THE COURSE DETAILS

CSE 1101	Computer Programming Techniques	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

The main objective of this course is an introduction to programming using the C/Python programming language. The point of the course is to learn the *basics* of computer programming. A secondary topic covered is a brief introduction to computer hardware and software.

Contents:

Introduction to digital computers; information representations in digital computers; number theory and number conversions; basic concepts of programming: writing, debugging and running a program; loader and linker; algorithm and flowchart; elements of language theory and formal languages; structured programming concepts; mathematical, logical and relational operators; reserved/key world; delimiters/punctuations; variables; header file and functions; different types of statements: if-else, switch and loop; representation of numbers and variables in computer memory; I/O operations; I/O functions; expression evaluations; operations on 1D and 2D array; recursion;

CSE 1102	Computer Programming Techniques Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 1101 using Python/C programming language.

ENG 1161	English	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

To illustrate the basics English writing principle along with correct English grammar with different ways of sentence construction and general essay and short story writing.

Contents:

English Phonetics: the places and manners of articulation of English sounds; Vocabulary: techniques of enriching stock of words; English Grammar: construction of sentences; common grammatical problems;Reading: techniques and strategies for improving comprehension skills; prose pieces by renowned authors; Writing: developing paragraphs as the building blocks of larger discourses; Business Correspondence: importance, classifications and structures; Report: types and layout of reports; Technical Writing: research paper; dissertation and thesis; technical proposals; instruction manual.

MATH 1163	Differential and Integral Calculus	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

The objective of the course is to provide insight into differential calculus and applications. This course will cover differentiation and integration of the elementary functions, with applications to physical and social sciences.

Contents:

Number system, sets and their applications, functions and their domain and range, sketch simple function, logarithmic and exponential functions; limits of functions, continuity and differentiability of functions; differentiation of varies types of functions and their applications; successive differentiation of functions, Leibnitz's theorem; Roll's theorem, mean value theorem; Taylor's theorem in finite and infinite form; Lagrange's and other form of reminder, expansion of function; evaluation of indeterminate forms by *L'hospital's* rule; partial differentiation and Euler's theorem for homogenous function; determination of maximum and minimum values of functions and point of inflexion of functions; tangent, normal, sub tangent and subnormal in Cartesian and polar co-ordinates; basic concept of integration, integration by method of substitution, integration by parts, standard integral; integration of rational fraction, integration of some special trigonometric function; definite integral, general properties of definite Integral, Walli's formula, beta function and gamma function; integration by method of successive reduction, finding values of definite integral by using reduction formula; improper integral; multiple integrals; area under plane curve in Cartesian and polar co-ordinate, area of the region enclosed by two curves in Cartesian and polar co-ordinate; rectification: finding arc length of curves in Cartesian and polar co-ordinate; volume of solids of revolutions, area of surfaces of revolutions.

PHY 1165	Physics	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

The objective of the course is give students basic exposure to Physics that will better prepare them for more rigorous courses that will be taken later on. The basics of thermodynamics, light, harmonic oscillation, polarization and introduction to fluid mechanics will be covered throughout the course.

Contents:

Heat & thermodynamics; kinetic theory of gases; laws of thermodynamics; waves and oscillations: simple harmonic oscillator, total energy and average energy, combination of simple harmonic oscillations, damped oscillation, forced oscillation, resonance, reduced mass, progressive wave, power and intensity of wave motion, stationary wave, group velocity and phase velocity, architectural acoustics, reverberation and Sabine's formula; physical optics: theories of light; interference of light; Young's double slit experiment; displacements of fringes and its uses; Fresnel's Bi-prism, interference at wedge shaped films, Newton's rings and interferometers; diffraction of light; Fresnel and Fraunhoffer diffraction, single slit and N-slits grating; polarization: polarized light, Brewster's law, malus law, polarization by double refraction, retardation plates, Nicol prism, optical activity, polarimeters and polaroid; modern physics: theory of relativity, length contraction, time dilation, relativity of mass, mass and energy relation, velocity addition theorem, twin paradox, massless particles. atomic structure and nuclear physics- electron orbits, atomic spectra, the Bohr atom, energy level and spectra, corresponding principle, atomic excitation, the laser, basic properties of nuclei, radioactivity, binding energy, meson, emergency particles; the solid state physics and statistical mechanics- crystalling and amorphous solids, ionic crystal, covalent crystal, van der walls bond, metallic bond, band theory of solids, semiconductor, superconductor.

CSE 1201	Structured Programming Language	3.00

Prerequisite: None Contact Hour: 3 hours/week.

Objective:
This course introduces functional programming style. Its primary intention is to develop key programming and problem solving skills within a short space of time. To be able to Design, implement, debug and test small programs. Develop simple algorithms to solve a wide range of common programming problems. Compare and contrast the different problem solving paradigms, understanding the relative advantages and disadvantages of each.

Contents:
Structured programming language: data types, operators, expressions, control structures; Functions and program structure: parameter passing conventions, scope rules and storage classes, recursion; Header files; Preprocessor; Pointers and arrays; Strings; Multidimensional array; User defined data types: structures, unions, enumerations; Input and Output: standard input and output, formatted input and output, file access; Variable length argument list; Command line parameters; Error Handling; Graphics; Linking; Library functions.

CSE 1202	Structured Programming Language Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 1201 using C programming language.

MATH1261	Differential Equation and Coordinate Geometry	3.00

Prerequisite: MATH 1141 Contact Hour: 3 hours/week.

Objective:
The students should understand what coordinate geometry and Equation are and how to apply them to real life situations for IT professionals.

Contents:
Continuity and differentiability; Leibnitz's forms; Lagrange's form of remainders; Cauchy's form of remainder; Expansion of functions; Evaluation of indeterminate forms by L 'Hospitals rule; Partial differentiation; Euler's Theorem; Tangent and Normal; Sub-tangent and subnormal in Cartesian and polar coordinates; Maximum and minimum values of functions of single variable.

Transformation of coordinates axes and its uses; General equations of second degree and their reduction to standard forms; Pair of straight lines; System of circles; Coaxial circles and limiting points; Equations of parabola, ellipse and hyperbola in Cartesian coordinates; Tangents and normal; Pair of tangents; Chord of contact; Chord in terms of its middle point; Parametric coordinates; Conjugate diameters; Asymptotes.

HUM1263	Engineering Economics	3.00

Prerequisite: None Contact Hour: 3 hours/week.

Objective:
Economics is the study of how societies allocate scarce resources among competing uses. It is about the choices made by people, individually and collectively, in the production, exchange, distribution and consumption of goods and services. Central to economic analysis is the study of how people respond to incentives in a market economy, how these incentives may be modified by government intervention, and whether and how government intervention is warranted.

Contents:
Definition of economics; economics and engineering; principles of economics; micro-economics: the theory of demand and supply and their elasticity's; price determination; economic theory, economic theories for developing countries; indifference curve technique; marginal analysis; production and production function; types of productivity; rational region of production of an engineering firm; concept market and market structure; cost analysis and cost function; small scale production and large scale production; optimization; theory of distribution; macro-economics: savings, investment, and employment; national income analysis; inflation; monetary policy, fiscal policy and trade policy with reference to Bangladesh; economics of development and planning.

EEE 1265	Electrical Circuit Analysis	3.00

Prerequisite: None Contact Hour: 3 hours/week.

Objective:
Electrical and electronics engineers design, plan, research, evaluate and test electrical and electronic equipment and systems. The basics of electrical circuits and designing along with different electrical devices mechanism will be covered in this course.

Contents:
Direct current: voltage, current, resistance and power; Laws of electrical circuits and methods of network analysis; Introduction to filters: Passive and Active filters; Alternating current: Instantaneous and rms values of current, voltage and power, average power for various combination of R, L and C circuits, phasor representation of sinusoidal quantities; Balanced three phase circuit circuits; Ideal operational amplifier circuits.

EEE 1266	Electrical Circuit Analysis Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on EEE 1265.

CSE 1301	Discrete Mathematics	3.00

Prerequisite: None Contact Hour: 3 hours/week.

Objective:
Use mathematically correct terminology and notation. Construct correct direct and indirect proofs. Use division into cases in a proof. Use counterexamples. Apply logical reasoning to solve a variety of problems.

Contents:
Set theory: sets, relations, and partial ordered sets; functions; Mathematical Logic: propositional calculus and predicate calculus; Mathematical reasoning and proof techniques; Counting: permutations, combinations, principles of inclusion and exclusion; Discrete Probability; Recurrence relations and recursive algorithms; Growth of functions; Graph Theory: graphs, paths, and trees; Algebraic structures: rings and groups.

CSE 1303	Object Oriented Programming Language	3.00

Prerequisite: CSE 1201 Contact Hour: 3 hours/week.

Objective:
This course introduces object-oriented programming with C++, covering topics such as class design, inheritance, dynamic binding and static binding. Sections are also included on the implementation of core data structures such as lists, trees and hash tables. In this course students will gain an understanding of how to design and use classes correctly and understand relationships among classes.

Contents:
Philosophy of Object Oriented Programming (OOP); Advantages of OOP over structured programming; Encapsulation, classes and objects, access specifiers, static and non-static members; Constructors, destructors and copy constructors; Array of objects, object pointers, and object references; Inheritance: single and multiple inheritance; Polymorphism: overloading, abstract classes, virtual functions and overriding; Exceptions; Object Oriented I/O; Template functions and classes; Multi-threaded Programming, Networking, FX, swing.

CSE 1304	Object Oriented Programming Language Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE1303 using C++/Java programming.

EEE 1361	Electronics Devices and Circuits	3.00

Prerequisite: EEE 1263. Contact Hour: 3 hours/week.

Objective:
Electronics engineers design, plan, research, evaluate and test electronic equipment and systems. The basics of electrical circuits and designing along with different Electronics devices mechanism will be covered in this course.

Contents:
Semiconductor; junction diode characteristics; bipolar transistor: characteristics, small signal low frequency h-parameter model and hybrid-pi model; amplifiers: voltage and current amplifiers; oscillators; differential amplifiers, operational amplifiers(OPAMPs); linear applications of OPAMPs, input & output impedances, off-set null adjustments, frequency response and noise; introduction to JFET, MOSFET, PMOS, NMOS and CMOS: biasing and application in switching circuits; silicon controlled rectifier(SCR), TRIAC, DIAC, UJT: characteristics and application; introduction to rectifiers, active filters, regulated power supply; introduction to IC fabrication techniques.

EEE 1362	Electronics Devices and Circuits Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on EEE1361.

CE 1364	Engineering Drawing and AutoCAD	1.50

Prerequisite: none. Contact Hour: 3 hours/week.

Objective:
The aims of this course includes to enable the students to learn sketching and taking field dimensions, to take data and transform it into graphic drawings, to learn basic engineering drawing formats, to learn basic AutoCad skills and to learn how to draw 2D drawings in AutoCad.

Contents:
Introduction; Instruments and their uses; Third angle projection; Orthographic drawing; Isometric views; Sectional views; Introduction to computer graphic software: Computer aided drawing (CAD).

CSE 2101	Digital Logic Design	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

The main goal of this course is to teach the students fundamental concepts of combinatorial and sequential circuits and basic hardware devices to build a computer system. Students will learn rudimentary circuits system and then how these circuits are combined to construct more complex systems.

Contents:

Digital logic: Boolean algebra, De Morgan's Theorems, logic gates and their truth tables, canonical forms, combinational logic circuits, minimization techniques; Arithmetic and data handling logic circuits, decoders and encoders, multiplexers and demultiplexers; Combinational circuit design; Flip-flops; race around problems; Counters: asynchronous and synchronous counters and their applications; Asynchronous and synchronous logic design: State diagram, Mealy and Moore machines; State minimizations and assignments; Pulse mode logic; Fundamental mode design; PLA design; Design using MSI and LSI components.

CSE 2102	Digital Logic Design Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 2101.

CSE 2103	Data Structures	3.00

Prerequisite: CSE 1201 Contact Hour: 3 hours/week.

Objective:

Data Structure is a specialized way of organizing and storing data. Different kinds of data structures are suited to different kinds of application. The main objective of this course is to learn various types of data structures in different types of programming problems

Contents:

Internal data representation; Abstract data types; Elementary asymptotic analysis: growth of functions, O, Ω and Θ notations; Elementary data structures: arrays, linked lists, stacks, queues, trees and tree traversals, graphs and graph representations, heaps, binary search trees; Data structures for set operations; Advanced data Structures: balanced binary search trees (AVL trees, red-black trees, splay trees, skip lists), advanced heaps (Fibonacci heaps, binomial heaps); Hashing.

CSE 2104	Data Structures Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 2103 using C/C++/Java programming.

MATH2161	Matrices and Vector Analysis	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

This course provides the basics of different matrix operations and solution methods of different vectorbased practical problems.

Contents:

Solution of the linear System of equation; matrices: definition of matrix; different types of matrices; algebra of matrices adjoint and inverse of a matrix; elementary transformation of matrix; normal and canonical form of matrix; rank and nullity of matrix;

Multiple products of vectors; Differentiation and integration of vectors together with elementary applications; Gradient, divergence and curl of point functions; Various formulae; Definition of line, surface and volume integrals; Green's theorem; Gauss's theorem; Stoke's theorem.

HUM2163	Sociology	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

This course enables the students todemonstrate knowledge essential for understanding society and culture from sociological and anthropological perspectives on a global scale, to identify and critically evaluate the contributions of female and black sociologists, anthropologists, social scientists and scholars, to identify and critically evaluate the social and historical forces and institutions that influence the lifeand to apply the analytical and research methods analysis of sociology and anthropology to social issues and conflicts in preparation for participation as an agent of creative social change.

Contents:

Society, Science and Technology; Social Research: Methods, Social Impact Assessment (SIA); Culture, civilization and professional ethics; Socialization and leadership development; Social stratification and social mobility; Globalization, mass media and technology; Deviance, crime, and juvenile delinquency; Social groups and organizations; Population and society: concepts and theories; Environment and Urbanization; Social change and technology.

CSE2201	Numerical Analysis	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
The objective of the course is to identify and classify the numerical problem to be solved,to choose the most appropriate numerical method for its solution based on characteristics of the problem andto understand the characteristics of the method to correctly interpret the results.

Contents:
Introduction; Solution of Non-linear Equations: Fixed Point Iteration, Bi-Section method, False Position method, Newton-Raphson method, Bairstow's Method; Solution of Linear equations: Triangular systems and back substitution, Gauss-Jordan elimination method, Pivoting, LU-factorization, Cholesky's method, Dolittle and Croutfactoriza- tion; Interpolation and Approximation: Taylor's Series, Lagrangian interpolation, Divided differences formula, Newton's forward and backward interpolation, Spline interpolation; Differentiation: Numerical differentiation, Richardson's extrapolation; Integration: Newton's-Cote integration, Trapezoidal rule, Simpson's rule, Romberg's integration; Ordinary Differential Equations: Euler's method, Picard's method, Milne's method, Taylor's series method, Runge-Kutta method; Curve Fitting: Least squares lines, Least square polynomials, Non-linear curve fitting; Numerical Optimization: Golden Ratio search, Newton's search, Powell's method, Gradient search.

CSE 2203	Computer Organization and Architecture	3.00

Prerequisite: CSE 2101 Contact Hour: 3 hours/week.

Objective:
The goal is to make the art that specifies the relations and parts of a computer system. The objective of reading this course is to tie the programmer's view of a computer system with the actual hardware and architecture of the underlying machine. Computer architecture is concerned with how the central processing unit (CPU) acts and how it uses computer memory.

Contents:
Information representation; measuring performance; instruction and data access methods: operations and operands of computer hardware, representing instruction, addressing styles; arithmetic logic unit design: arithmetic and logical operations, floating-point operations; processor design: data paths-single cycle and multi cycle implementations; control unit design-hardwired and micro programmed; hazards; exceptions; memory organization: cache memory, virtual memory; channels; DMA and interrupts; buses; parallel processing: overview, importance, architecture, hardware and software issues, parallel programming and parallel algorithms; d**istributed processing: overview, impact, forms of distributed processing, strategies of distributed data processing, centralization vs. decentralization.**

CSE 2204	Computer Organization and Architecture Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 2203.

CSE 2205	Java and Socket Programming	3.00

Prerequisite: CSE 1303 Contact Hour: 3 hours/week.

Objective:
This course introduces programming with Java, covering topics such as class design, inheritance, dynamic binding, interfaces and visual programming. Sections are also included on the implementation of core data structures such as Array Lists, lists, trees and hash tables. In this course students will gain an understanding of designing real world applications and use advanced level API's available in java correctly.

Contents:
Inheritance; packages and interfaces; exception handling; multithreaded programming; enumerations, autoboxing and annotations; I/O, Applets and other topics; generics; java library: string handling, java.lang, java.util and java.io; networking; the applet class; event handling; introducing the AWT; AWT controls, layout managers and menus; images; the concurrency utilities; NIO regular expressions and other packages; java beans; introducing swing; exploring swing; Servlets; financial Applets and Servlets; creating a downloaded manager in Java.

CSE 2206	Java and Socket Programming Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 2205 using Java Programming Language.

CSE 2301	Microprocessor and Interfacing	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
The goal is to teach the students' assembly language based program, to incorporate the functions of a computer's central processing unit (CPU) on a single integrated circuit (IC),or at most a few integrated circuits.

Contents:
Introduction to 8-bit, 16-bit, and 32-bit microprocessors: architecture, addressing modes, instruction set, interrupts, multi-tasking and virtual memory; Memory interface; Bus interface; Arithmetic co-processor; Microcontrollers; Integrating microprocessor with interfacing chips; Programmable peripheral interfacing chip with interface to A/D and D/A converters; Keyboard/display interface; Programmable timer; Programmable interrupt controller, DMA controller; Introduction to embedded systems: overview of the design flow, Embedded systems specifications and modeling; Embedded hardware platforms and peripherals; Interfacing to the external world through sensors and actuators.

CSE 2302	Microprocessor and Assembly Programming	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 2301.Assembly Language will be taught; Contents of Assembly Language are following: Instruction set, Instruction types and their formats; Assembly program format; Assembly process; Interrupts and system services; Addressing methods; High level control structure formation; Use of subroutines and macros; Numeric processing and string processing. Experiments will be performed using Microprocessor and Microcontroller

CSE 2303	Theory of Computation	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

Be able to construct finite state machines and the equivalent regular expressions. Be able to prove the equivalence of languages described by finite state machines and regular expressions. Be able to construct pushdown automata and the equivalent context free grammars. Be able to prove the equivalence of languages described by pushdown automata and context free grammars. Be able to construct Turing machines and Post machines. Be able to prove the equivalence of languages described by Turing machines and Post machines

Contents:

Regular languages: regular expressions, nonregular languages; Finite automata: deterministic finite automata, nondeterministic finite automata, equivalence and conversion of deterministic and nondeterministic finite automata, pushdown automata; Context free languages: Context free grammars, ambiguity, Chomsky normal form, pumping lemma; Turing machines: basic machines, configuration, computing with Turing machines, combining Turing machines, Church-Turing thesis, Hilbert's problems; Decidability: Decidable Languages, Undecidability, halting problem, Reducibility; Complexity: Time complexity, class P, class NP, NP-completeness, space complexity, Savitch's theorem.

CSE 2305	Algorithm	3.00

Prerequisite: CSE 1201 Contact Hour: 3 hours/week.

Objectives:

To know the basics of analyzing the running time of different algorithms, designing and implementing efficient algorithms for solving different classical problems and finally getting an idea of complexity classes to deal with some hard computational problems.

Contents:

Introduction to algorithms; Correctness proof and techniques for analysis of algorithms; Master Theorem; Methods for the design of efficient algorithms: divide and conquer, greedy methods, dynamic programming; Sorting: heap sort, merge sort, quick sort; Graph algorithms: DFS, BFS, Applications of DFS and BFS, MST algorithms, shortest path algorithms, maximum flow and maximum bipartite matching; Lower bound theory; NP-completeness; NP-hard and NP-complete problems; Coping with hardness: backtracking, branch and bound, approximation algorithms; String matching algorithms; FFT and its applications.

CSE 2306	Algorithm Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 2305 using C/C++/Java programming.

MATH2361	Complex Variable and Fourier Transformation	3.00

Prerequisite: MATH 1141 Contact Hour: 3 hours/week.

Objective:

This course covers the theory and application of complex variables and Fourier Transformation.Complex variable begins with the exploration of the algebraic, geometric and topological structures of the complex number field. The concepts of analyticity, Cauchy-Riemann relations and harmonic functions are then introduced. The notion of the Riemann sheet is presented to help student visualize multi-valued complex functions. Complex integration and complex power series are presented. Fourier transformation includes the Fourier series, and the discrete Fourier transform; those are necessary for analysis signal processing and transmission for storing, Internet and networking.

Contents:

Functions of a complex variable; Limits and continuity of functions of complex variable; Complex differentiation and Cauchy- Riemann Equations; Mapping by elementary functions; Line integral of a complex function; Cauchy's Integral Theorem; Cauchy's Integral Formula; Liouville's Theorem; Taylor's Theorem and Laurent's theorem; Singular points; Residue; Cauchy's Residue Theorem; Contour integration; Mapping.

Fourier series; Fourier sine and cosine series, half range Fourier series, Fourier integral, complex form of the Fourier series, Parseval's formula finding Fourier series of various functions; Fourier transformation;

CSE 3101	Database Management System	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

To understand the different issues involved in the design and implementation of a database system.
To study the physical and logical database designs, database modeling, relational, hierarchical, and network models. To understand and use data manipulation language to query, update, and manage Database. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Contents:

Concepts of database systems; Data Models: Entity-Relationship model, Relational model; Query Languages: Relational algebra, SQL; Constraints and triggers; Functional dependencies and normalization; File organization and data storage; Indexing: primary and secondary indexes, B+ trees, hash tables; Query optimization; Transaction management; Recovery; Concurrency control; Access control and security; Semi-structured database: XML, XPath, XQuery; Object oriented and object relational databases; timestamp management; serializability; deadlock handling.

CSE 3102	Database Management System Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE3101 using MS-SQL Server, MySQL and Oracle.

CSE3103	Compiler	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

Compiler is an introductory course on the basic concepts of language translation and principles of compiler design. This course is intended to introduce students to the theory and tools that can be used to perform a grammar-oriented translation of a high level programming language into an executable code. The techniques and tools can also be employed in wider area of application that requires a grammar-oriented analysis and transformation.

Contents:

Basic issues, compiler structure, front end, back end; Lexical analysis: Tokens, patterns, and lexemes, input buffering, transition diagrams, lexical-analyzer generator; Syntax analysis: Elimination of left recursion, left factoring, FIRST and FOLLOW, LL(1) grammars, nonrecursive predictive parsing, parser generators; Syntax-directed translation: Syntax- directed definitions, inherited and synthesized attributes, dependency graphs, syntax-directed translation schemes; Semantic analysis: Type expressions, type equivalence, type-checking; Run-time environments: Storage organization, static versus dynamic storage allocation, activation trees, activation records; Intermediate code generation: Directed acyclic graphs for expressions, three-address code, quadruples, triples, static single-assignment form; Code generation; Code optimization: Basic blocks and flow graphs, next-use information, optimization of basic blocks.

CSE3104	Compiler Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE3103 using C/C++/Java programming language.

CSE 3105	Data Communication	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
This course discusses the evolution of early networks and the Internet. This also demonstrates the ability to use effectively a range of common networked applications including e-mail, telnet, FTP, and web browsers, online web courses, and instant messaging. Emerging technologies in the net-centric computing area and assess their current capabilities, limitations, and near-term potential are also addressed in this course.

Contents:
Introduction to signals; Review of Fourier Transform; Frequency Response of Linear Systems; Analog Modulation: AM, DSB-SC, SSB- SC, VSB, FM, PM; Introduction to digital data communication; Sampling theorem; Quantization; Pulse modulation: PAM, PDM, PPM, PCM, delta modulation, differential PCM; Intersymbol interference; Pulse shaping; Line coding; Digital modulation: ASK, FSK, BPSK, QPSK, Offset QPSK, 4-shifted QPSK, MSK, GMSK, QAM; Multiple access techniques: TDM, FDM; Random processes; Additive White Gaussian Noise (AWGN); Error rate due to noise; Introduction to information theory; Concept of channel coding and capacity.

CSE 3107	Information System Management	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
The main objective of this course is to provide students with an overall understanding of the main concepts of information systems, and to highlight the importance of information systems in modern organizations and societies.

Contents:
Information systems management: importance of information systems (IS) management; IS management's leadership role; strategic uses of IT; IS planning; managing essential technologies: distributed systems; managing telecommunications; managing information resources; and managing operations; managing system development: technologies for developing systems and management issues in system development; systems for supporting knowledge work: supporting decision making; collaboration, and knowledge works; acquisition of hardware, software, networks, and services: request for proposal, acquisition methods (buy, rent, or lease), software acquisition, and analysis of alternatives; people and technology: the challenges ahead.

CSE 3201	Computer Network	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

To achieve skills in network programming through development of distributed applications using the socket interface to TCP and UDP. Understanding the application layer protocol HTTP (used by the World Wide Web) and web-based programming and the layered design of computer networks and the key concepts at the application layer through the link layer are also considered in this course.

Contents:

Introduction to Computer Networks; Protocol hierarchies; Data link control: Link layer and services; Error Detection and Correction; Multiple access protocol: Standards IEEE 802.*; Hubs, Bridges, and Switches, Fast Ethernet; Routing architecture and algorithms; IPV4, IPV6, ARP, RARP; Introduction to transport layer: UDP,TCP; Principles of Reliable data transfer, Principles of congestion control, TCP, Congestion control; Application layer services: Web, HTTP, FTP, SMTP, DNS architecture; Network security: Cryptography, DES, public key algorithm; Authentication; Digital signatures.

CSE 3202	Computer Network Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 3201.

CSE 3203	Operating System	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

Describe the functions of the major components of an operating system. Compare and contrast alternative possible implementations for some of these components and analyze the performance of components Understanding the system call interface and the key concepts in the design of an operating system kernel.

Contents:

Operating system: its role in computer systems; multitasking, multiuser, multiprocessing OS; Operating system structures; Process: process concept and scheduling, inter-process communication, communication in client-server systems; CPU scheduling: scheduling criteria and algorithms, thread scheduling, multiple-processor scheduling; Process synchronization: critical-section problem, semaphores, monitors; Deadlock: resource allocation and deadlock, deadlock detection, prevention and recovery; Memory management: swapping, paging, segmentation, virtual memory; Input/ Output: hardware, software, disk, terminals, clocks; File Systems: files, directories, security, protection; Case study of some operating systems.

CSE 3204	Operating System Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 3203 in Linux environment and using Linux scripts.Introduction to the UNIX Operating System; The Directory Structure; The vi editor; Unix Communications; Utilities and Filters; I/O redirection; controlling child processes; C-shell programming; Bourne shell programming; The emacs editor; Stream Editing; System Administration;Text processing;Text processing : LaTeX.

CSE3205	Applied Statistics and Queuing Theory	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
The course concentrates on probability theory, statistical methods and the introductory mathematics to facilitate the analysis of algorithms and advanced computer programming. The objective of this course is to introduce students to a collection of mathematical tools, which will help to deal with the randomness or stochasticity of many technological operations, controlled manipulation of mathematical formulas and a set of techniques for solving problems.

Contents:
Recurrent problems; Manipulation of sums; Integer functions; Number theory; Binomial coefficient; Special numbers; Generating functions; Combinatorial game theory; Introduction to probability theory, expectation; Random variables; Conditional Probability and Conditional Expectation; Stochastic process; Markov chains: discrete parameter, continuous parameter, birth-death process; Queuing models: birth-death model, Markovian model, open and closed queuing network; Application of queuing models.

CSE 3207	Cyber Crime and Security	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective
Main objectives of this course are understanding security concepts, Ethics in Network Security, understanding security threats, and the security services and mechanisms to counter them, comprehending and apply relevant cryptographic techniques, comprehending security services and mechanisms in the network protocol stack, comprehending and apply authentication services and mechanisms, comprehending and apply relevant protocol like SSL, SSH, comprehending and apply email security services and mechanisms, comprehending and apply web security services and mechanisms, comprehending computer and network access control.

Contents:
Remote access technologies and vulnerabilities; a**ccessibility**; Fundamentals on security and cryptography; security standards: data encryption standard (DES), RSA, digital signature algorithm (DSA), SHA, SSL, secure sockets layer(SSL), CBC, IPSec, AES and SET; distributed denial of service (DDOS) attacks; security for communication protocols; security for operating systems and mobile programs; security for electronic commerce, passwords and offline attacks; network security applications: authentication, e-mail, IP and web; system security: intruders, malicious software and firewalls; PKI smart cards, secure multipurpose internet mail extensions; viruses and spy ware; security models; wireless security, sandboxing, router security strategies and network security assessment.

CSE 3301	System Analysis and Design	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
System Analysis and Design refers to the process of examining a business situation with the intent of improving it through better procedures and methods. System analysis and design relates to shaping organizations, improving performance and achieving objectives for profitability and growth. The emphasis is on systems in action, the relationships among subsystems and their contribution to meeting a common goal. Looking at a system and determining how adequately it functions, the changes to be made and the quality of the output are parts of system analysis.

Contents:
System analysis fundamentals: systems, roles, and development methodologies; Understanding and modeling organizational system; Project management; Information requirements analysis: Interactive methods; Information gathering: Unobtrusive methods; agile modeling and prototyping; The analysis process: Using data flow diagrams; Analyzing systems using data dictionaries; Process specifications and structured decisions; Object oriented systems analysis and design using UML; The essentials of design: Designing effective output, Designing effective input; Designing databases; Human-computer interaction; Quality assurance and implementation: Designing accurate data entry procedures; Quality assurance and implementation.

CSE 3302	System Analysis and Design Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 3301 and design of a real life full-phase customized system.

CSE 3303	Computer Graphics	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
This course intends to develop the basic concepts of computer graphics including 2D and 3D graphics. Moreover, the goal is to teach the students about different algorithms, modeling, illumination and application in rendering different scenario.

Contents:

Basics of computer graphics and its applications; Raster graphics: images and colors; 3D rasterization pipeline; 3D modeling: parametric curves and surfaces using B-spline and Bezier curves and surfaces, polygonal meshes, subdivision surfaces, BSP trees, voxels, sweeps, fractals; Scene graphs; Transformations: modeling, viewing, projection, and viewport transformations; 3D rendering; Visible surface detection and hidden surface removal methods: back-face detection, depth buffer method, depth-sorting method, BSP trees method, ray casting methods; Direct illumination; Global illumination: shadows, ray tracing, and radiosity; Shading and textures; Scan conversion and clipping; Computer animation: kinematics, motion capture, and dynamics-passive and active; Application development using OpenGL.

CSE 3304	Computer Graphics Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 3303 using OpenGL and C/C++/Java programming language.

CSE 3305	Software Engineering	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
Understand the software life cycle. Be able to elicit requirements from clients and specify those requirements. Be able to perform detail software design activities. Have practical experience using UML.

Contents:
Concepts of software engineering: software engineering paradigms, different phases of software system development, different types of information, qualities of information; Project management concepts: software process and project metrics, software project planning, risk analysis and management, project scheduling and tracking, software cost analysis, COCOMO model; Analysis concepts and principles: requirement analysis, analysis modeling, data modeling; Design concepts and principles: architectural design, user interface design, object oriented software development and design, iterative development and the unified process, sequential waterfall life cycles, use case model for requirement writing, elaboration using system sequence diagram, domain model, visualizing concept classes; UML diagrams: Interaction and Collaboration Diagram for designing Software, class diagram; GoF design patterns: adapter, factory, singleton, strategy, composite, facade, and observer; Content management systems: concepts, planning and developing dynamic web content sites; Software testing: white box and black box testing, basis path testing, testing for specialized environment; Software testing strategies: unit testing, integration testing, validation testing, system testing; Art of debugging; Analysis of system maintenance and upgrading: software repair, downtime, error and faults, specification and correction, maintenance cost models, documentation; Software quality assurance: quality factors. Software quality measures, cost impact of software defects, concepts of software reliability, availability and safety, function based metrics and bang metrics, metrics for analysis and design model, metrics for source code, testing and maintenance.

CSE 3306	Software Engineering Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on requirement discovery and analysis, software design, report writing on software design and other features of CSE 3305.

CSE 4000	Project and Thesis	6.00

Prerequisite: Completion of 108 CH Contact Hour: 4x3 hours/week.

A student must complete the required credit hour thesis and/or research project. The student can apply for registering his/her thesis after completion of minimum 108 credit hours. The duration of performing thesis is 12 months. No more than two students can work together in a thesis work under the supervision of a supervisor. No one outside the thesis group can be involved into the research work otherwise permitted by the supervisor. Any work performed for any reason not included within the academic curriculum cannot be allowed or submitted as their thesis work.

CSE 4101	Artificial Intelligence	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
To provide with understanding of the role of Artificial Intelligence, Expert Systems and Decision Models in real life scenario. Develop abilities to apply, build and modify decision models to solve real problems. Explore the issues involved in the design and development of Artificial Intelligence Based Decision Support Systems and discuss the role these systems play in the business environment. Gain an in-Depth Knowledge of a particular type of Artificial Intelligence Technique, namely Genetic Algorithms. Gain the knowledge to build a prototype Artificial Intelligence Based Decision Support System.

Contents:
Introduction to old and new AI techniques; Search techniques in AI; Constraint satisfaction problems; Game playing; Knowledge representation and reasoning; Propositional and first order logic, inference in first order logic; Planning; Probabilistic reasoning; Learning in symbolic and non- symbolic representation; Expert systems and knowledge engineering; Natural language processing; Computer vision and image understanding.

CSE 4102	Artificial Intelligence Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 4101.

CSE 4103	Switching and Routing	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
The objective of this course is to advance the state of the art in theory and applications of information switching and networking to bring the students into interest in various aspects of communications switching and routing such as theory and architecture, tele-traffic theory, mobility and call control, signaling protocol, intelligent networks and service features, switching software architecture, management, economics and applications of switching and routing systems.

Contents:
Introduction of network and network model; interconnection at different layers; relays; Ethernet; different types of repeaters, hubs, bridges and switches; broadcast and collision domains; campus network; connecting the switch blocks; VLANs; layer 2 switch and spanning tree protocol; using spanning tree with VLANs; inter-VLAN routing; multi-layer switching; multicast; traffic isolation; interior routing protocols: RIP, OSPF, IGRP and EIGRP; autonomous systems; exterior routing protocols: EGP, BGP and IDRP; layer 3 switching; MPLS; queuing techniques; over provisioning; traffic shaping; and congestion control.

CSE 4104	Switching and Routing Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 4103.

CSE 4200	Mobile Apps Development	2.00

Prerequisite: None. Contact Hour: 4 hours/week.

This Mobile Apps Development course has been developed to help the student make that step into building commercial Apps a reality. This course will focus on building mobile web apps, which will work across multiple platforms including Android, iOS, and/or others. This course has a technical focus and develops an in-depth expertise of core technical disciplines such as designing, developing and testing software solutions for mobile platforms. After completing this course, the student will understand what it takes to build professional Apps for mobile devices while gaining experience and knowledge in using platforms and tools such as Objective-C Interface Builder for Apple, Java and Eclipse for Android combined with SDK and 3rd party libraries such as PhoneGap and Jquery Mobile. The student will be provided with practical and relevant hands-on tutorials combined with modern approaches to building commercial mobile apps, including invaluable insights into the mobile app development industry. They will also be given the opportunity to utilize and develop these skills through appropriate practical work and be able to apply these skills and knowledge to their own development projects in the future.

On completion of thiscourse, the students will gain practical knowledge in hardware interfaces for mobile devices,UML for mobile applications design, XML for Mobile Computing, building mobile apps using HTML5, implementing JQuerymobile, working with Phonegap to develop mobile apps, building iOS applications using Objective-C, iOS SDK, Android app development using Eclipse and Android SDK.

CSE 4201	Technical Writing	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

To give students an overview on basic business and research articles. The more emphasize will be given on technical report writing and communication skills.

Contents:

Purposes and types of writing; mechanics of writing; basic grammar, effective paragraph and essay writing; writing personal letters, official and business letters (including sales letter, claim and adjustment letter, recommendation letter, etc); report writing (progress report, study report, etc).

CSE 4300	Industrial Training	2.00

Prerequisite: None. Contact Hour: 4 hours/week.

The purpose of Industrial Training is to expose students to real work of environmentexperience and at the same time, to gain the knowledge through hands on observation andjob execution. From the industrial training, the students will also develop skills in work ethics,communication, management and others. Moreover, this practical training program allowsstudents to relate theoretical knowledge with its application in the manufacturing/development industry.

The objectives of industrial training are:

- To provide students the opportunity to test their interest in a particular career before permanent commitments are made.
- To develop skills in the application of theory to practical work situations.
- To develop skills and techniques directly applicable to their careers.
- To increase a student's sense of responsibility and good work habits.
- To expose students to real work environment experience gain knowledge in writing report in technical works/projects.
- To increase student earning potential upon graduation.
- To build the strength, teamwork spirit and self-confidence in students life.
- To enhance the ability to improve students creativity skills and sharing ideas.
- To build a good communication skill with group of workers and to learn proper behavior of corporate life in industrial sector.
- To instill with good moral values such as responsibility, commitment and trustworthy among the students during their training.

CSE 4401	IT Entrepreneurship Development	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
Today's business world demands both sharp technical skills and broad business insight.*IT Entrepreneurship Development course offers a balanced mix of thinking and hands-on approaches, with plenty of room for entrepreneurial creativity.*

Contents:
Concept of entrepreneurship, need of entrepreneurship, origin and development of entrepreneurship; govt. agencies promoting entrepreneurship; entrepreneur development program, self-employment programs, the entrepreneurial development perspective; creating entrepreneurial venture; entrepreneurship development and government; project management; why do entrepreneurs fail – elaboration on solutions for the problems; infrastructure and logistics; business support; procedures; marketing; IT industry; legal and regulatory framework; productive sectors; decision making and the political economy of information technology; national information and communication infrastructure policies and plans; the wireless revolution and universal access; emergence of VoIP; legal regime that foster development of IT business; the role of the private sector in general and the business sector in particular in closing the digital divide; telecommunications development strategy; cyber cafe; digital business ecosystems; the law and digital business ecosystems; Internet telephony – the regulatory issues; developments and challenges in the protection of intellectual property rights.

CSE 4403	E-Commerce and E-Governance	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
This course provides the students the fundamental knowledge on e-commerce and e-business. E-commerce is the system that allows selling and buying something via electronic means. E-business consists of the exchange of data to facilitate the financing and payment aspects of business transactions. This is an effective and efficient way of communicating within an organization and one of the most effective and useful ways of conducting business.

Contents:
Vision and mission of e-Government; status affecting e-Government development; Principles of e-Government strategy; current issues and trends in e-government; ways the Internet can improve government's responsiveness; identifying career requirements for e-government services; web site management; implications of public private partnerships;e-Government policy frameworks; development of portal architecture;key e-government practices; citizen centric web design; e-government legal/social drivers; e-Government policy issues; the management of strategy and projects; data security; quality assurance; political challenges and ethical challenges; security issues and the need for a certification authority; delivery channels and service delivery; capacity building and business process re-engineering; e-Government service branding and communications strategy; e-Government financing; comparative case study of e-Government implementation and programme structures; unicode and ICT in local languages; issues in transliteration and natural language translation; records management; service oriented architecture; IT workforce; concepts in bridging the digital divide; working with donors; models of public-private partnerships (PPP); application scenarios for G2G, G2B and G2C; emergence of new e-sectors such as e-Health, e-Water & e-Tourism; ICT for democracy and development; transparency and right to information; proprietary vs. open source software; e-literacy and illiteracy; Categories of e-Business (b2b, b2c, b2a etc); electronic markets; electronic data interchange; internet commerce; e-Business planning; business and operational aspects of e-Business; data warehousing, data mining and intelligent agents; electronic payment; cryptography techniques for payment systems; systems based on credit cards; electronic checks; electronic cash payment systems; micro payments.

CSE 4405	IT Laws, Regulations and Ethics	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

The main objective of this course is to educate the prospective IT professionals regarding laws, regulations and security. The laws and regulations aim to ensure transparency in online transactions. The seller needs to provide the consumer with necessary information such as terms and conditions and fine as well as give them the right to cancel their order within a specified time. A security wake-up call for companies conducting business over the Internet will be the wave of the future, provided businesses can allay consumer fears about security. This course addresses the essential elements of safe electronic commerce and electronic businesses over the Internet.

Contents:

The legal and social environment of E-commerce; uniform commercial code; Validity and enforceability of electronic agreements; evidentiary problems; privacy, consumer rights; copyright and trademark laws; laws which affect online buying and purchasing; law enforcement; evidence collection and preservation; customer security; digital signatures and certificates; digital signature laws; secure socket layers, PCI, SET, firewalls and Kerberos; secure transactions; computer monitoring; corporate e-mail privacy, computer crimes security for Internet trading, security tools; non repudiation services.

CSE 4407	Software Testing and Quality Assurance	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

This course enables students understanding credible resources verified through methodological software engineering processes. The students are to be able to test techniques, measures, and processes.

Contents:

Testing in the lifecycle; testing objectives; the fundamental test process; testing and risk; test policy, test strategy, test plans; entry and exit criteria; estimating techniques; test monitoring; incident management process; fundamentals of test analysis; test environment requirements; selection of techniques; coverage measures; test cases; levels of testing - unit testing, integration testing, system testing, acceptance testing, alpha testing and beta testing, static vs. dynamic testing, manual vs. automatic testing, testers workbench; different types of testing - installation testing, usability testing, regression testing, performance testing, load testing, stress testing, security testing; static and dynamic testing; black box and white box testing; structural testing; reliability assessment; reliability assessment; testing real time system; testing documentation; test reports; test estimation; test monitoring and control; test technique, test type and test coverage selection; test tool selection and implementation; f**oundations of software project management; organization structure and staffing; motivation, authority and influence; conflict management; proposal preparation; a large engineering software system management; client management; managing software project teams; project planning and scheduling; risk management; configuration management; pricing estimation and cost control; quality assurance and accreditation; factors affecting software quality; software quality assurance plans; business context and legal issues for software projects; software measurement: testing, upgrading and maintenance; network systems; and international project management.**

CSE 4409	Software Project Management	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
This course enables students to learn the discipline of planning, organizing, motivating, and controlling resources to achieve specific goals from beginning and ending. The project management is to bring about beneficial change or added value repetitive, permanent, or semi-permanent functional activities to produce products or services, which requires the development of distinct technical skills and management strategies.

Contents:
Foundations of software project management; organization structure and staffing; motivation, authority and influence; conflict management; proposal preparation; a large engineering software system management; client management; managing software project teams; project planning and scheduling; risk management; configuration management; pricing estimation and cost control; quality assurance and accreditation; factors affecting software quality; software quality assurance plans; business context and legal issues for software projects; software measurement: testing, upgrading and maintenance; network systems; and international project management.

CSE 4411	Basic Graph Theory	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
The objective of this course is to learn the theorems and properties of graphs and to model and solve real life problems using graph theory.

Contents:
Graphs and their applications; Basic graph terminologies; Basic operations on graphs; Graph representations; Degree sequence and graphic sequence; Paths, cycles and connectivity; Trees and counting of trees; Distance in graphs and trees; Euler tours; Hamiltonian cycles; Ear decomposition; Graph labeling; Matching and covering; Planar graphs; Graph coloring; Special classes of graphs.

CSE 4413	Fault Tolerant System	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

This course focuses on the design of fault-tolerant and reliable computer systems. The objective of this course is to enable the student to understand the root causes of faults in computer systems and their impact. The student will learn to use both traditional and cutting-edge techniques to provide fault-tolerance and error resilience. Finally, the knowledge of practical applications of the techniques in the context of real systems will be incorporated in this course. The techniques used for fault tolerant system ranges from analytical modeling to empirical validation.

Contents:

Introduction: background and motivation, dependability attributes, probability distributions; Reliability modeling: combinational modeling, state-space modeling; System view of high availability design; Defects: defect avoidance, shielding and hardening, defect circumvention, yield enhancement; Faults: fault testing, design for testability, fault masking, replication with voting; Errors: error detection, self-checking modules, error correction, redundant disk arrays; Hardware redundancy: basic approaches, static and dynamic, voting, fault tolerant interconnection networks; Software redundancy: software reliability models, software aging, N-version programming; Degradation allowance: performability of a fail-soft system, check pointing and rollback.

CSE 4415	Basic Multimedia Theory	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

Students undertaking this course develop strong practical skills which are to be enhanced through the study of the critical elements of multimedia and communication theory, research and project development and professional practice. The teaching and coursework aims to heighten experiential learning, team and group work, understanding of the relevant communication and multimedia theories and applications, as well as critical approaches to research and design and project management.

Contents:

Overview of multimedia systems; multimedia storage; data compression techniques for audio and video; synchronization; multimedia networking and protocols; QOS principles; multimedia coding and streaming; mobile multimedia communications; operating system support for multimedia; hypermedia system; standards for multimedia; multimedia database and multimedia applications, required hardware and communication supports for multimedia applications; application-specific multimedia signal processing and communications.

CSE 4417	Machine Learning	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

Learn about some of the most widely used and successful machine learning techniques. Be able to formulate machine-learning problems corresponding to different applications. Understand a range of machine learning algorithms along with their strengths and weaknesses. Understand the basic theory underlying machine learning. Be able to apply machine-learning algorithms to solve problems of moderate complexity. Be able to understand knowledge acquisition, pattern recognition, program synthesis, text and language processing, internet-based information systems, human-computer interaction.

Contents:

Introduction to machine learning; Regression analysis: Logistic regression, linear regression; Classification techniques: Supervised and unsupervised classification; Neural networks; Support vector machines; Classification trees; Rule based learning; Instance based learning; Reinforcement learning; Ensemble learning; Negative correlation learning; Evolutionary algorithms; Genetic algorithm, Statistical performance evaluation techniques of learning algorithms: bias-variance tradeoff; Practical applications of machine learning.

CSE 4419	Bioinformatics	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

The objective of this course will be to introduce students to the fundamentals of evolution, molecular biology, and molecular evolution. These principals underlie much of modern bioinformatics, and students will be shown how they apply to many of the basic predictive methods that are of common use in the field. This course also aims to provide students with a practical and hands-on experience with common bioinformatics tools and databases. Students will be trained in the basic theory and application of programs used for database searching, protein and DNA sequence analysis, prediction of protein function, and building phylogenetic trees. Specific types of analysis discussed in the course will include but is not limited to: Detection of homology with BLAST, prediction of transmembrane segments, multiple alignment of sequences, prediction of protein domains, prediction of protein localization, and building phylogenetic trees.

Contents:

Introduction to Bioinformatics; Introduction to biology, biological databases, and high-throughput data sources; Overview of bioinformatics problems; Statistical significance of alignments; Suffix Trees; Suffix Arrays; Patterns, Profiles, and Multiple Alignments; Hidden Markov Models; Multiple Sequence Alignment Algorithms; Introduction to protein structures; Protein Structure Prediction; Structural Alignment of Proteins; Microarray data normalization, analysis of Clustering techniques; Introduction to Systems Biology;Gene regulatory networks; Construction and Analysis of protein networks:Monte Carlo Sampling, Random Walks on Graphs.

CSE 4421	Robotics	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

Course covers fundamentals of robot working, programming and integration in a manufacturing process. It starts with examples of robotics idea over history and continue with a numerous of examples in nowadays robot applications on different areas of human activities. Topics to be covered include robot mechanical, power, measuring and control system, robot kinematics, dynamic, control and programming. Special chapter of mobile robots will cover mobile robot kinematics, path planning and control. Overview of nowadays research in robotics and view of the robotics impact in human future.

Contents:

Historical evolution of robotics; Importance of material goods production in modern society; Robots role in modern production; State of the art in the industrial robotics; IFR statistics; Robot characteristics, subsystems and classification; Robot mechanical system: links, bearings, shafts, gearboxes, grippers; Robot power system: electrical, pneumatic and hydraulic motors; Robot measuring system; Internal sensing: position, velocity, acceleration, force;External robot sensing: proximity sensors, range finders, tactile sensors, vision; Robot control system; Robot kinematics: joint and Cartesian space, homogenous transformation, frames and standard names, Denavit-Hartenberg notation, direct and inverse kinematics solution, Euler angels, Jacobian matrix and velocity transformation; Robot trajectory planning in joint and Cartesian space;Robot dynamics: Euler-Lagrange formulation, joint and Cartesian forces;Robot control: decoupling of nonlinear systems, feedforward and feedback control, control models and strategies, position control and simple feedback synthesis, adaptive control and force control; Robot programming: motion oriented and task oriented languages; Robot application in typical operations and tasks; Mobile robots kinematics, path planning and control;Research and future of robotics.

CSE 4423	Data and Web Mining	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

Data mining is a discipline within knowledge discovery that seeks to facilitate the exploration and analysis of large quantities of data, by automatic or semiautomatic means. This subject provides a practical and technical introduction to knowledge discovery and data mining. Topics to be covered include problems of data analysis in databases, discovering patterns in the data, and knowledge interpretation, extraction and visualization.

Contents:

Introduction to data mining; data warehousing and OLAP technology for data mining; data preprocessing; data mining primitives, languages and systems; descriptive data mining: characterization and comparison; association analysis; classification and prediction; cluster analysis; mining complex types of data; applications and trends in data mining; Models, Methodologies, and Processes; The KDD Process; Generic Tasks; Broad Themes (Search, Induction, Querying, Approximation, and Compression); Application Areas; The Good, Bad, and Ugly of Data Mining Practice: Data Dredging, Data Fishing, and Data Scrubbing; Attribute-Value Learning Techniques; Decision Trees; Decision Lists; Classification and Regression Trees; Association Rules; Correlations; Rule-Based Mining; Sequential versus Simultaneous Paradigms; Propositional Representations; Customized Data Structures for Speeding up Data Mining Algorithms; Relational Mining Techniques: Inductive Logic Programming; Commercial Software such as PROGOL, Aleph, Golem, FOIL, Tertius, and WARMR; Main Approaches to ILP; Rule Induction, Beam Search, Logical Decision Trees, Clausal Discovery, Model Selection; Inverse Resolution, Relative Least General Generalization. Propositionalization Techniques; Recursive Rule Generation. Operators for Efficient Search of Relational Spaces; Learning from Interpretations; Comparative Merits of Attribute-Value and Relational Mining Techniques; Domain Theories and Incorporating Prior Background Knowledge; Probabilistic Techniques; Bayesian Networks; Conditional Independence and its Modeling; Inference and Representational Complexity; Gradient Ascent Training; EM Algorithms; Combining Relational and Probabilistic Techniques (PRMs); Incremental Learning; Approximations and Tweaks; Techniques from Numerical Analysis and Statistics; Matrix-theoretic Approaches to Clustering (inc. K-means); Singular Value Decomposition (SVD) and Principal Component Analysis (PCA); Latent Semantic Indexing (LSI); Semi-Discrete Decompositions; Non-Negative Matrix Factorizations; Independent Component Analysis (ICA); Latent Variables; Factor Analysis; Mixed Models; Modeling for Data Mining and Methodology; Spatial Aggregation (SA); Closing-the-Loop; Sampling Strategies; Feature Extraction; Identifying Relevant Features; Model Assessment; Bayesian Model Inference and Averaging; Applications: Data Mining Applications in Bio-informatics, Personalization, Information Retrieval, Web Modeling, Filtering, and Text Processing.

CSE 4425	Cloud Computing	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective

This course investigates cloud computing models, techniques, and architectures. Cloud computing has evolved as a very important computing model, which enables information, software, and other shared resources to be provisioned over the network as services in an on-demand manner. Students will be exposed to the current practices in cloud computing. Topics may include distributed computing models and technologies, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), virtualization, security and privacy issues, performance and systems issues, capacity planning, disaster recovery, Cloud OS, federated clouds, challenges in implementing clouds, data centers, hypervisor CPU and memory management, cloud hosted applications, and other advanced and research topics in cloud computing.

Contents:

Cloud computing terminology and concepts; cloud-enabling technologies and standards; cloud computing service and deployment models; public cloud offerings and private cloud options; service-oriented computing and service-oriented architectures; evaluating architecture of cloud-enable system; building a private cloud: business case and technical design and implementation; migrating to clouds; security and privacy; reference architectures for cloud-based systems; virtualization; end-user access to clouds; mobility and the cloud; benefits, challenges, and risks of cloud computing.

CSE 4451	Digital Signal Processing	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

The purpose of this course is to give the students of Computer Science/Engineering the basic background in Digital Signal Processing. Introduces how a computer (a general purpose or special purpose DSP chip) could be used to solve Signal Processing problems digitally. The topics include introduction to discrete signal and systems, difference equations, discrete convolution, Z-transform and Fast Fourier transform techniques.

Contents:

Discrete time signals and systems: Fourier and Z transforms, DFT, 2- dimensional versions; Linear time invariant discrete time systems; Digital signal processing topics: flow graphs, realizations, FFT, quantization effects, linear prediction; Digital filter design methods: windowing, frequency sampling, S-to-Z methods, frequency-transformation methods, optimization methods, 2-dimensional filter design; Quantization of signals and filter coefficients; Oversampling techniques for ADC and DAC.

CSE 4452	Digital Signal Processing Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 4451.

CSE 4453	Network and Server Administration	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
The objective of this course is to teach entry-level competencies necessary for becoming a network administrator. The course emphasizes the PC based technologies necessary for network protocols, installation, troubleshooting, management and user needs.

Contents:

Networking overview; IP addressing basics; active directoryl; network planning; DHCP, DNS, FTP, HTTP etc; implementing and managing WINS; securing network traffic; remote access; Internet authentication service; routing; naming; configuring file services; configuring and monitoring print services: maintaining and updating Windows; maintaining network health with network access protection and IPSec; securing data transmissions and authentication; maintaining file and print services; routine system maintenance; Internet connectivity, system optimization, troubleshooting, and scripting languages; Internet connectivity, system optimization, troubleshooting, and scripting languages.

CSE 4454	Network and Server Administration Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 4453.

CSE 4455	Wireless Network	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
The objective of this course is to enable students to be able to work with wireless environment as well as to construct and to manage wireless LANs in Windows and Linux environments. Studying this course the students is to be able to understand the different types of personal, local, wide and metropolitan wireless networks including Bluetooth, 802.11 LANs, cellular and WiMAX networks.

Contents:
Introduction to wireless networks; wireless transmission; frequencies; regulations; antennas; wireless signal propagation; modulation; spread spectrum; cellular system; media access; different types of wireless communication networks; different generations; mobile communication systems: GSM, HSCSD, GPRS, and EDGE; wireless telecommunication systems; TETRA; CDMA2000; satellite communication system; broadcast systems; digital radio; localization systems; wireless LANs; Wi-Fi and WiMAX technologies; Bluetooth; network protocols; mobile IP; ad-hoc networking; wireless sensor networks; transport protocols; reliable transmission; flow control; support for mobility, wireless WWW; WAP and i-mode; wireless security; mobile programming using J2ME.

CSE 4456	Wireless Network Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 4455.

CSE 4457	Software Architecture	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objectives:

Understand the role of software architecture in the development of an enterprise application system. Examine and compare various architecture view types and styles. Develop the ability to read and understand the models that are used to document software architecture. Understand the nature of and the advantages and disadvantages for various architectural choices. Examine and compare centralized vs distributed architectures. Explore various aspects of client-server architectures including web architectures.

Contents:

Requirements Engineering in the engineering life cycle; eliciting requirements; modeling and analysis; communicating the requirements; agreeing requirements; evolving requirements; method engineering; problem frames; viewpoints-Oriented requirements engineering; procedure and processes; project and risk management; responsibilities and roles; identification of requirements; specification of requirements; requirements analysis; tracking of requirements; requirements documentation; documentation of requirements using natural language; model-based documentation of requirements; checking and reconciling requirements; requirements Management; requirements engineering in agile methods; fluctuating and conflicting requirements; communication and coordination breakdown; tools; introduction to design process; design process and concepts; inception phase; elaboration phase; construction phase; transition phase; software architecture: control hierarchy; structural partitioning; information hiding: Effective modular design - functional independence; cohesion, coupling; design specification outline; architectural design; real time systems; SCM; layered behavioral model of software development process; relations between RE and software design.

CSE 4458	Software Architecture Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE4457.

CSE 4459	Distributed Database Management System	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective

This course will introduce principles and foundations of distributed databases, including architecture, design issues, integrity control, and query processing and optimization, transactions, and concurrency control.

Contents:

Concepts of distributed database; levels of distribution transparency; distributed database design; translation of global queries to fragment queries; optimization of access strategies; management of distributed transaction; concurrency control; distributed database administration; homogeneous and heterogeneous distributed database; parallel database: basic concepts and design issues; multimedia database system: basic concepts and design issues; database wire-housing and data-mining concepts and algorithm.

CSE 4460	Distributed Database Management System Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE4459.

CSE 4461	Digital Image Processing	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective

The aim of this course is to introduce to the students the basics of digital image processing. The students will gain overview about the available techniques and possibilities of this field. They will learn basic image transforms, segmentation algorithms and problems of object measurements. They will be able to perform the basic techniques and apply them in practice.

Contents:

Acquisition of 2D and 3D image data, process of signal digitization; Properties of the digital image, types of noise; Fourier transform and Nyquist sampling theorem; Convolution, PSF and OTF; Image preprocessing; linear and non-linear filters; Deconvolution; Edge detection; Global and local thresholding;Binary image and its modification; Mathematical morphology; Image segmentation; Object description; Object classification; Digital image processing in practice and biomedical applications.

CSE 4462	Digital Image Processing Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE4461.

CSE 4463	Simulation and Modeling	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective

The objective of this course is to explain the benefits of simulation and model in a range of important application areas, demonstrate the ability to apply the techniques of modeling and simulation to a range of problem areas and evaluate a simulation, highlighting the benefits and the drawbacks.

Contents:

Simulation methods; model building, random number generator; statistical analysis of results; validation and verification techniques; Digital simulation of continuous systems; Simulation and analytical methods for analysis of computer systems and practical problems in business and practice; Introduction to simulation packages.

CSE 4464	Simulation and Modeling Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 4463.

CSE 4465	Pattern Recognition	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:

Able to know the basic principles of pattern recognition theory and the main application domains. Understand the fundamental pattern recognition methods and algorithms. Apply well –known algorithms to pilot problems. Select the most efficient algorithm, based on problem requirements. Design the methodology for pattern recognition problems of medium complexity.

Contents:

Introduction to Pattern Recognition; Statistical and Neural Pattern Recog- nition; Bayesian decision theory; Linear classifiers; Nonlinear classifiers; Parametric Estimation Techniques; Non-Parametric Estimation Techniques; Template matching techniques; Context dependent classification; Hidden Markov models; Syntactic Pattern Recognition; Clustering algorithms; Principal Component Analysis.

CSE 4466	Pattern Recognition Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 4465.

CSE 4467	Communication Engineering	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
This course provides an introduction to both elementary and modern forms of Communication Engineering. Communication engineering can be defined as the reliable transmission and reception of information.This course will develop your skills in the basic theory and methods associated with Communication Engineering, including (1) an introduction to information representation and processing; (2) familiarization with the basics of classical and modern communication systems; and (3) hands on experience with communication devices and system hardware

Contents:
Review of Fourier series and transforms; Amplitude modulation; AM, DSB-SC, SSB and VSB; Carrier acquisition; Superheterodyne AM receivers; Angle modulation; Narrow-band and Wide-band FM and PM; Demodulation of FM; Phase Locked Loop (PLL); FM receiver; Sampling theorem and quantization; Sampling theorem and signal reconstruction; Pulse Code Modulation (PCM); Differential PCM and Delta modulation; Uniform and Non-uniform quantization; T1 Carrier system; Introduction to Digital communications; ISI and Pulse shaping; Line coding; M-ary communication and digital carrier systems.

CSE 4468	Communication Engineering Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 4467. The experiments includes Fourier series and transform, AM analog board and simulation, FM analog board and simulation, Sampling and Quantization, PCM and TDM and Channel effects.

CSE 4469	Internet Engineering	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective:
This course comprehends fundamental design principles of Internet Protocols, IP addressing, and IP networks, including routing and forwarding. This also comprehends advanced Internet protocol technologies including network management, domain name system, network address translation, DHCP and multicasting. Upon completion of this course, the student can apply their understanding of Internet protocols by analysing and evaluating for improving actual network configurations of IP routers, switches and hosts.

Contents:
Infrastructure and Organization of Internet; Internet Addressing and DNS System; Internet Routing: Basics, OSPF, BGP, IBGP, Policy Engine; Internet Client-Server Models; Classical Internet Services: FTP, EMAIL, Telnet, WAIS; Internet Service Layer Protocols: URL, MIME, HTTP protocol, Dexter Hypertext Model; Web Systems: Web Server Client Architecture, CGI mechanism, Virtual Machine,Cooperating servers, Plugins,search engines, web crawler data mining and portals; Multimedia Services: stream audio/ channels, multicast services; Business Systems and Internet Security: Intranet, Security: Firewalls, Encryption based Systems; Internet Performance and Future Technologies.

CSE 4470	Internet Engineering Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 4469.

CSE 4471	Embedded Systems	3.00

Prerequisite: None. Contact Hour: 3 hours/week.

Objective
Embedded systems have become the next inevitable wave of technology, finding application in diverse fields of engineering. Microprocessors, together with sensors and actuators, have become embeddable in almost everything. The purpose of the course is to provide the students with the basic information about embedded systems, which can be defined as a control system or computer system designed to perform a specific task. The aim of the course is to introduce students to the theory and practice of control system engineering as well as designing the microcontrollers architecture and programming of embedded systems.

Contents:
Introduction to embedded systems; Basis of discrete control theory with practical examples; Transfer functions and block diagrams; Control system specifications: sampling time, delay time, phase margin, gain margin, bandwidth etc.; Commonly employed compensators; Logic-based control; Embedded system architecture; Processor examples: AVR, ARM, DSP; Peripherals on chips; Real-time operating systems; Software for embedded systems design.

CSE 4472	Embedded Systems Sessional	1.50

Prerequisite: None. Contact Hour: 3 hours/week.

Laboratory works based on CSE 4471.

========== THE END ==========