Computer Science Department

Course Descriptions 2015/2016

Introduction to Programming (CS011) (0 Credit hours) Prerequisite (None)

Topics include: problem solving steps, programming methods evolution, modeling tools (i.e. flowchart, UML activities diagram and algorithms), structured programming method and constructs (sequence, selection, repetition and recursion), design, design modeling, tracing and testing of UML and algorithms.

Introduction to computers mathematics(CS020) (0 Credit hours) Prerequisite (None)

Topics include: An introduction to Numbering system, Set theory, Functions, matrices, Logic Expressions, and graph theory.

Introduction to computer science(CS051) (0 Credit hours) Prerequisite (None)

This course familiarizes students with the computer science terms and methodologies. It defines the components of a computer system in terms of software and hardware. It also gives a brief explanation to several topics such as, computer language, computer networking, programming languages, logic gates and the computer settings.

Introduction to mathematics and statistics(MAT099) (0 Credit hours) Prerequisite (None)

Topics include: real and integer numbers, basic rule of algebra, exponents, fractions, linear equations, quadratic functions, inequalities, absolute values and sets.

Mathematics (MAT101) (3 Credit hours) Prerequisite (None)

Topics include: principles of set theory, rules of set theory, distance formula, inequalities, slop and line equations, parallel and perpendicular lines, simultaneous equations, domain and range, exponential functions, matrices, deviation and integration.

Introduction To Physics (PHY101) (3 Credit hours) Prerequisite (None)

Topics include: Newton second equation for movement, accelerated motion, forces, movements and pressure. It also discusses energy and power, electric current, electrons. The course also covers resistance & resistivity and discussion about kirchoots law.

Structured Programming (CS111) (3 Credit hours) Prerequisite (None)

Topics include: introduction to computer programming, Computer programming methods evolution, problem solving steps, program design, flow chart, algorithm, UML, structured programming constructs (i.e. selection, sequencing, repetition and recursion), C++ programming language statements and program tracing, testing and implementation.

Discrete Mathematics (CS121) (3 Credit hours) Prerequisite (None)

Topics include: Numbering systems, sets and binary operations, operations on sets, functions, introduction to graph theory, diagraph and relations, sequence and series, counting methods and probabilities.

Digital Logic (CS152) (3 Credit hours) Prerequisite (None)

Topics include: numbering system, binary system, Boolean algebra, logic expressions, basic logic gates, universal logic gates, combinational logic circuit and sequential logic circuit.

Communication Skills (CS201) (3 Credit hours) Prerequisite (ENG111)

Topics include: issues related to effective technical communication, how to communicate with the higher administrators, fellow colleagues, and future non-technical customers.

Mathematics II (MAT201) (3 Credit hours) Prerequisite (MAT101)

Topics include: Limits, Definitions of limits, properties of limits, one-sided and two-sided limits, Sandwich theorem, and Limits involving infinity. It also includes Derivatives, Definition of a function, differentiability, differentiability, Rules for differentiation, Velocity and other rates of change, Derivatives of trigonometric functions, Chain rules. Implicit differentiation, derivatives of I verse trigonometric functions, derivatives of exponential and logarithmic functions, and Application of derivatives, Definite Integral, Definite Integral and Ant-derivatives, Fundamental theorem of calculus, Trapezoidal Rules, and application of definite integral, Integration by Parts, Differential equations and Mathematical Modeling, Infinite sequence and series are also included.

Probability and Statistics (STA201) (3 Credit hours) Prerequisite (None)

This course covers an introduction to concepts, tools, techniques and methods of statistics. It discusses the concepts that are commonly used in business disciplines and act as thresholds for advanced courses of statistics including data managing techniques, descriptive tools, and inferential statistics and provides an introductory survey of many applications of descriptive and inferential statistics.

Scientific research methods (SRM201) (3 Credit hours) Prerequisite (STA201)

The course introduces and develops the concepts, organizational structure and deliverables of a research project using qualitative and quantitative methods.

Linear Algebra (MAT 202) (3 Credit hours) Prerequisite (MAT201)

At its core, the course will introduce students to the fundamental concepts of linear algebra culminating in abstract vector spaces and linear transformations. The course starts with systems of linear equations and some basic concepts of the theory of vector spaces in the concrete setting of real linear n-space. The course then goes on to introduce abstract vector spaces over arbitrary fields and linear transformations, matrices, matrix algebra, similarity of matrices, eigenvalues and eigenvectors. The subject material is of vital importance in all fields of mathematics and in science in general.

Computer Ethics & Social Responsibility (CS206) (3 Credit hours) Prerequisite (CS104)

Topics include: guidelines for proper use of computer & information, copyrights, computer access, computer crimes, data security and privacy, software licensing and protection from viruses and hacking. Social issues related to abuse of data and information will also be covered.

Object Oriented Programming I (CS212) (3 Credit hours) Prerequisite (CS111)

Topics include: object-oriented programming concepts, constructs, and characteristics, ADT, information hiding, constructors, destructors, friend function and friend class, array of objects, manipulating object via its address, inheritance and polymorphism.

Data Structures (CS215) (3 Credit hours) Prerequisite (CS111)

This course covers topics in Data Structures such as, Fundamental of Data structure, Array, Link list, Stack, Queue, Graph, Tree. In addition, Student will learn algorithm design, abstract data type, recursion, sorting and searching. At the same time student will practice the variety of data structure types using structured programming.

Microcomputers & Assembly Languages (CS251) (3 Credit hours) Prerequisite (CS152)

Topics include: Microcomputer organization, microprocessor unites, Registers (A,PC,IP,BC,DE,HL), Data Bus, address bus, control bus, I/O ports, 8085 Assembly programming instruction: I/O , Arithmetic , Looping and branching.

Computer Architecture (CS252) (3 Credit hours) Prerequisite (CS251)

Topics include: Concepts of combinational logic circuits, Memory Hierarchy, Register Transfer Language (RTL), ALU design, design of hardwired CU and micro-programmed CU, and the characteristics of instruction sets.

Systems Software (CS253)(3 Credit hours) Prerequisite (CS251)

Topics include: introduction to system software, machine structure, Assemblers: basic function, Machine-dependent and machine-independent, Loader and Linker, Compilers, Operating Systems, and Other Systems Software.

Operations Research (OR 301) (3 Credit hours) Prerequisite (STA 201)

Topics include: The origin of Operation Research (O.R.), its nature, and impact. Overview of O.R. modelling approach; define, formulating a mathematical model, deriving the solutions and testing the model are described and demonstrated. Linear programming; models, assumptions, formulating and solving linear programming model, graphical LP solution, the simplex method, LP in equation form, iterative nature of the simplex method, transformation model, and the Hungarian method are given in details. In addition, other models including queuing theory, stock control models (Inventory) and project management (Network models) (CPM and PERT Technique) are described. Some applications of these models are given.

Algorithms Design And Analysis (CS311) (3 Credit hours) Prerequisite (CS215)

The course introduces students to the principles of algorithm design & analysis. It includes topics such as, the mathematical principles of algorithms analysis, calculating the algorithm complexity, using the big-O-notation, graph algorithms, and sorting and searching algorithms.

Visual Programming (CS313) (3 Credit hours) Prerequisite (CS212)

This course introduces computer programming using the Visual Studio.Net 2013 and visual basic programming language with object-oriented programming principles. Emphasis is on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools.

Object Oriented Programming II (CS314) (3 Credit hours) Prerequisite (CS212)

Topics include: Advanced designing and implementation of object-oriented based programs using complex data structures. Data structures implementation is an essential area of study for computer scientists and for anyone who will ever undertake any serious programming tasks. Students will study many advanced programming constructs of the C++/JAVA language oriented for classes and objects. Inheritances types, polymorphism and software reuse will be covered.

Software Engineering I (CS333) (3 Credit hours) Prerequisite (CS335)

This course provides a solid base in Software Engineering (S/E), student will learn principles of S/E, evolving roles of software, Software process, software product, process models and advanced models, requirements Engineering: gathering, modeling and analysis.

Information Systems Analysis (CS335) (3 Credit hours) Prerequisite (CS212)

Topics include: introduction to Information Systems, types of systems, integrating technologies for systems, roles for system analyst, SDLC, AGILE approaches and object-oriented analysis, depicting systems graphically, levels of management, project management, feasibility study, information gathering: interactive methods and unobtrusive methods, Agile methodologies and Prototyping, modeling with DFD, using data dictionaries to analyze systems, system specification, structured decision, structured English, object-oriented analysis and Unified Modeling Language.

Database Systems (CS336) (3 Credit hours) Prerequisite (CS335)

In this course, the students introduced to traditional files structure problems, Database systems concepts, Database systems evolution, Database types, entity, attributes, relationship, and relationship degree, Database architecture, Database modeling methods, Relational algebra, relation calculus and relational database constraints. SQL Data definition and manipulation languages are also covered.

Artificial Intelligence (CS341) (3 Credit hours) Prerequisite (CS311)

This course introduces the concepts of artificial intelligence and its applications concentrating on the fundamental principles of intelligent agents, such as their architecture and the way they sense, reason and react in their environment. It covers the following topics: representing the world problems as state space, knowledge representation, problem solving utilizing search algorithms (i.e. first-depth search), inference using propositional logic and causal model. It also presents the available techniques for reasoning under uncertainty focusing on the probabilistic inference (Bayesian Networks) and its implementation.

Data Mining (CS342) (3 Credit hours) Prerequisite (CS336)

This course covers the following topics: the basic concepts of data mining, classification and Prediction, Data Warehouses, Multi-dimensional data model, Data cleaning, data integration and transformation, data redaction, Data mining primitives, languages and system architectures, Characterization and Comparison, Mining Association in rules in large databases, Categorization of major clustering methods (i.e. Density-based, Grid-based and Model-based clustering methods, Partitioning methods and Hierarchal methods), Multidimensional analysis and descriptive mining of complex data objects.

Neutral Networks & Genetic Algorithms (CS345) (3 Credit hours) Prerequisite (CS311)

This course discusses the fundamentals of Neural Network including: basic neuron models (i.e. McCulloch-Pitts model), Neural Network models (i.e. recurrent network, feedforward network), learning algorithms (i.e. supervised learning) and Neural Network applications (i.e. patterns recognition). It also gives an introduction to Genetic algorithms including the chromosome design, the fitness function and permutation. The implementation of both Neural Network and Genetic Algorithms using MATLAB will be covered during the course.

Operating systems (CS351) (3 Credit hours) Prerequisite (STA252)

In this course, the students introduced to the definition and principles of software used to operate computer systems (operating systems, Assembly Language, Loader, Linker, Compiler… etc), the advantage of using such systems and the design principles of such software.

Data Communication And Computer Networks (CS361) (3 Credit hours) Prerequisite (CS351)

This course covers the following topics: Uses of computer networks, network classifications, network software including OSI and TCP/IP reference models (the focus is on TCP/IP layers), transmission media including guided and unguided media, vehicular ad hoc networks and their communication domains, data flow control and error control (i.e. hamming code), packet switching including datagram and virtual circuits, internetwork routing, IPv4 protocol, IP address, subnet, IP address classes, network address translation, user datagram protocol, transmission control protocol, domain name system (DNS), electronic email and the world wide web.

Computational Theory (CS371) (3 Credit hours) Prerequisite (CS215)

This course explains to students the finite automata, which is a modeling tool for many important kinds of hardware and software, such as, Software for designing and checking the behavior of digital circuits; The "lexical analyzer" of a typical complier, that is, the compiler component that breaks the input text into logical units, such as identifiers, keywords, and punctuation; Software for scanning large bodies of text, such as collections of Web pages, to find occurrences of words, phrases, or other patterns; Software for verifying systems of all types that have a finite number of distinct states, such as communication protocols or protocols for secure exchange of information. Refinement calculus for finite state machine and regular languages is also covered.

Multimedia Systems (CS383)(3 Credit hours) Prerequisite (CS385)

This course introduces the theory and fundamentals of multimedia systems. It defines the various types of media such as sound, image, animation and video. It discusses the difference between continuous and discrete media and their transmission relative to time and size. The course also covers the various types of image filters speech signals and the animation. Computer programs that deal with managing and enhancing such a types of media will be discussed throughout the course.

Special topics in computer science (CS384)(3 Credit hours) Prerequisite (Dept. Approval)

This course covers the hottest topics and the latest research in the field of Computer Science. The topic might be different from semester to another; an approval from the computer science department is required to select the course content whenever offering the course.

Web based software development I (CS385) (3 Credit hours) Prerequisite (CS212)

Within the context of Web based software development topics include: creating a web site using html, xml, and CSS. Other topics such as, creating tables, page division, inserting animation and multimedia, using/creating templates, managing hosting and its control panel are also covered.

Web based software development II (CS386) (3 Credit hours) Prerequisite (CS385)

This course introduces to students advance topics in web applications development. Topics include: web applications development, smart devices and Web design programming languages (i.e. HTML, CSS, PHP, JavaScript, ASP.NET and Visual studio.NET), web hosting, file transfer protocol, control panel for local and remote servers, Word Press, and Yii frameworks.

Software Engineering II (CS431) (3 Credit hours) Prerequisite (CS333)

Within the context of software Engineering Topics include: design concepts, software design models, architectural design, component-level design, designing class-based components, component-level design for web applications, user interface design, web applications interface design, pattern-based design, architectural patterns, web applications design quality, aesthetic design, content design, object-oriented hypermedia design method, quality management,

achieving software quality, review techniques, formal technical review, software testing and testing strategies.

Graduation Project (CS432) (3 Credit hours) Prerequisite (90 Cr)

In this course, the student follows a research method to identify specific problem (define the research question), conducts a literature survey and proposes a solution (an artifact) to the identified problem utilizing computer algorithms, software packages and/or hardware devices. This will take place with guidance from a supervisor. At the end of the course, the student will demonstrate the outcome of the investigation (project) and will write a graduation project report.

Internship (CS433) (3 Credit hours) Prerequisite (90 Cr)

The course is designed to provide students with the opportunity to gain experience in workplace setting and to translate classroom learning into practice. It focuses on reinforcing students practical and transferrable skills where further industry knowledge and skills necessary for professional advancement are acquired and developed. This course enables them to function well in a culturally diverse working environment. Additionally, it helps students reflect on the skills they are learning and the benefits gained from the internship experience.

Database Development (CS434) (3 Credit hours) Prerequisite (CS336)

The course covers the following topics: practicing the database design methodologies such as, normalization, entity relationship diagram (ERD), extended entity relationship diagram (EERD), and Object oriented database design (OODBD). Also the student will practice the Unified Modeling language (UML), how to carry out design optimization, mapping design model constructs to relations, and schema definition using SQL DDL.

Ciphering and computer security (CS462) (3 Credit hours) Prerequisite (CS361)

This course provides students with a firm understanding of the major issues of data and computer security. The student will study computer security, threats & ways for protection, ciphering algorithms, public and private keys algorithms, authentication, the network security firewalls and the internet security.

Mobile Computing (CS463) (3 Credit hours) Prerequisite (CS361)

This course introduces students to the fundamental principles of mobile computing, and its applications and challenges. Topics include: mobile and pervasive computing, wireless communication technologies, mobile computing applications (i.e. location based systems and context-aware systems) and software engineering principles of mobile computing.

Compilers Design (CS471)(3 Credit hours) Prerequisite (CS371)

In this course, students will study compilers design, major problems in interpretation of programming languages, compilation steps, difference between compilers and interpreters, Top-down versus bottom-up grammatical analysis, codes generation, and storage allocation strategies.

Computer Graphic Algorithms (CS481) (3 Credit hours) Prerequisite (CS311)

This course introduces to students the concepts of computer graphics. It starts with an overview of interactive computer graphics, two dimensional system and mapping, then it presents the most important drawing algorithm, two-dimensional transformation; Clipping, filling and an introduction to 3-D graphics.

Image Processing (CS482) (3 Credit hours) Prerequisite (CS481)

This course discusses the fundamental principles of digital image processing including: Fourier transform, discrete Fourier transform, image enhancer algorithms (i.e. smoothing filters, Gaussian filters and Sobel filter). It also covers discontinuity detection, similarity and region detection and using MATLAB to perform image manipulation.