controls that together: maintain essential channels of communication, process and control routine business activities, and alert management and others to significant internal and external accounting events.

CIS 457: Marketing (3C=3H+0L)

Prerequisite: CIS 151

This course introduces students to the main concepts in marketing. After being aware to the importance of marketing, they will learn about the marketing mix and its relationship with the marketing concept. They will learn about the environmental scanning and analysis of the environmental forces including economical, political and technological. They will learn the role of information technology in improving marketing performance, customer relationship management, and marketing research. Finally, the students will learn about the consumer buying decision process and the factors affecting it. Case studies that demonstrate the concepts are discussed as well as popular marketing systems.

CIS 475: Principles of Modern Operating Systems (3C=3H+0L)

Prerequisite: CS 211 + CPE 236

Introduction to fundamental issues in design and development of parallel programs for various types of parallel computers. Various programming models according to both machine type and application area. Cost models, debugging, and performance evaluation of parallel programs with actual application examples. Emphasis will be on MPI parallel programming language.

CIS 476: Cloud computing (3C=3H+0L)

Prerequisite: CIS 441

This course gives an introduction to cloud computing and its techniques, issues, ecosystem and case studies. This course covers a series of current cloud computing technologies, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Business Process as a Service (BPaaS), Cloud security and privacy. For different layers of the cloud technologies, practical solutions such as Google, Amazon, Microsoft, SalesForce.com, etc. solutions as well as theoretical solutions are introduced.

CIS 482: Operations Research (3C=3H+0L)

Prerequisite: CS 112 + MATH 233

This course introduces students to problem modeling and solving using mathematical techniques. It covers topics that include: linear programming, transportation, assignment, network flow and CPM/PERT techniques. Students will learn how to use quantitative analysis techniques and computer packages in solving problems facing business managers in decision environments. In addition to the full understanding that students will gain in learning how to use quantitative methods and techniques for effective decisions–making; model formulation and applications., they will enjoy a hands-on experience in solving real business decision making problems in the covered topics . The discussed applications are diverse, including industry, government, and defense. Topics usually chosen from dynamic, linear, and nonlinear programming; sensitivity analysis, decision theory, Markov chains, queuing theory, inventory control, simulation, network analysis, selected case studies.

CIS 491: Graduation Project I (1C)

Prerequisite: Completion of 90 credit hours

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.

CIS 492: Graduation Project II (2C)

Prerequisite: CIS 491

This course is a continuation of CIS 491 and is also subject to the regulations in the "Graduation Project Guidelines".

CIS 493: Special Topics in Computer Information Systems (1C=1H+0L)

Prerequisite: Department Approval

This course grants the CIS department flexibility in offering courses not included in the curriculum.

CIS 494: Special Topics in Computer Information Systems II (2C=2H+0L)

Prerequisite: Department Approval

This course grants the CIS department flexibility in offering courses not included in the curriculum.

CIS 495: Special Topics in Computer Information Systems III (3C=3H+0L)

Prerequisite: Department Approval

This course grants the CIS department flexibility in offering courses not included in the curriculum.

CIS 700: Computer Applications (1C=0H+3L)

Prerequisite: None (for graduate students in medical faculties)

This course is designed to help graduate students lacking IT backgrounds to acquire the basic computer skills. The major topics in this course include introduction to computers, computer hardware, computer software, computer viruses, operating systems, word-processing, spreadsheets, presentation software, Internet, World Wide Web, search engines, FTP, telnet and file downloading.