



Faculty of Computer Science and Informatics

Department of Computer Science

Study Plan of the Bachelor's Degree

In: Computer Science

Academic Year: 2018/2019

**Vision of the Department:**

Excellence in teaching, learning, scientific research and community service in the field of computer science.

Mission of the Department:

To provide a qualitative and advanced research program in the field of computer science and its applications to prepare graduates with the knowledge and research skills necessary to meet the growing market requirements and lifelong learning.

Objectives of the Department:

- 1. Providing students with diverse knowledge in the light of the rapid change in the software industry and computing.**
- 2. Providing students with in-depth research competencies in the subject of computer science as a basis for postgraduate studies.**
- 3. Providing students with analytical knowledge and skills to find effective and creative solutions to practical and research problems.**
- 4. Prepare specialists with the ability to bring about change and development and creativity in the fields of computer science**

Intended Learning Outcomes (ILOs):

- 1. Ability to apply extensive knowledge and focused in the fields of computer science.**
- 2. Developing scientific research in academic and industrial fields.**
- 3. The ability to apply mathematical methods and algorithm to solve computer problems in the fields of computer science.**
- 4. The ability to design, develop and implement simulation of problem solving in the fields of computer science.**
- 5. Ability to analyze, design, implement and evaluate computing systems in various practical fields.**
- 6. Ability to adapt to growing technological change and its impact on organizations and communities and engage in lifelong learning**



Framework

Framework of the MSc's Degree in Computer Science (33. Cr. Hrs.)

Thesis Track:

Sequence	Classification	Credit Hours	Percent %
1st	Core Requirements	15	46%
2nd	Elective Requirements	9	27%
3rd	Thesis	9	27%
Total		33	100%

Comprehensive Track:

No	Requirement Type	Credited Hours	Percentage
1st	Core Requirements	24	73%
2nd	Elective Requirements	9	27%
Total		33	100%

Course Numbering

Sequence	Course Level	Cognitive Domain	Dept. Code	Faculty Code
			1	4
			2 CIS	Faculty of Computer Science and Informatics
			3 SE	
			4 MC	

Comprehensive Track

First: Core Requirements: 24 Credit Hours

Code	Course Name	Credit Hours	Pre-requisite
40171011	Statistics and Research Methodology in Computer Science	3	-
40172011	Advance Operating Systems	3	-
40172012	Advance Computer Networks	3	-

40172025	Advance Design and Analysis of Algorithms	3	-
40173011	Advance Data Base and Data Warehouse Systems	3	-
40173030	Advanced Information Security and Cryptography	3	-
40173012	Advanced Artificial Intelligence	3	-
40173026	Graduation Project	3	-
Total		24	

Second: Elective Requirements: 9 Credit Hours

Track	Code	Course Name	Credit Hours	Pre-requisite
Networking and Information Security	40173031	Advanced Computer Networks Security	3	-
	40173032	Advanced Network and Internet Protocols	3	-
	40173033	Advanced Cloud Computing and Internet of Things	3	-
Artificial Intelligence	40173014	Advanced Image Processing		
	40173034	Advanced Data Mining	3	-
	40173028	Advanced Natural Language Processing	3	-
Other Courses	40172023	Advance Software Engineering	3	-
	40173023	Special Topics in Computer Science	3	-

Third: Comprehensive Exam



Courses Description

40171011 Statistics and Research Methodology in Computer Science 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

Providing experiences using the tools and techniques for doing research in Computer Science. Subjects include aspects of research from developing a project proposal to various forms of dissemination. Emphasizes communication skills, creative thinking, problem-solving, and integration of knowledge from prior computer science courses. Includes a study of computer science research tools, principles of experiment design, and statistics. There will be a semester-long project in which, student will select a research problem, review relevant literature, produce a report, and present the results of their research to their peers.

40172011 Advanced Operating Systems 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

Operating Systems Theoretical and practical aspects of operating systems. Process and thread communication and synchronization. File systems, disk management, I/O systems, protection and security systems, distributed system, real-time systems, mobile operating systems, current trends in operating systems, the course includes complete a research or project by the students.

40172012 Advanced Computer Networks 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

The course covers the principles of computer networking with emphasis on algorithms, protocols, and implementation aspects of advanced networking services. The topics covered in this course include the design of the Internet and its basic mechanisms and protocols in addition to selected advanced recent topics of research in networking such as routing, congestion control, wireless and mobile networks, and performance analysis of computer networks, the course includes complete a research or project by the students.

40172025 Advanced Design and Analysis of Algorithms 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

The course introduces advanced techniques for design and analysis of algorithms and focuses on the range of algorithms available for computational tasks, considering the fundamental division of tractable tasks, with linear or polynomial-time algorithms; Algorithmic techniques such as (greedy, divide-and-conquer, dynamic

programming, graph traversal, backtracking, and branch-and-bound); applications include sorting and searching, graph algorithms, and optimization. Concept of algorithm correctness, NP-Complete theory.

40173011 Advanced Database and Data Warehouse Systems 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

The course describes the basic concepts, which underpin the technology of database systems. The main areas covered are Database System Architecture, database design, Entity relationship Model, Normalization of database tables, an Introduction to SQL (Standard Query Language), SQL Queries, Distributed Systems, and the Internal Management and Control of database Systems. The Course introduces the data Warehouse and how it may serve as the foundation for decision support activities. We explore several approaches to the implementation of decision support systems, online processing (OLAP) using relational DBMS and multidimensional database. Given the existence of the data warehouse, data mining system provide automated tools to perform data extraction and data analysis, also covers in this course, the course includes complete a research or project by the students.

40173030 Advanced Information Security and Cryptography 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

The course gives a comprehensive study of the principles and practices of computer system security including operating system security, network security, software security and web security. Topics include common attacking techniques such as virus, trojan, worms and memory exploits; the formalisms of information security such as the access control and information flow theory; the common security policies such as BLP and Biba model; the basic cryptography, RSA, cryptographic hash function, and password system; and real system implementations; intrusion detection; software security theory; web security; legal and ethical issues in computer security, the course includes complete a research or project by the students.

40173031 Advanced Computer Networks Security 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

Security of IEEE 802.11 Wireless LANs, Smart phone and cellular network security, RFID security, Privacy protection in wireless access networks, Location privacy, Anonymous communication in wireless networks, Secure localization, Anti-jamming techniques, Security in cognitive radio networks, Broadcast authentication in wireless sensor networks, Vehicular ad hoc network security. Trust Concepts, Trustworthiness, Reputation, and Security, Recommender Systems. Introduction to Beta and Dirichlet Probability Distribution, Bayesian Approaches to Trust



with Application to MANETs, Sensor Networks, etc., Common Security Attacks and their Prevention, the course includes complete a research or project by the students.

40173032 Advanced Network and Internet Protocols 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

The Internet protocols have revolutionized communications. This advanced networking course will equip students with a deep knowledge of network concepts, protocol design, and performance analysis that make the Internet work, help you develop critical insight into their design, and obtain a first-hand feel for implementation through homework and project exercises. Another key goal is to prepare you for doing research in the field of networking. Additional protocols from the OSI and telecommunications/ATM world will also be featured to provide in-depth comparative studies, the course includes complete a research or project by the students.

40173033 Advanced Cloud Computing and Internet of Things 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

This course investigates cloud computing and the Internet of Things (IoT) techniques, and architectures. Students will be exposed to the basic concepts and current practices of cloud computing. Topics include distributed computing models and technologies, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), virtualization, security and privacy issues. The course addresses example applications of IoT which is based several technologies and research disciplines that enable the Internet to reach out into the real world of physical objects. Technologies such as RFID, short range wireless communications, real-time localization, and sensor networks are becoming increasingly pervasive, making the IoT a reality with applications in smart homes, smart cities, smart healthcare, and wearable devices. Course work will include student presentations, and a term project that will provide exposure to scientific research in cloud computing and IoT, the course includes complete a research or project by the students.

40173012 Advanced Artificial Intelligence 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

The main aim of this course is to learn the basic AI techniques, the problems for which they are applicable and their limitations. The concept of AI is to describe and build agents that receive precepts from the environment and perform actions. Topics covered include search (solving puzzles, playing games), planning, logical inference (drawing conclusions from data), expert systems, natural language processing and machine learning. We explain the role of learning as extending the reach of the designer into unknown environments, and show how it constrains

agent design, favoring explicit knowledge representation and reasoning, the course includes complete a research or project by the students.

40173034 Advanced Data Mining 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

Data mining is a foundational piece of the data analytics skill set. At a high level, it allows the analyst to discover patterns in data, and transform it into a usable product. This course introduces the basic concepts, principles, methods, implementation techniques, and applications of data mining, with a focus on three major data mining functions: pattern discovery, cluster analysis, and classification, the course includes complete a research or project by the students.

40173014 Advanced Image processing 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

The course provides mathematical foundations and practical techniques for digital manipulation of images, image acquisition, representation, preprocessing, segmentation, and compression. Other topics include multi-resolution image processing, wavelets, morphological image processing, noise reduction and restoration, simple feature extraction and recognition tasks, image registration, the course includes complete a research or project by the students.

40173028 Natural Language Processing 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

This course offers an overview of natural language processing (NLP) and natural language understanding (NLU) for educational practitioners, leaders, and researchers. This class introduces analysis of and analytical tools for research work with unstructured data such as student writing, responses to learner surveys, interview data, or audio and video recordings in an educational setting. Topics will include an overview of How to collect unstructured data in an educational environment for research purposes; How to use NLP software to analyze a sample, unstructured data set; Operational applications of Natural Language Processing (NLP) and Natural Language Understanding (NLU) , the course includes complete a research or project by the students.

40172023 Advanced Software Engineering 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

This course includes advanced principles and practices in software engineering: exploring evolutionary software development, software prototyping, object-oriented analysis and design, software system architectures, software



project management, software testing, software metrics and measurement, software quality assurance, software reuse, software maintenance, reverse engineering, and computer-aided software engineering, the course includes complete a research or project by the students.

40173023 Special Topics in Computer Science 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

The aim of this course is to study advanced topics and techniques in merging of different topics of computer science, the course includes complete a research or project by the students.

40171022 Research Seminar 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

This course is the first step in thesis development. The course prepares graduate students in computer science to write a Master's Degree thesis research proposal. The student should demonstrate his/her ability to do independent work in reviewing the relevant literature, identifying a problem in a research area, organizing existing concepts, suggesting approaches to solving the problem. Students are expected to develop their research proposal and defend it throughout an oral presentation.

40173026 Graduation Project 3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite:

The purpose of this course is to prepare graduate students in computer science to write a research paper. This course should demonstrate the student's ability to do independent work in reviewing the relevant literature, identifying a problem in a research area, organizing existing concepts, suggesting and developing new approaches to solving the problem and reporting the results. In addition, students should be expected to develop their skills and abilities in oral presentation.