

Computer Science Program Course Description

Course Title & No.	Brief Course Description
Computer Skills 0102120 (3 Cr. H.)	The course is designed to provide basic knowledge of computers and their applications. It will also emphasize the use of computers and technology during their university and future careers. The course discusses a variety of computer applications, including Word processing, spreadsheet, and multimedia presentations. Towards the end of the course, the students explore computer hardware, software, internet generations and their applications. Moreover, ethical issues related to computers software and Internet-based applications will be delivered.
Introduction to Programming 0102220 (3 Cr. H.)	This course introduces principles of computer programming using Java as a programming language. The course introduces the concept of algorithms and trains students to compile and run Java programs. Also, the course includes topics such as simple data types; operators and expressions; variables; input and output; control structures (conditional and repetition statements); methods; libraries; arrays and some of their applications.
Object - Oriented Programming 0102221 (3 Cr. H.)	This course provides students with deep understanding of object-oriented programming concepts. Topics covered include classes, objects, instantiation, methods, and instance variables, I/O, encapsulation, static fields and static methods, overloading, constructors, scope of declarations, overriding, composition, Java API packages, inheritance, garbage collection, polymorphism, final methods and final classes abstract classes and methods, interfaces, and introduction to GUI.
Computer Organization 0102240 (3 Cr. H.)	This course introduces the fundamentals of computer organization and machine architecture. It covers logical components and circuits, data representations, register transfer, bus and memory transfers, arithmetic micro operations, logic micro operations and shift micro operations, instruction codes, registers, common bus system, timing and control, instruction cycle, register-reference instructions, memory-reference instructions, I/O instructions, design control logic circuits for Basic computer, programming the basic computer, addressing modes, stack, organization of memory, RISC, and CISC. Moreover, the course covers how to generate programs in assembly code and machine code.
Data Structures and Algorithms 0102270 (3 Cr. H.)	This course introduces the main concepts of data structures and algorithms. Topics covered: concepts of Abstract Data Types (ADT), specification of different ADT structures such as: (Bags, Lists, Stacks, Queues, Hash Tables, Trees, Binary Search Trees, and Graphs), Array and Linked Data implementations of these ADTs using object oriented approach, and analyzing algorithm's efficiency in term of time and space storage. In addition, the course will introduce recursion as simple technique for solving complex problems and a detailed comparison of various sorting and searching algorithms.
Introduction to Artificial Intelligence 0114208 (3 Cr. H.)	This course aims to introduce artificial intelligence as an important tool to facilitate learning and reasoning about the world. It covers different topics including: the nature of intelligence; Problem solving techniques including a game playing examples; Knowledge and Reasoning including Planning and acting in the Real World; Uncertain Knowledge and Reasoning including making decisions; and some concepts about learning in real life.
Database Systems 0102330 (3 Cr. H.)	This course introduces the basic concepts of databases, which include database system architecture; entity relationship model; hierarchical, network, and relational data models; functional dependencies and normal forms. Design, implementation, and optimization of SQL query languages with basic relational algebra; and security and integrity.
System Analysis & Design 0102331 (3 Cr. H.)	This course introduces information systems analysis and design techniques. The student will be provided with the knowledge and skills that are necessary for the analysis and design of information systems including: different techniques to elicit system requirements and how to develop business models, data and process models, and object models representing a system. Students will also make use of a Computer Aided Software Engineering (CASE) tool to build those models that capture the specifications of a system. The course includes a software-development project.
Operating Systems 0102340 (3 Cr. H.)	This course covers the basics of operating system concepts starting from its history. The course covers the Processes including process and threads scheduling, inter-process communication, critical section problem, and CPU scheduling. It also covers the concepts of Input/output including principles of I/O hardware and software, disk arm scheduling and deadlocks; Memory management including swapping, paging, virtual memory and page replacement algorithms; File systems including File system structures, access, protection and I-nodes.
Formal languages & Automata Theory 0102341 (3 Cr. H.)	The course introduces fundamental concepts in automata theory and formal languages including finite automata (deterministic and non-deterministic finite accepters), regular expressions, regular grammar, regular languages, non-regular languages, context-free grammars, deterministic and non-deterministic pushdown automata, and Turing Machines. The course also covers a hierarchy of formal languages including languages which are recursively enumerable, languages which are not recursively enumerable, unrestricted grammars and context-sensitive grammars and languages.
Design and Analysis of Algorithms 0102370 (3 Cr. H.)	This course provides students with basic concepts of design and analysis of algorithms in a step-by-step manner. It covers divide and conquer method with examples, the course deals with greedy methods and various problems related to greedy method. It also deals with dynamic programming, different types of graphs related problems, branch and bound algorithms, travelling salesman problem and 15-puzzle problem. Various types of traversal and searching techniques are discussed in this course. Finally, the course highlights briefly the NP hard and NP complete problems.
Web Development 0102420 (3 Cr. H.)	This course introduces the basics programming and scripting languages for the Web development. It covers basic concepts of the World Wide Web (WWW), HTML 5, CSS 4, JavaScript 1.8, XML, and PHP 7. The course starts with a general introduction about the fundamentals of WWW and the web programming tools. First, it introduces HTML and XHTML basic syntax, XHTML document structure and text markup, images, Hypertext links, lists, tables, forms, and frames. Second, the course covers Cascading Style Sheets (CSS) including levels, style specs, font and list properties, color and alignment of text. Then, basics of JavaScript are discussed including syntactic characteristics, primitives, operations, expressions, screen output and keyboard input, and control statements. PHP is discussed along with syntactic characteristics, primitives, operations, expressions, output, control statements, arrays and simple functions. Finally, review the basic statements of SQL (DDL, DML) and use MySQL with PHP.

Introduction To Compilers 0102421 (3 Cr. H.)	This course introduces students to the fundamental concepts of compilers. It covers compiler architectures, data types and representation, grammatical production process, properties of grammars, grammar formalism, lexical analysis, lexical versus syntactic analysis, creating a lexical analyzer, transition table compression, symbol tables, bottom-up parsing, top-down parsing, exception handling, Symantec analysis, code generation, preprocessing the intermediate code, optimization techniques, general optimization, code size reduction, and power reduction and energy saving.
Computer Networks 0102450 (3 Cr. H.)	This course introduces concepts and principles in today's networks and various aspects of computer networking, including layered network architecture, OSI and Internet models, client-server and P2P paradigms. Further this course covers computer network architectures, network Layers; network access; physical layer and data link layer, network layer, transport layer protocols (TCP/UD) and application layer protocols (e.g. HTTP, FTP, SMTP, POP3, IMAP, and DNS). Furthermore, the course will introduce IP Addressing (IPv4 and Ipv6 Network Addresses), sub-netting and computer network security.
Distributed Systems 0102451 (3 Cr. H.)	This course introduces the theory of distributed systems, including types and characteristics of distributed system, architecture of distributed system; centralized, decentralized and hybrid architecture. The course also covers communication models of distributed systems, coordination of distributed system, consistency and replication and replication protocols.
Security of Information Systems 0102452 (3 Cr. H.)	This course is introductory to the fundamentals of security of information systems. The students will learn the basic knowledge and fundamentals of information systems security including threats, vulnerabilities, malicious activities, possible attacks on the information systems as well as their countermeasure will be covered. Moreover, information security standards, elements of cryptography, cryptographic system standards, security operations, and administration, access control, and hacking/ethical hacking will be investigated. The course will also focus on security techniques for the protection of information systems.
Computer Ethics 0102453 (3 Cr. H.)	This course addresses a definition of ethics, provides a framework for making ethical decisions, and analyzes in detail several areas of ethical issues that computer professionals are likely to encounter in the workplace. Topics include philosophical, business and professional ethics, software reliability, intellectual property, copyrights, privacy, data mining, and computer security.
Introduction to Computer Graphics 0102460 (3 Cr. H.)	This course introduces basic concepts of computer graphics. It includes graphics geometry, primitives, two and three-dimensional representations. It also covers geometric transformations, window clipping, and computer animation. OpenGL is used to illustrate the techniques and algorithms covered in the course.
Simulation and Modeling 0102480 (3 Cr. H.)	This course covers Modeling and Simulation Process principles; data collection and analysis; Monte Carlo simulation; event scheduling; dealing with uncertainty; confidence intervals; Terminating and steady state analysis; and Input Distribution Modeling. The course will use MATLAB to conduct the modeling and simulation techniques and learned algorithms.
Data and Web Mining 0102481 (3 Cr. H.)	The course introduces principles and techniques of (Web) data mining. Topics include: different data mining techniques such as classification, prediction, clustering and reasoning. The course go through the cycle of data mining starting from collecting the data all the way to evaluating and interpretation the results. Some challenges are covered that are concern with Web data mining in particular such as data integration for ecommerce, Web data warehousing, and Web personalization and recommender systems. The course will use Weka as a data mining tool.
CS Internship 0102490 (3 Cr. H.)	The Bachelor of Science in Computer Science (BSCS) internship course is designed to let students apply their knowledge of mathematics, computer science, and programming in real world professional situations. The students work as interns and practice team-based activities related to computer science. The internship experience provides the students with an industrial training opportunity through cooperation between the university and the local industry, which can help them in choosing their career path based on hands-on industrial experience. The student should work on site for at least 480 hours (equivalent to 12 weeks of full-time work).
C S Capstone Project I 0102491 (1 Cr. H.)	Capstone-I covers the first phase of the student final year project. The capstone project should include solving a substantial problem with knowledge gained from different areas in computer science. This phase starts with constructing a team to agree and select a topic. A literature review should be prepared to develop the problem statement. The team should develop the project management plan and perform the needed analysis at this stage. At the end of this course, a proposal should be submitted to cover interdisciplinary contents. Proposal should live up to the ethical standards as put forward by international professional bodies such as IEEE.
C S Capstone Project II 0102492 (2 Cr. H.)	Capstone-II starts with translation of proposal identified in Capstone-I into implementable design. This involves developing a suitable prototype and/or work development and to submit a first demo from the agreed system. The proposed analysis in Capstone-I should take place in this course in details. The course ends with a final product that should meet the user/problem requirement and needs. The output should live up to ethical standards as put forward by international professional bodies such as IEEE.