



University of Benghazi

Administration of Graduate Studies

Faculty of Information Technology

Computer Science Department

**Computer Science Postgraduate
Program**

**A Newly Suggested M.Sc. Program in
Computer Science, Computer Engineering
and Networking**

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I. Introduction

Due to the fact that the M.Sc. program in the Faculty of Information Technology has been in existence for the last ten years or so and to the fact that the field of Information Technology is a dynamic one. It is the time to suggest a newly updated M.Sc. program for the Faculty of Information Technology.

II. Objectives of the Program

This program aims at the preparation and rehabilitation of national cadres specialized in the field of Information Technology through a scientific program to progress the quality of workmanship and level.

Our Expectation from the postgraduate program of a master's degree is to provide students with the latest advance knowledge in the field Information Technology to help them to go into a profession in the field.

We strongly believe that this program will enable us to provide modern knowledge and good scientific support for the lifting of the scientific and practical level of confidence to who engaged in it.

III. General Rules and Conditions

1. This plan conforms to the regulations of the general frame of programs of graduate studies at the university of Benghazi.
2. Candidates for admission in this program are holders of the Bachelor's Degree in the following specialties:
 - a) Computer Science.
 - b) Information Systems.
 - c) Software Engineering.
 - d) Computer Engineering.
 - e) Computer Networks.

IV. The Study Plan: as shown in figure 1 the students should study (36) Credit hours as follows:

1. Faculty courses listed in table 1 are compulsory for all students; **(6) Credit Hours.**

C. No	Course Name	Credits	Pre-request
IT5101	Research and Professional Skills(NC)	3	--
IT5102	Academic Writing (NC)	3	--
IT5104	M.Sc. Dissertation	6	--

2. Computer Science Core Courses listed in table 2 are compulsory for students of Tracks (Information systems, Software Engineering and Artificial Intelligence). **(15 Credit Hours).**

C. No	Course Name	Credits	Pre-request
AI5201	Analysis of Algorithms	3	--
SE5201	Object Oriented Analysis and Design	3	--
IS5201	Information System	3	--
AI5203	Advanced Database	3	--
SE5302	Web – Application Development	3	--

3. Computer Engineering and Networking core courses listed in table 3 are compulsory for students of tracks (Computer Engineering and Computer Networks). **(15 Credit hours)**

C. No	Course Name	Credits	Pre-request
CE5201	Advanced Computer Architecture & Organization	3	--
AI5205	Advanced Operating Systems	3	--
CN5201	Advanced Networking Systems	3	--
CN5202	Network Security	3	--
CE5203	Embedded System Design and Synthesis	3	--

4. Students who are specialist in Artificial Intelligence, need to select 5 elective courses from the listed shown in table 4. **(15 Credit Hours)**

C. No	Course Name	Credits	Pre-request
IT5103	Object Oriented Programming	3	--
AI5202	Computer programming Languages	3	--
AI5204	Artificial Intelligence	3	--
AI5205	Advanced Operating Systems	3	--
AI5301	Advanced Data Structure	3	IT5103
AI5302	Data Mining	3	AI5203
AI5303	Compilers Construction	3	AI5202
AI5304	Computer Graphics	3	AI5201
AI5305	Image Processing	3	--
AI5306	Computational biology	3	AI5201
AI5307	Machine Learning	3	AI5204
AI5308	Artificial Neural Networks	3	AI5204
IT5301	Special Topic in Computer Science "AI"	3	--

5. Students who are specialist in Software Engineering, need to select 5 elective courses from the listed shown in table 5. **(15 Credit Hours)**

C. No	Course Name	Credits	Pre-request
IT5103	Object Oriented Programming	3	--
SE5202	Software Requirements Engineering	3	SE5201
SE5203	Software testing & Quality.	3	SE5201
SE5204	Software Project Management	3	SE5201
SE5301	Agents Systems	3	SE5201
IS5304	Human Computer interaction	3	--
IS5305	Information Security	3	-----
CN5201	Advanced Networking Systems	3	-----
CN5303	Mobile Computing	3	CN5201
IT5301	Special Topics in Computer Science "SE "	3	-----

6. Students who are specialist in Information Systems, need to select 5 elective courses from the listed shown in table 6. **(15 Credit Hours)**

C. No	Course Name	Credits	Pre-re quest
IT5103	Object Oriented Programming	3	--
IS5202	Organizational Behavior	3	--
IS5203	Analysis, Modelling and Design	3	--
IS5204	Project and Change Management	3	--
IS5205	Enterprise Models	3	--
IS5301	Financial Accounting	3	IS5201
IS5302	E-business	3	IS5202
IS5303	Distributed Systems	3	--
IS5304	Human Computer Interaction	3	--
IS5305	Information Security	3	--
IS5306	GIS	3	--
IS5307	Marketing	3	--
IT5301	Special Topics in Computer Science "IS"	3	--

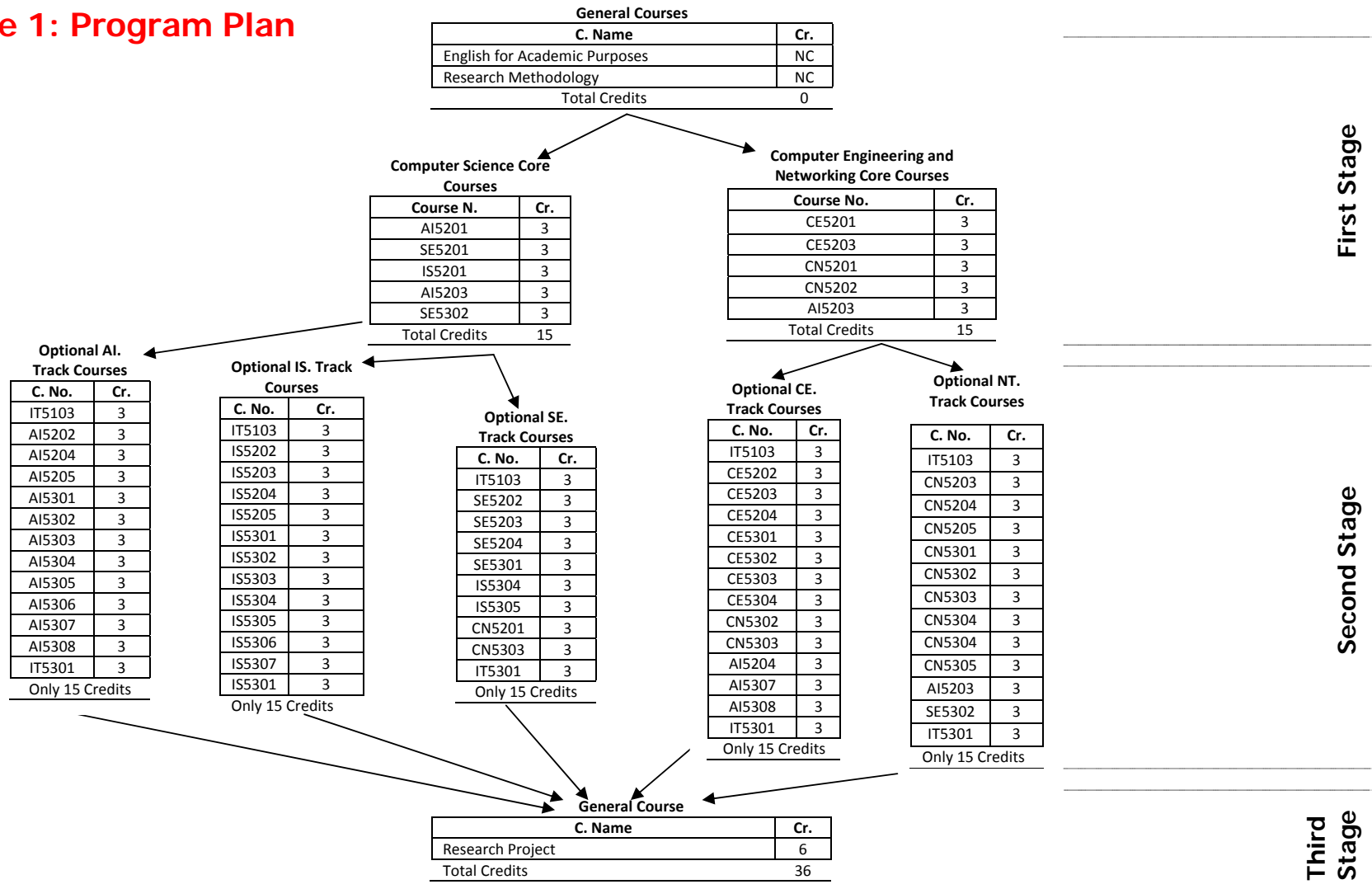
7. Students who are specialist in Computer Engineering, need to select 5 elective courses from the listed shown in table 7. **(15 Credit Hours)**

C. No	Course Name	Credits	Pre-request
IT5103	Object Oriented Programming	3	--
CE5202	Advanced of Digital Integrated Circuits	3	--
CE5204	Image Processing and Visual Communication	3	--
CE5301	Distributed Computing Systems	3	CE5203
CE5302	Advanced Robotics	3	CE5201
CE5303	Intelligent Tools of Computer Systems Design	3	CE5205
CE5304	Computer Vision	3	CE5205
CN5302	Virtualization and Cloud Computing	3	CN5205
CN5303	Mobile Computing	3	CN5201
AI5204	Artificial Intelligence	3	--
AI5307	Machine Learning	3	AI5204
AI5308	Artificial Neural Networks	3	AI5204
IT5301	Special Topics in Computer Science "CE"	3	--

8. Students who are specialist in Computer Networks, need to select 5 elective courses from the listed shown in table 8. **(15 Credit Hours)**

C. No	Course Name	Credits	Pre-request
IT5103	Object Oriented Programming	3	--
CN5203	Wireless Networks.	3	--
CN5204	Network Evaluation and Management.	3	--
CN5205	Networks Operating Systems.	3	--
CN5301	Analysis of Algorithms	3	CN5201
CN5302	Virtualization and Cloud Computing	3	CN5205
CN5303	Mobile Computing	3	CN5201
CN5304	Project Management.	3	--
CN5305	Data Centre Technologies	3	CN5304
AI5203	Advanced Database	3	--
SE5302	Web – Application Development	3	--
IT5301	Special Topics in Computer Science "CN"	3	--

Figure 1: Program Plan



FACULTY COURSES DESCRIPTION

IT5101 Research and Professional Skills (NC)

(Credit hrs: 3)

Prerequisite: None.

Introduction to research in science, Research methods and Creative thinking, Management of the M.Sc. project, including managing the academic year, relationship with supervisor and interaction with research groups. Requirements of an M.Sc. research project, research presentations, requirements of a good dissertation, technical writing skills. Professional skills: Including teamwork skills, industrial problem-solving, leadership skills, and communication and presentation skills. Job applications, careers advice and interview skills.

IT5102 Academic Writing (NC)

(Credit hrs: 3)

Prerequisite: None.

The purpose of this course is to enhance grad students' writing quality in terms of Academic writing styles. The students will be introduced to several writing genres such as descriptive essays, process essays, classification essays, comparison-contrast essays, cause-effect essays and argumentative essays. The ultimate purpose is to help students improve their writing skills when they conduct their writing assignments for some course-work or to write up their thesis.

IT5103 Object Oriented Programming

(Credit hrs: 3)

Prerequisite: None.

This course provides an introduction to Java language that supports the object-oriented paradigm. Students are exposed to the concepts, fundamental syntax and semantics, control structures, arrays, algorithms, debugging techniques and object-oriented programming that includes features such as objects, classes, data abstraction, encapsulation, modularity, polymorphism and inheritance.

IT5301 Special Topics in Computer Science

(Credit hrs: 3)

Prerequisite: Depending upon topic and approval of the instructor

Topics of mutual interest to the department and students and not currently available in the graduate program.

ARTIFICIAL INTELLIGENCE COURSES DESCRIPTION

AI5201 Analysis of Algorithms

(Credit hrs: 3)

Prerequisite: None

Algorithm design strategies such as divide and conquer, dynamic programming, greedy algorithms, backtracking and branch-bound. Computational complexity of sorting and searching algorithm. Introduction to Theory of NP problems. Recurrence equations. Asymptotic notations for complexity classes.

AI5202 Computer Programming Languages

(Credit hrs: 3)

Prerequisite: None

This course examines the concepts and structures governing the design and implementation of programming languages. It presents an introduction to the concepts behind compilers and runtime representations of programming languages; features of programming languages supporting abstraction and polymorphism; and the procedural, functional, object-oriented, and concurrent programming paradigms. Programs are required in languages illustrating each of these paradigms.

AI5203 Advanced Database

(Credit hrs: 3)

Prerequisite: None

Distributed database design, query and transaction processing, data integration, data warehousing, data cleansing, management of spatial data, and data from large scale distributed devices.

AI5204 Artificial Intelligence

(Credit hrs: 3)

Prerequisite: None

This course introduces fundamental techniques in the field of Artificial Intelligence. It covers methods for knowledge representation, reasoning, problem solving, and learning. It then explores those further by surveying current applications in selected areas such as game playing and natural language processing. Students complete several programming projects, including a large project of their own design that spans most of the second half of the semester.

AI5205 Advanced Operating Systems

(Credit hrs: 3)

Prerequisite: None

This course is intended to give a broad exposure to advanced operating systems topics such as Concurrent Execution, Memory Management, Operating System kernels, OS Architecture, File Systems, Virtualization, Synchronization, Communication, Protection, Security, Reliability, Recovery, Experience; and Systems Reports, naming, and distributed systems.

AI5301 Advanced Data Structure**(Credit hrs: 3)****Prerequisite: IT5103**

This course explores advances in algorithm design, algorithm analysis and data structures. The primary focus is on randomized and approximation algorithms, randomized and advanced data structures, and algorithmic complexity. Topics include combinatorial algorithms for cut, packing, and covering problems, linear programming algorithms, approximation schemes, hardness of approximation, random search trees, and hashing.

AI5302 Data Mining**(Credit hrs: 3)****Prerequisite: AI5203**

This course covers data mining for business intelligence. Data mining refers to extracting or “mining” knowledge from large amounts of data and consists of techniques that aim at discovering patterns that can bring value or “business intelligence” to organizations, for example consumer behavior. The course covers salient data mining techniques including classification, clustering, association rule mining, visualization and prediction.

AI5303 Compilers Construction**(Credit hrs: 3)****Prerequisite: AI5202**

This course covers the principles and practices for the design and implementation of compilers and interpreters. Topics include all stages of the compilation and execution process: lexical analysis; parsing; symbol tables; type systems; scope; semantic analysis; intermediate representations; run-time environments and interpreters; code generation; program analysis and optimization; and garbage collection. The course covers both the theoretical and practical implications of these topics. Students construct a full compiler for a simple object-oriented language.

AI5304 Computer Graphics**(Credit hrs: 3)****Prerequisite: AI5201**

This course teaches the fundamental techniques behind applications such as Photo Shop, medical MRIs, video games, and movie special effects. It begins by building a mathematical model of the interaction of light with surfaces, lenses, and an imager. Students then study the data structures and processor architectures that allow for efficiently evaluating that physical model. Students complete a series of programming assignments for both photorealistic image creation and real time 3D rendering using C++, OpenGL, and GLSL. These assignments cumulate in a multi-week final project. Topics covered in the course include: projective geometry, ray tracing, bidirectional - 513 - surface scattering functions, binary space partition trees, matting and compositing, shadow maps, cache management, and parallel processing on GPUs.

AI5305 Image Processing**(Credit hrs: 3)****Prerequisite: None**

General concept of image processing, sensing, sampling and quantization, image segmentation and edge detection, image sequence analysis, image enhancement and restoration, image understanding systems, applications of mathematical morphology.

AI5306 Computational Biology**(Credit hrs: 3)****Prerequisite: AI5201**

This course provides an overview of Computational Biology. Topics covered include database searching, DNA sequence alignment, phylogeny reconstruction, protein structure prediction, microarray analysis, and genome assembly using techniques such as string matching, dynamic programming, suffix trees, hidden Markov models, and expectation-maximization.

AI5307 Machine Learning**(Credit hrs: 3)****Prerequisite: AI5204**

This course examines the design, implementation, and analysis of machine learning algorithms. It covers examples of supervised learning algorithms (including decision tree learning, support vector machines, and neural networks), unsupervised learning algorithms (including k-means and expectation maximization), and optionally reinforcement learning algorithms (such as Q learning and temporal difference learning). It introduces methods for the evaluation of learning algorithms, as well as topics in computational learning theory.

AI5308 Artificial Neural Networks**(Credit hrs: 3)****Prerequisite: AI5204**

Artificial neural network models are inspired by biological neural networks. The course begins with an overview of information processing principles in biological systems. The core of the course consists of the theory and properties of major neural network algorithms and architectures. The students would have a chance to implement and try out several of these models on practical problems. By the end of the course, students should be able to assess the applicability of neural networks for a given task, select an appropriate neural network paradigm, and build a working neural network model for the task.

SOFTWARE ENGINEERING COURSES DESCRIPTION:

SE5201 Object Oriented Analysis and Design

(Credit hrs: 3)

Prerequisite: None

This course aims to investigate, understand and apply the software design process, using an object-oriented paradigm. The course has two major components. It first introduces the Unified Modelling Language (UML), and a number of software development processes, including the Rational Unified process. The second half of the course is devoted to the understanding of a catalogue of design patterns, selected from Gamma et.al.

SE5202 Software Requirements Engineering

(Credit hrs: 3)

Prerequisite: SE5201

This course is about the elicitation, analysis, modelling and specification of software engineering requirements. Requirements engineering has attracted much interest in the research community and is increasingly recognized by practitioners as one of the most important stages in the software development life cycle. The course covers such topics as: the position and importance of Requirements Engineering, problem frames, requirements elicitation and negotiation, requirements modelling and modelling approaches, specifications – industry practice, requirements management, and requirements validation.

SE5203 Software Testing & Quality

(Credit hrs: 3)

Prerequisite: SE5201

Introduces the concepts, tools and processes needed to be perform Quality Assurance (QA) and software testing. Students with some programming background are shown best practices and will focus on creating and executing test plans using test cases and test scripts. They will practice how to record and report results, as well as document identified issues. Exercises and labs will include using popular open source QA software testing and tracking tools. Topics include: Black Box, White Box and Grey Box testing techniques and all aspects of QA planning and execution. Automated testing topics include constructing a framework, scripting techniques, generating test data, test architecture, pre/post-processing, test maintenance, and job specific metrics. Successful participants will be able to understand effective software testing methods, create a Quality Assurance plan and a test plan as well as be able to monitor test processes, evaluate test results and conduct automated testing to industry standards.

SE5204 Software Project Management

(Credit hrs: 3)

Prerequisite: SE5201

This course introduces the concept of project time and cost management. This course will develop student's skills in software life-cycle models, software project scheduling, and risk management, time and cost management and expand their knowledge of how to apply these

skills across diverse project management projects. Students will further develop these skills by utilizing specialized software.

SE5301 Agents Systems

(Credit hrs: 3)

Prerequisite: SE5201

Key concepts of agent-oriented enterprise software engineering, agent technologies, multi-agent systems, software agents and workflows for enterprise application system engineering. Industrial examples. Team-based projects.

SE5302 Web- Application Development

(Credit hrs: 3)

Prerequisite: None

This course aims at building core competencies in web design and development. It includes introductions into XHTML, Cascading Style Sheets (CSS), fundamentals of JavaScript language, AJAX with XML and JSON as primary means to transfer data from client, and server and server-side languages, such as ASP.NET or Java (JEE). Course topics also include: HTTP Protocol, Application server vs. Web server, MVC architecture and Java beans.

INFORMATION SYSTEMS COURSES DESCRIPTION:

IS5201 Information Systems

(Credit hrs: 3)

Prerequisite: None

Systems theory, quality, decision making, and the organizational role of information systems are introduced. Information technology including computing and telecommunications systems are stressed. Concepts of organizations, information systems growth, and process improvement are introduced.

IS5202 Organizational Behavior

(Credit hrs: 3)

Prerequisite: None

This course deals with human behavior in a variety of organizations. Conceptual frameworks, case discussions, and skill-oriented activities are applied to each topic. Topics include communications, motivation, group dynamics, leadership, power, and organizational design and development. Class sessions and assignments are intended to help participants acquire the skills that managers need to improve organizational relationships and performance.

IS5203 Analysis, Modelling and Design

(Credit hrs: 3)

Prerequisite: None

The course covers System Development Life Cycle Model, with emphasis on Risk Management methodologies. Emphasis is on the specification of system's logical and physical analysis and design from a management perspective. The course also addresses team organization and communication, project feasibility assessment as well as globalization issues and professional code of ethics.

IS5204 Project and Change Management

(Credit hrs: 3)

Prerequisite: None

Managing projects within an organizational context, including the processes related to initiating, planning, executing, controlling, reporting, and closing a project. Project integration, scope, time, cost, quality control, and risk management. Software size and cost estimation. Assigning work to programmer and other teams. Monitoring progress. Version control. Managing the organizational change process. Identifying project champions, working with user teams, training, and documentation. The change management role of the IS specialist. The use of sourcing and external procurement; contracts and managing partner relationships.

IS5205 Enterprise Models

(Credit hrs: 3)

Prerequisite:

Provides a process-oriented view of the organization and its relationships with suppliers, customers, and competitors: processes as vehicles for achieving strategic objectives and transforming the organization; process analysis, design, implementation, control and monitoring; processes as a means of achieving compliance; impact on work; the role of enterprise resource planning (ERP), supply chain management (SCM), and customer relationship management

(CRM) systems. The process continuum: from structured to unstructured processes. Impact on work practices. The role of systems in transforming organizations and markets; global perspectives.

IS5301 Financial Accounting

(Credit hrs: 3)

Prerequisite: IS5201

This course revisits topics covered in Introductory Financial Accounting (Accounting 101), with a focus on the asset side of the balance sheet: Cash, accounts and notes receivable, inventory, marketable securities, equity investments, PPE, and intangibles. The course also covers revenue and expense recognition issues, and generally accepted accounting principles that affect the format and presentation of the financial statements.

IS5302 E-business

(Credit hrs: 3)

Prerequisite: IS5202

This course describes the basic principles of e-business technologies. Upon the completion of this course, students should have a good working knowledge of e-business concepts, applications and technologies (e.g. e-business marketplace, e-Commerce, B2B e-business, e-learning, e-government and online payments). In addition, and after understanding the main concepts, students should understand how to initiate and launch online business.

IS5303 Distributed Systems

(Credit hrs: 3)

Prerequisite: None

This course studies the key design principles of distributed systems. Covered topics include communication protocols, processes and threads, naming, synchronization, consistency and replication, fault tolerance, and security. Students also examine some specific real-world distributed systems case studies, ranging from the Internet to file systems. Class discussion is based on readings from the textbook and research papers. The goals of this course are to understand how large-scale computational systems are built, and to provide students with the tools necessary to evaluate new technologies after the course ends.

IS5304 Human Computer Interaction

(Credit hrs: 3)

Prerequisite: None

This course will introduce computer science students to the theory and practice of developing user interfaces. Practical concerns will be balanced by discussion of relevant theory from the literature of computer science (graphics, software engineering, multimedia), cognitive psychology, and industrial design. Students will also participate in group projects to design, implement, and evaluate user interfaces. Students who take this class will (a) develop practical user interface design skills, (b) develop an understanding of the human side of computing, (c) understand the significance of historical case studies, (d) learn about future directions in HCI.

IS5305 Information Security**(Credit hrs: 3)****Prerequisite: None**

Information security concepts; elementary cryptography; program security (malicious code); protection in general purpose operating security, designing trusted operating systems; database security; and network security. Specific topics may include: security threats, vulnerabilities and countermeasures; security objectives and techniques; risk analysis; Trojan horses, viruses, and worms; symmetric key cryptography, public key cryptography, and cryptanalysis; access control, pass-word-based security, authentication and authorization; ACLs and capabilities; multilevel and multilateral security; covert channels and inference control; BLP and Biba's models; Operating system security; network attacks; firewalls, and intrusion detection systems.

IS5306 Geographical information systems (GIS)**(Credit hrs: 3)****Prerequisite: None**

This course offers an introduction to methods of managing and processing geographic information. Emphasis will be placed on the nature of geographic information, data models and structures for geographic information, geographic data input, data manipulation and data storage, spatial analytic and modeling techniques, and error analysis.

IS5307 Marketing**(Credit hrs: 3)****Prerequisite: None**

This course is designed to provide students with an understanding of the principles of Marketing. There will be a focus on the management of the marketing activities and how marketing relates to overall organizational functioning, including the management of exchange processes between business units and consumers and between firms. It will include topics such as environmental analysis, industry and competitor analysis, objective setting, marketing strategies, market mix components, and finally implementation and control mechanisms.

COMPUTER ENGINEERING COURSES DESCRIPTION

CE5201 Advanced of Computer Architecture & Organization**(Credit hrs: 3)****Prerequisite: None**

This course focuses on advanced, system level, architecture techniques for devices such as personal computers, servers, and embedded or portable systems. It covers topics such as overview of modern processor architectures, processor design, memory hierarchy (cache and cache coherence, bus architecture), types of parallel machines (vector pipeline architectures, replicated architectures: SIMD/MIMD, shared memory and distributed memory), connectivity (clusters, networks), storage and I/O systems, virtualization, fault-tolerance, and low power design. It also covers the interactions between hardware and software layers in such systems. Other topics covered include performance and cost issues, instructions sets, pipelines, etc. The course involves significant programming in C and assembly as a basis for understanding the topics discussed.

CE5202 Advanced of Digital Integrated Circuits**(Credit hrs: 3)****Prerequisite:** None

This course aims to convey a knowledge of advanced concepts of circuit design for digital VLSI components in state of the art MOS technologies. Emphasis is on the circuit design, optimization, and layout of either very high speed, high density or low power circuits for use in applications such as microprocessors, signal and multimedia processors, memory and periphery. Also , related topics include MOSFET switch and models, logic gate design, transistor sizing, interconnect parasitic, gate delay, timing design, logical effort, static and dynamic logic families, latch and flip-flop elements, arithmetic circuits.

CE5203 Embedded System Design and Synthesis**(Credit hrs: 3)****Prerequisite:** None

This course is aimed to teach students that can design, implement and verify embedded computer systems based on hardware and software. The course will gain knowledge and skills in a variety of areas, such as integrated circuit technology, computer design. This course will cover a topics such as Embedded Systems Optimization, Embedded System Technologies, Processor Technologies, and IC Technologies.

CE5204 Image Processing and Visual Communication**(Credit hrs: 3)****Prerequisite:** None

This course covers the fundamental concepts and methods, as well as state-of-the-art theories and technologies, in the field of image processing and visual communications. Topics include fundamental digital image and video processing methods; image analysis and understanding; statistical and perceptual image modeling and processing; and compression, streaming, robustness, scalability and security issues in visual communications.

CE5301 Distributed Computing Systems**(Credit hrs: 3)****Prerequisite:** CE5203

This course emphasizes developing applications on various distributed computing platforms or environments. This course is designed to study software & hardware components of distributed computing systems. The communication and interconnection architecture of multiple computer systems is introduced. The design issues of distributed computing systems can be discussed.

CE5302 Advanced Robotics**(Credit hrs: 3)****Prerequisite:** CE5201

This course is an introduction to the field of robotics. It covers the fundamentals of kinematics, dynamics, and control of robot manipulators, robotic vision, and sensing. The course deals with forward and inverse kinematics of serial chain manipulators, the manipulator Jacobian, force relations, dynamics, and control. It presents elementary principles on proximity, tactile, and force sensing, vision sensors, camera calibration, stereo construction, and motion detection. The

course concludes with current applications of robotics in active perception, medical robotics, autonomous vehicles, and other areas.

CE5303 Intelligent Tools of Computer Systems Design

(Credit hrs: 3)

Prerequisite: CE5205

This course outlines fundamentals of soft computing based design approaches using such tools as approximate reasoning, fuzzy inferencing, neural networks, evolutionary algorithms, and neuro-fuzzy systems. Fundamentals and advances on these procedures are outlined along with their potential applications to various real world applications in virtually most fields of computer engineering including pattern recognition, system planning, data analysis, classification, power generation, intelligent transportation, optimization, communication, robotics systems and control.

CE5304 Computer Vision

(Credit hrs: 3)

Prerequisite: CE5205

This course mainly covers the basic theory, models, and practically useful methods for computer vision with applications within e.g. vision systems. The introductory course is included such topics as image formation, image sensing, image filtering, edge extraction, brightness and reflectance. More great depth topics focuses on computer vision applications, including various algorithms for reconstructing 3D shape and recognizing objects in images. Course has to go through programming assignments and short to put these core concepts into practice.