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Name : Mohamed Hany Mohamed Fares
Dept. : Software Engineering (Credit hour program)

# Scientific Content Report

## Level (١)

### ١- GN١٧٠ English Language-١

The course gives practice in specific points of grammar to consolidate and extend a learner's existing knowledge, analysis of syntax, comprehension questions interpretation and implication, the activities and games used to develop listening, speaking and writing skills through a communicative, functional approach with suggested topics for discussion and exercises in summary writing and composition. Topics covered include: Learning Vocabulary and Word Formation through the use of a Dictionary, Verb Tenses and Subject-Verb Agreements, Conditionals, Modals, Active vs Passive, Gerunds and Infinitives, Sentence Structure, and Punctuation

### ٢- MA١١١ Mathematics-١

The main objective of this course is to provide students with pre-calculus review. Sets. Realvalued function. The continuity and the differentiability of a real function. Techniques of differentiation. Derivatives of the trigonometric functions. Implicit differentiation. Linear approximations and differentials. Applications of the derivative: Extreme of functions, optimization problems, velocity and acceleration. Integrals: Indefinite integrals, change of variables, definite integrals, the fundamental theorem of calculus, numerical integration. Applications of definite integrals: Areas, solids of revolution, arc length and surfaces of revolution, work, moments and centers of mass. Transcendental functions: Derivative of inverse function, natural logarithm function, exponential functions, inverse trigonometric functions, hyperbolic and inverse hyperbolic functions, indeterminate forms and rule.

OD١١١ Discrete Mathematics ٣

This is an introductory course in discrete mathematics. The goal of this course is to introduce students to ideas and techniques from discrete mathematics that are widely used in computing sciences and engineering. The course gives the students the necessary techniques to think logically and apply these techniques in solving problems. The contents of this course should cover the following topics: Propositional Logic, Predicate Logic and Quantification, Boolean Algebra, Methods of Proof, Sets and Functions, Growth of Functions, Mathematical Induction, Recursion, Sequences and Summations, Program Correctness and Graphs and its Applications.

### CS١٣١ Fundamentals of Programming

The main objective of this course is to provide students with computer programming, programming languages and generations, programming life cycle, programming errors, problem solving techniques, what is algorithm, algorithm representation (Pseudo code), sequential operations, conditional operations, iterative operations, what is flowchart, flowchart notations, program construction, constants, variable declarations, simple data types,

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input statement, output statement, formatting output, arithmetic expressions, control structures, conditions, selection structures, repetition and loop statements, library functions, user-defined functions, function arguments, array declarations, array subscripts, array operations, array sorting and searching, multidimensional arrays.

**CS١١١ Computer Introduction**

The main objective of this course is to provide students with a general introduction to the basics of computer sciences and its different fields. The course may cover topics like: Digital revolution, digital devices, personal computers, servers, mainframes, super computers, microcontrollers, representing numbers, text, and pictures, quantifying bits and bytes, programs and instruction sets, microprocessor basics, RAM, ROM, EEPROM, magnetic disk and tape storage, CD and DVD storage, solid state storage, storage wrap-up, display devices, printers, system software, application software, utilities and device drivers, popular applications, software copyrights and licenses, software updates, operating system activities, network classifications, network devices, clients, servers, and peers, wired networks, wireless networks, Internet services, fixed, portable, and mobile Internet access, Internet infrastructure, Internet protocols, addresses, , and domains, hardware security, software security, Internet security, number systems.

**CS١١٠ Semiconductors**

The main objective of this course is to provide students with understanding Energy bands. Electrons and holes. Extrinsic semiconductors. Structure and current voltage characteristics of a p-n junction. Diode. Possible circuits. Rectifier circuits. Half wave rectifier. Full wave rectifier. Bridge rectifier. Voltage doubler. Filters. Zener diodes and regulators. Junction transistors. Digital Circuits, Inverter Characteristics and Circuits, Gates (AND/NAND, OR/NOR)

**ST١٩٠ Statistics & Probabilities**

The main objective of this course is to provide students with understanding sample space, probability axioms, combinatorial techniques, conditional probability, independence and ٢٢ Bayes' theorem. Random variables; distribution functions, moments and generating function. Some probability distributions. Joint distribution, the Chebyshev inequality and the law of large numbers. The central limit theorem and sampling distributions.

**OD١١٢ Fundamentals of Management**

History of Management, planning, fundamentals of planning, making decisions, strategic planning, plans and planning tools. Organizing and managing human resources. Influencing, leadership, controlling. Production management and control. Quality management. Management of service industries, accounting for risk, and economic analysis.

**U ١٣٠ Creative Thinking**

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Creative thinking allows for going beyond our normal conditioned modes of thinking generating new approaches to problem solving, to see the world from varying perspectives, and to create what we desire for ourselves and our various communities. Applications to be covered will include, among others, communication, problem solving and decision making. This is an opportunity for students to learn how others think differently from themselves, to understand meta-cognition (thinking about thinking). The course includes Edward do Bono's CoRT (cognitive research trust) program of learning thinking, Vertical and lateral thinking approaches ٢١ and Creative thinking tools like Brainstorming, Tony Buzan's Mind mapping and Edward do Bono's Six Thinking hats.

**IT١٨١ Introduction to Electronics**

The course will focus on the application to electrical physics world through exploratory investigation and activities. Students will be provided experiences to develop and enhance problem-solving skills, critical thinking skills, reasoning, graphical analysis, data collection and interpretation of data as well as the application of mathematics. Topics covered include: Ideal Basic circuit elements, Kirchhoff's law, Node voltage method, Mesh current method, circuit theorem overview, Thévenin and Norton equivalent circuits, capacitor and capacitance, and AC analysis. Introduction to digital electronics, Number Systems, Logic Gates, The Karnaugh Map, Design an SR Latch, Flip-Flops, Clocks and Oscillators, Design a ٤-bit Shift Register, Design a ٤-bit Counter, Design an LED Shifter, ٧٤٠٠ Series Logic Devices, ٤٠٠٠ Series Logic Devices.

**MA١١٢ Mathematics-٢**

The main objective of this course is to provide students with understanding techniques of integration: Integration by parts, trigonometric integrals and substitutions, integrals of rational functions, quadratic expressions, tables of integrals, improper integrals. Infinite series: Sequences, convergent or divergent series, positive-term series (basic comparison test, limit comparison test, ratio and root tests), alternating series and absolute convergence, power series, power series representations of functions, Maclaurin and Taylor series, applications of Taylor polynomials. Differential equations: Definition, classifications and terminology, techniques of solution of ordinary first-order first-degree differential equations (separable, reducible to separable, homogeneous, reducible to homogeneous, linear, reducible to linear, exact differential, non-exact differential-integrating factor), applications.

**CS١٣٢ Computer Programming – ١**

The main objective of this course is to provide students with the basic concepts and techniques of computer programming. It includes an introduction to problem solving for programming, primitive data types and expressions, variables and constants, basic input and output, conditional statements, repetition, methods, arrays, strings, file I/O and exception handling.

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## Level (٢)

### IT٢٨٢ Computer Organization

In This course student will study organization of a simple stored-program computer: CPU, busses and memory. Instruction sets, machine code, and assembly language. Conventions for assembly language generated by compilers. Floating-point number representation. Hardware organization of simple processors. Address translation and virtual memory. Very introductory examples of input/output devices, interrupt handling and multi-tasking systems. Basic understanding of computer organization: roles of processors, main memory, and input/output devices. Understanding the concept of programs as sequences of machine instructions. Understanding the relationship between assembly language and machine language; development of skill in assembly language programming; understanding the relationship between high-level compiled languages and assembly language. Understanding arithmetic and logical operations with integer operands. Understanding floating-point number systems and operations. Understanding simple data path and control designs for processors. Understanding memory organization, including cache structures and virtual memory schemes. Course include basic machine architecture and design, digital logic circuits, digital components, central processing unit, machine representation of instructions and data, addressing techniques, memory organization, and execution of instructions at machine level.

### CS٢٣٣ Computer Programming – ٢ (OO Programming)

The main objective of this course is to provide students with the object-oriented programming concepts. It includes topics such as defining and using classes, classes and objects, constructors and destructors, objects as function arguments, returning objects from functions, inheritance, multiple inheritance, super-classes and subclasses, creating and using interfaces, abstract classes and methods, final methods and classes, polymorphism, encapsulation, information hiding.

### IS٢١٢ Systems Analysis & Design -١

The main objective of this course is to provide students with knowing the concept of systems analysis and design and its meaning in practice. Additionally, students will use a variety of information systems analysis and problem-solving tools and approaches. It describes the basic techniques of project estimating, writing detail specifications. The major topics of this course include: Introduction of Information system components, Types on information systems, System development life cycles, The systems analyst and Systems planning and Determining requirements like Interviews, JAD and RAD, Object-oriented systems development and Analyzing requirements and Evaluating alternatives, and Systems design and Systems implementation.

### CS٢٦١ Operating Systems-١

The main objective of this course is to provide students with the introduction to Operating Systems, User view and system view of Operating Systems, Basic concepts of processes,

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Process Scheduling, Memory Management Concurrency, File Systems Management, and Input/output Management.

**IT٢٦١ Multimedia-١**

In this course, different aspects related to multimedia systems design and development are introduced. Topics to be covered in this course include: Introduction to multimedia data and multimedia systems, multimedia revolution and its possible future, multimedia content creation which includes digital data acquisition and simple processing, media representation and media formats (include text, digital images and graphics, digital video, digital audio and animation), multimedia authoring, authoring tools, intera- and inter-media processing, multimedia authoring paradigms and user interfaces, and finally several cases of multimedia systems and their design requirements will be discussed.

**IS٢٥١ Web Design and Development ٣**

The course is designed to provide students with the programming and technical skills to design and develop effective Web applications. In web design track. Students will learn and gain the skills to create and design powerful interactive web sites, including graphic design, multimedia, video, animation, and e-commerce applications. In Web Development Track, Students will learn to build and develop functional aspects of websites including database integration, programming, and other server-side components using the latest programming, networking and human-computer interaction methods.

**CS٢٥٠ File Organization ٣**

Introduction to File Organization and Management- Definition of File Management and Organization- Components of a File- File Types- Modes of access- File Operations - File Storage Devices Components of Storage Devices- Types of Storage Media- Types of Storage Devices- Sequential File Organization- Indexed Sequential File Organization- Relative File Organization- Multi-Key File Organization.

**IT٢١١ Computer Networks-١**

This course introduces the fundamentals of networking concepts and technologies. The course topics include: exploring the network, network protocols and communications, network access layer, Ethernet, network layer, transport layer, ipv٤ and ipv٦ addressing, sub-netting ip networks, and application layer. The course will assist students in developing the skills necessary to plan and implement small networks across a range of applications.

**IS٢٢١ Database Systems -١ ٢٥**

This main objective of this course is to provide students with the concepts of relational database systems. Major topics of this course include: Evolution of database management systems, Relational data model, Relational database design, Structured Query Language (SQL), Entity-Relationship (E-R) modeling and design, Functional dependencies and normalization, Physical data Storage and File Organization.

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**CS٢٥١ Software Engineering-١**

The main objective of this course is to provide students with the introduction of software engineering, Software processes, software development techniques, Requirements engineering, System models, and software prototyping. Architectural design, Design and implementation, Software testing, Software evolution

**CS٣١٤ Formal Languages and Automata Theory ٣**

The main objective of this course is to provide students with alphabets and languages. Finite representation of language. Deterministic and non-deterministic finite automata and their applications. Equivalence considerations. Regular expressions. Context-free languages. Context-free grammars. Regular languages, pushdown automata. Properties of context-free languages. Determinism and parsing top-down parsing, and bottom-up parsing. Turing machines: Computing with Turing machines, combining Turing machines, and nondeterministic Turing machines.

**CS٣٦٢ Operating Systems -٢ ٣**

The main objective of this course is to provide students with the Deadlocks, Distributed processing, Security and Protection, Real Time and Embedded Systems, System Performance Evaluation, Fault Tolerance

## Level (٣)

**CS٢١٢ Data Structure**

The main objective of this course is to provide students with simple numerical algorithms, Sequential and binary search algorithms, Worst case quadratic sorting algorithms (selection, insertion), Worst or average case O(N log N) sorting algorithms (quicksort, heapsort, merge sort), Hash tables, including strategies for avoiding and resolving collisions, Binary search trees, Graphs and graph algorithms, Heaps, Pattern matching and string/text algorithms (e.g., substring matching, regular expression matching, longest common subsequence algorithms).

**CS٣٤١ Internet Computing**

The main objective of this course is to provide students with a foundational understanding of the technologies of Internet Computing. The course includes the concepts, principles, methods, and techniques for designing and building internet-enabled systems that uses the web as the basic transport infrastructure. In particular, students will learn about the evolving Internet computing paradigm and the technologies that enable such change. Emphasis will be placed on internet as a domain for sharing resources with grids, distributed computing with web services, and the service-oriented computing.

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### CS٣٣٤ Computer Programming -٣ (UI Programming)

This course aims to understand stages of the user interface life cycle including design, implementation, and evaluation. The course covers user interface design-implementation cycle, rapid prototyping (sketching and evaluating interfaces quickly), advanced interface ٢٨ technologies (speech and handwriting recognition, and intelligent interfaces), interfaces for disabled users, and interface evaluation (user studies and cognitive models).

### CS٣٥٢ Software Engineering-٢

The main objective of this course is to provide students with the critical systems: dependability, critical systems specification, critical systems development. Security engineering, Distributed software engineering, Project management, Quality management, Process improvement. Configuration management

### CS٣٢١ Artificial Intelligence

The main objective of this course is to provide students with the introduction of artificial intelligence, Basic Problem-Solving Strategies, Heuristic Search, Problem Reduction and AND/OR Graphs, domains of AI- symbolic processing: semantic nets, modeling model based ٢٧ reasoning, frames. Knowledge Representation, Representing Knowledge with If-Then Rules. Inference Engines, Inference techniques: implication, forward and backward chaining, inference nets, predicate logic, quantifiers, tautology, resolution, and unification. Rule based systems: inference engine, production systems, problem solving, planning, decomposition, and basic search techniques. AI languages: symbolic and coupled processing prolog: objects and relations, compound goals, backtracking, search mechanism, dynamic databases, lisp, program structure and operations, functions, unification, memory models. Fields of AI: heuristics and game plying, automated reasoning, problem solving, computational linguistics and natural language processing, computer vision, intelligent agents, robotics AI based computer systems: sequential and parallel inference machines, relation between AI and artificial neural nets, fuzzy systems.

### CS٣١٣ Analysis and Design of Algorithms

The main objective of this course is to provide students with the introduction to the design and analysis of algorithms. The course covers design techniques, such as dynamic programming and greedy methods, as well as fundamentals of analyzing algorithms for correctness and time and space bounds. Topics include advanced sorting and searching methods, graph algorithms and geometric algorithms, notion of an algorithm: big-O, small-O, theta and omega notations. Space and time complexities of an algorithm. Fundamental design paradigms: divide and conquer, branch and bound, backtracking, dynamic programming greedy methods. Backtracking. NP-hard and NP-complete problems.

### CS٣٥٣ Software Testing and Verification

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Theoretical and practical aspects of testing software. Students participate in the entire range of test activities, from analyzing a requirements document for test conditions through executing test cases and writing a test report. In addition, there will much discussion on the types of testing that should be done, who should do it, and why it should be done at all. At course completion, the student should confidently be able to organize and carry out the software-testing phase for any small or medium-size software project.

**CS٣٣٥ Logic Programming**

The main objective of this course is to provide students with the clausal representation of data structures and algorithms, Unification, Backtracking and search, Cuts. The reference point for the course is the Prolog programming language, a principal aim being to develop students programming expertise through experience in typical applications. The course is divided into two interacting sections: a theory section and a programming section

**CS٣١٠ Cryptography and Security**

Survey of the principles and practice of cryptography and network security: classical cryptography, public-key cryptography and cryptographic protocols, network and system security. Motivate concepts using real-world applications, Security definitions and attacks on cryptographic primitives: Cryptographic standards and references implementations, Quantum cryptography.

**CS٤٣٠ Distributed and Parallel Systems**

Issues arising in distributed and parallel systems and applications; related architectures such as connection machines, shared memory multiprocessors. The main objective of this course is to provide students with the main principles underlying distributed systems: processes, communication, naming, synchronization, consistency, fault tolerance, and security. Additionally, students will be familiar with some of the main paradigms in distributed systems: object-based systems, file systems, web-based and coordination-based systems. On the completion of the unit, students will understand the fundamentals of distributed computing and be able to design and develop distributed systems and applications.

**OD٣٤٢ Modeling and Simulation ٣**

Fundamentals of computer simulation as a modeling technique are presented. Simulation will be versus mathematical modeling. The value of simulation as an experimental tool to support solving the problem and decision making process. Time management in simulation models (concepts of timing routine). Stochastic versus deterministic models. Discrete versus continuous simulation. Deterministic fixed time advance simulation. Stochastic discrete event simulation (event, activity and process-based models). Random sampling on computers. An overview of statistical methods in simulation experiments. Introduction to software tools for simulation purposes. The development of simulation models using procedural and simulation programming languages is stressed throughout the course.

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### CS٣٥١ Algorithms for Image Analysis

Fundamental concepts in computer and robot vision, medical image analysis, photo/video editing and graphics; problems such as image segmentation, registration, correspondence, matching, object recognition, tracking, stereo, texture synthesis; gradient descent, dynamic programming, graph-based optimization, techniques from computational geometry.

### CS٣٢٣ Machine Learning

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.

## Level (٤)

### CS٤٣٨ Mobile Application programming

The main objective of this course is to provide students with the principles of mobile application design and development. Students will learn application development on the Android platform. Topics will include memory management; user interface design; user interface building; input methods; data handling; network techniques and URL loading; and, finally, specifics such as GPS and motion sensing. 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 pilot testing of mobile phone software applications, using weight loss and physical activity motivation health applications as the target domain.

### CS٤٢١ Artificial Intelligence and Software Agents ٣

Problems in search, logic, and game playing, first order predicate logic, inference, and<br>knowledge representation. Definitions of ”intelligent” or ”autonomous” agents, agent<br>classifications, agent architectures, and various application areas, such as electronic commerce<br>and robotics.

### CS٤٢٥ Game Programming

The main objective of this course is to provide students with the Introduction of Game Programming, This is an introductory course in programming, designed to teach the fundamentals. Emphasis is on object orientation. Objects will be used to create a series of typical simple games. In addition, the course will introduce the student to

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game engine and programming ٢D games. Games with features such as scrolling backgrounds, collision detection, sprite sheets, scoring and menus will be built in game engine. Additional programming language features will be covered, including generic lists and exception handling

**CSx٨x Selected Topics in Software Engineering-١**
This course aims at introducing students to novel topics in computer science that need to be identified in a responsive manner as technology and its use evolve and develop. This course is essentially a flexibility enhancing will be filled on a year-by-year basis.

**CS٤٧٣ Human-Computer Interaction (HCI)**

The main objective of this course is to provide students with the design interactions between human activities and the computational systems that support them and with constructing interfaces to afford those interactions. Interaction between users and computational artefacts occurs at an interface that includes both software and hardware. Thus interface design impacts the software life-cycle in that it should occur early; the design and implementation of core functionality can influence the user interface– for better or worse. Because it deals with people as well as computational systems, as a knowledge area HCI demands the consideration of cultural, social, organizational, cognitive and perceptual issues. Consequently it draws on a variety of disciplinary traditions, including psychology, ergonomics, computer science, graphic and product design, anthropology and engineering. For end-users, the interface is the system. So design in this domain must be interaction-focused and human-centered. Students need a different repertoire of techniques to address this than is provided elsewhere in the curriculum. CS students need a minimal set of well-established methods and tools to bring to interface construction. To take a user-experience-centered view of software development and then cover approaches and technologies to make that happen. An exploration of techniques to ensure that end-users are fully considered at all stages of the design process, from inception to implementation.

**CS٤٥٣ Software Development for Embedded and Real-time Systems**

This course is an introduction to systems that sense and interact with the world in a physical way (e.g. medical devices, robots, cars, etc.). The success and safety of these systems critically depend on their ability to react to the environment in an appropriate and timely manner, thus they are referred to as real-time systems. Software development requires an understanding of system architecture, modeling, scheduling, and low-level hardware control of sensors and/or motors. In addition, real-time systems are often

**CS٤٥٤ Software Maintenance and Configuration Management**

An examination of industrial-style software development issues related to managing and maintaining large-scale software systems; in a group project, students will

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examine software maintenance and configuration management concepts, tools, techniques, risks and benefits; case studies.

**CS٤٥٧ Selected Topics in Software Engineering -٢ ٣**

This course aims at introducing students to novel topics in computer science that need to be<br>identified in a responsive manner as technology and its use evolve and develop. This course is<br>essentially a flexibility enhancing will be filled on a year-by-year basis.

**CS٤٥٥ Quality Assurance and Process Improvement**

Theory and application of the capability maturity model: process assessment, modeling, and improvement techniques. Life cycle issues related to development and maintenance, quality, safety, and security assurance, project management, and automated support environments. Students participate in group projects and case studies.

**IS١١١ Introduction to Information Systems**

The aim of the course is to enable the students to learn the basic functions of management (planning, organizing, leading/activating, and controlling), their component activities, and their interrelationships. The student should also understand and critically evaluate the alternative schools of thought, or philosophies about the field of management. (S)he will also gain knowledge and understanding of major theories and concepts in the field of Management, and gain knowledge of some of the contemporary developments in the field. The students will be acquainted with the management process; this includes understanding the theory behind and the practical applications of management.

**IS٢٥٢ Systems Integration**

This course focuses on the integration of information systems in organizations, the process by which different computing systems and software applications are linked together physically or functionally. It examines the strategies and methods for blending a set of interdependent systems into a functioning or unified whole, thereby enabling two or more applications to interact and exchange data seamlessly. The course will explore tools and techniques for systems integration as well as proven management practices for integration projects.

**CS٢٣٤ Web Programming**

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Course introduces the Overview of client/server architecture, Overview of JavaScript and Usage Structure, Variables, and Syntax, JavaScript Objects, OOP, JavaScript Events, JavaScript DOM PHP/MySQL., Overview of PHP and Usage, Structure, Variables, Syntax, Arrays, HTML Form Validation, User Input, Sessions and Cookies and Data-driven applications with MySQL.

**ST٢٩٢ Mathematical Statistics and Data Analysis**

Course covers topics with data analysis and reflects the use of the computer with close ties to the practice of statistic

**CS٣١٤ Formal Languages and Automata Theory**

The main objective of this course is to provide students with alphabets and languages. Finite representation of language. Deterministic and non-deterministic finite automata and their applications. Equivalence considerations. Regular expressions. Context-free languages. Context-free grammars. Regular languages, pushdown automata. Properties of context-free languages. Determinism and parsing top-down parsing and bottom-up parsing. Turing machines: Computing with Turing machines, combining Turing machines, and nondeterministic Turing machines.

**CS٣٢٢ Advanced AI**

The main objective of this course is to provide students with advanced topics in AI such as fuzzy logic for data analysis. Fuzzy Logic can be used to model and deal with imprecise information, such as inexact measurements or available expert knowledge in the form of verbal descriptions. Also the course can be covered recent topics in AI.

**CS٣٣٦ Microprocessors Assembly language**

The main objective of this course is to provide students with the architectures and design concepts for computer systems, fundamental of microprocessors, assembly-language programming, microcomputer systems, and hardware interface. This course provides the programming techniques, design techniques of memory system, input/output system and hardware interfaces for a simple microprocessor system. And subroutines to include such concepts as screen manipulating, table searching, disk processing, calling assembly language subroutines, communicating with programs written in higher-level languages, debugging techniques and machine language execution, interrupt and Direct Memory Access and fundamental knowledge to program a microprocessor system for specific application.

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**CS٤٢٦ Robotics**

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The main objective of this course is to provide students with the fundamental concepts of robotics and architectures and design concepts for Robotic systems, Topics include how robots move, sense, and perceive the world around them. The course introduces also constructing, planning and programming robots ability to Sensing, controlling, remote control and testing using computer languages for communication and advanced Input / Output programming for system practical programming and harmonious programming and fundamental knowledge to program a robotic system for specific applications.

**CS٤٣٧ Advanced Computer Programming (Advanced Mobile Applications Development)**

The main objective of this course is to provide students with the advanced user interface issues and techniques; animation; structuring and organizing complex applications for efficiency and reliability; accessing web services; integrating with ٣rd party libraries; background applications; content providers; and tying into and replacing applications, which came with the device. The course centers around building several small applications which focuses on advanced techniques. In these applications we will utilize and effectively integrate specific features of mobile devices such as the user interface, process creation and life cycle events, local and remote process services, location based facilities, accelerometer and other on-device sensors, network/web access, sound and multimedia. Throughout the course test-based development methods will be stressed and students will learn to test and debug their applications.

**CS٤٤٣ Parallel Programming**

The main objective of this course is to provide students with the mathematical models, methods and technologies of parallel programming for multiprocessor systems. This course includes the following topics: overview of parallel system architecture, modeling and analysis of parallel computations, communication complexity analysis of parallel algorithms, parallel programming for multi-processing, principles of parallel algorithm design, parallel algorithms for solving time consuming problems, and modeling the parallel program executing.

**CS٤٧١ Compiler Design**

The main objective of this course is to provide students with the structure of compiler, lexical analysis, lexical patterns, deterministic & Nondeterministic finite automata, scanner, construction, limits of regular languages. derivations, parse trees, Parsing algorithms: top-down parsing, bottom-up parsing, LL-parsers, LR-parsers. Semantic analysis. Intermediate code generation. Error detection and error handling .code optimization.

**CS٤٧٢ Natural Language Processing**

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The main objective of this course is to provide students with the introduction to the field of computational linguistics and the theory and methods of natural language processing (NLP). We will learn how to create systems that can understand and produce human language, for applications such as information extraction, machine translation, automatic summarization, question-answering, and interactive dialogue systems. The course will cover linguistic (knowledge-based) and statistical approaches to language processing in the three major subfields of NLP: syntax (language structures), semantics (language meaning), and pragmatics/discourse (the interpretation of language in context). Analyzing and extracting information from large online corpora.

**Wireless Programming**

This course provides the students with hands-on experience in developing and deploying wireless applications on J٢ME platform and .NET platform. Coursework emphasizes how to create cross device GUIs, handle events, access remote services and store and retrieve data on the device. Both Java ٢ Micro Edition and Visual Studio .NET will be used to create a variety of wireless applications.

**CS٤٨٢ Project**

This component is final year B.Sc project, which is essentially an exercise in systematic independent study and work, which must be executed and reported on to a satisfactory standard. The project provides students with the experience of planning and bringing to fruition a major piece of individual or group work. The module aims to encourage and reward creativity, initiative, intellectual discipline, clarity of communicating ideas and application of effort. Group projects also give the students a valuable experience of co-coordinating work with and organizing a group that aims at a technical product. A wide range of tasks can be undertaken, but almost always leading to the implementation of an information system, software or other information technology artifact. In some cases, students will do not have the time to produce an industrial-strength application; in these cases, a prototype that is systematically and fully evaluated and documented will be required.