Syllabus of Bachelor of Science in Computer Science and Engineering (CSE)

United International University

House # 80, Road # 8/A, Satmasjid Road
Dhanmondi, Dhaka-1209, Bangladesh

BSc in CSE (with CSI 124) Course Plan (Total 135 Credits) **[131 to 133]**

S	Code	Course Title	CH	Pre-Req.	S	Code	Course Title	CH	Pre-Req.
1	ENG 002	Pre English			7	**************	Humanities / Business	3	
	ENG 101	English I	3			CSI 309	Operating Systems Concept	3	CSI 227
	CSI 121	Structured Programming Language	3			CSI 310	Operating Systems Concept Lab	1	CSI 228
	CSI 122	Structured Progr Language Lab	1			CSE 315	Data Communication	3	MATH 187
						CSI 411	Compiler	3	CSI 233,121
2	MATH 003	Elemantary Calculus				CSI 412	Compiler Lab	1	CSI 122
	MATH 151	Diff. & Integral Calculus	3						
	CSI 219	Discrete Mathematics	3		8	CSI 221	Database Management Systems	3	
	ENG 103	English II	3	ENG 101		CSI 222	Database Management Systems Lab	1	
	CSI 124	Advanced Programming Lab	1	CSI 121, CSI 122		CSI 341	Artificial Intelligence	3	CSI 227
						CSI 342	Artificial Intelligence Lab	1	CSI 228
						CSE425	Microprocessor, Microcontroller and Interfacing	3	CSE 236
						CSE426	Microprocessor, Microcontroller and Interfacing Lab	1	CSE 236
3	CSI 217	Data Structure	3	CSI 121					
	CSI 218	Data Structure Lab	1	CSI 122					
	MATH 183	Linear Algebra, Ordinary and partial Differential Equations	3	MATH 151					
	CSE 113	Electrical Circuits	3		9	CSI 311	System Analysis and Design	3	CSI 221
	PHY 105	Physics	3			CSI 312	System Analysis and Design Lab	1	CSI 222
	PHY 106	Physics Lab	1			CSE 323	Computer Networks	3	CSE 315
						CSE 324	Computer Networks Lab	1	
4	CSI 227	Algorithms	3	CSI 217		**************	Humanities / Business	3	
	CSI 228	Algorithms Lab.	1	CSI 218					
	CSI 225	Digital Logic Design	3		10	CSI 321	Software Engineering	3	CSI 311
	CSI 226	Digital Logic Design Lab	1			CSI 322	Software Engineering Lab	1	CSI 312
	MATH 187	Fourier and Laplace Trans. and Complex Variables	3	MATH 183		CSI ___	Option I Theory	3	
						CSI ___	Option I Lab.	1	
5	MATH 201	Coordinate Geometry and Vector Analysis	3			CSE___	Option II	3	
	CSI 211	Object Oriented Programming	3	CSI 121		CSE 400	Project/Thesis	2	
	CSI 212	Object Oriented Programming Lab	1	CSI 122					
	CSE 123	Electronics	3	CSE 113	11	CSE429	Digital System Design	3	CSE 425 426
	CSE 124	Electronics Lab	1			CSE430	Digital System Design Lab	1	CSE 426
	***********	Humanities / Business	3			CSI ___	Option I Theory	3	
						CSI ___	Option I Lab.	1	
6	CSE 313	Computer Architecture	3	CSE 225,226		CSE___	Option II	3	
	CSI 233	Theory of Computing	3	CSI 227,228,219					
	STAT 205	Probability and Statistics	3		12	CSE 400	Project/Thesis	2	
	CSI 229	Numerical Methods	3	MATH 183		CSE___	Option II	3	

Course	Title	Credit	Prerequisite
CSE 236	Assembly Programming Lab	1	CSI 121, CSI 122

Option I   69

Code	Title	Prerequisite
CSI 415	Pattern Recognition	CSI 341
CSI 416	Pattern Recognition Lab	CSI 342
CSI 421	Computer Graphics	MATH 201, CSI 227, 121
CSI 422	Computer Graphics Lab	CSI 228,122
CSI 423	Simulation & Modeling	STAT 205
CSI 424	Simulation & Modeling Lab	STAT 205, CSI 122
CSI 447	Multimedia Systems Design	CSI 311
CSI 448	Multimedia Systems Design Lab	CSI 322
CSE 427	VLSI Design	CSE 225
CSE 428	VLSI Design Lab	CSE 226

Option II   66

Code	Title	Prerequisite
CSE 453	Optical Fiber Communication	CSE 323
CSE 457	Mobile Cellular Communication	CSE 323
CSE 461	Wireless Communication	CSE 323
CSE 463	E-Commerce	CSE 323 CSI 211,212
CSE 465	Web Programming	
CSE 467	Advanced DBMS	CSI 221
CSE 469	Project Management	CSI 321
CSE 471	Advanced Object Oriented Prog.	CSI 211
CSE 473	Advanced Network Services & Mgt	CSE 323
CSE 475	Mobile Computing	CSE 323

Revised Syllabus of B.Sc. in

Computer Science and Engineering (CSE)

Rapid development in the fields of Computer Science and Engineering (CSE) over the last decade has made Computer Science and Engineering an emerging field of specialization. United International University (UIU) has been successfully running its B.Sc. in CSE program (UGC approval BIMAKA/SHA/414(1)/02/2974 on 25/06/2005) since its inception as one of the private universities in Bangladesh. UIU needs to revise the syllabus of its CSE program in order to meet the current needs of home and abroad.

Bachelor of Science in Computer Science and Engineering primarily involves the study of a number of core courses which every CSE graduate should know and a significant number of courses from specialized areas. Core courses build the foundation and specialized courses prepare the students for the specific areas of Computer Science and Engineering. To understand the underpinning theory of the courses of Computer Science and Engineering, a number of courses on Mathematics and Basic Science have been felt mandatory to include in the syllabus. In addition some social science, management, accounting, economics and communication-skills development related courses have been incorporated to make the syllabus a balanced and reasonably complete one. The objective of the undergraduate program in Computer Science and Engineering is to develop skilled and competent graduates to meet the current and future needs at home and abroad.

Admission Requirements

Every applicant, without any exception, must fulfill the admission requirements as laid down by UIU. Admission test and interview for admission into a trimester will be held as decided by UIU.

A higher secondary certificate or its equivalent in science with mathematics and physics or other fields of study is the basic educational requirement.

Admission Test

Applicants will be required to sit for an admission test designed to judge their abilities and aptitude for the program. The test will be held as arranged by UIU. The admission test will be held on the following three areas:

i. Language and Communication
ii. Mathematics and Physics
iii. Analytical ability

To qualify in a written test an applicant is required to obtain a minimum mark in all the three sections separately.

Degree Requirements

The B.Sc. in CSE degree requirements will be as follows:

(a) Completion of 135.0 credit hours
(b) Completion of the project with at least a 'C' grade
(c) Passing of all courses individually and maintaining a minimum CGPA of 2.25

Proposed Revised Syllabus (CSE) (Total 135 Credits)

1. General Education Courses

A. SCIENCE (4 credits)

1	PHY 105	Physics	3.00
2	PHY 106	Physics Laboratory	1.00

B. HUMANITIES/ BUSINESS: (Any Three: 9 credits)

1	SOC 101	Society, Technology and Engineering Ethics	3.00
2	ACT 111	Financial and Managerial Accounting	3.00
3	ECO 213	Economics	3.00
4	IPE 401	Industrial Management	3.00
5	PSY 101	Psychology	3.00
6	MGT 101	Principles of Management	3.00
7	SOC 103	Sociology	3.00

C. ENGLISH (6 credits)

1	ENG 101	English I	3.00
2	ENG 103	English II	3.00

2. MATHEMATICS (15 credits)

1	MATH 151	Differential and Integral Calculus	3.00
2	MATH 183	Linear Algebra, Ordinary & Partial Differential Equations	3.00
3	MATH 187	Fourier and Laplace Transformations and Complex Variables	3.00
4	MATH 201	Coordinate geometry and Vector Analysis	3.00
5	STAT 205	Probability and Statistics	3.00

3. Computer Science Courses

A. Computer Science and Information Courses (39+11 = 50 credits)

Course Code	Title of the course	Credits
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CSI 121	Structured Programming Language	3.00
CSI 122	Structured Programming Language Laboratory	1.00
CSI 124	**Advanced Programming Laboratory**	**1.00**
CSI 211	Object-Oriented Programming	3.00
CSI 212	Object-Oriented Programming Laboratory	1.00
CSI 217	Data Structure	3.00
CSI 218	Data Structure Laboratory	1.00
CSI 219	Discrete Mathematics	3.00
CSI 221	Database Management Systems	3.00
CSI 222	Database Management Systems Laboratory	1.00
CSI 227	Algorithms	3.00
CSI 228	Algorithms Laboratory	1.00
CSI 229	Numerical Methods	3.00
CSI 233	Theory of Computing	3.00
CSI 309	Operating System Concepts	3.00
CSI 310	Operating System Concepts Laboratory	1.00
CSI 311	System Analysis and Design	3.00
CSI 312	System Analysis and Design Laboratory	1.00
CSI 321	Software Engineering	3.00
CSI 322	Software Engineering Laboratory	1.00
CSI 341	Artificial Intelligence	3.00
CSI 342	Artificial Intelligence Laboratory	1.00
CSI 411	Compiler	3.00
CSI 412	Compiler Laboratory	1.00

B. Option I: Any Two (6+2 = 8 credits)

CSI 415	Pattern Recognition	3.00

CSI 416	Pattern Recognition Laboratory	1.00
CSI 421	Computer Graphics	3.00
CSI 422	Computer Graphics Laboratory	1.00
CSI 423	Simulation & Modeling	3.00
CSI 424	Simulation & Modeling Laboratory	1.00
CSI 447	Multimedia Systems Design	3.00
CSI 448	Multimedia Systems Design Laboratory	1.00
CSE 427	VLSI Design	3.00
CSE 428	VLSI Design Laboratory	1.00

4. Computer Engineering Courses (24+6=30 credits)

CSE 113	Electrical Circuits	3.00
CSE 123	Electronics	3.00
CSE 124	Electronics Laboratory	1.00
CSE 225	Digital Logic Design	3.00
CSE 226	Digital Logic Design Laboratory	1.00
CSE 236	Assembly Programming Laboratory	1.00
CSE 313	Computer Architecture	3.00
CSE 315	Data Communication	3.00
CSE 323	Computer Networks	3.00
CSE 324	Computer Networks Laboratory	1.00
CSE 429	Digital System Design	3.00
CSE 430	Digital System Design Laboratory.	1.00
CSE 425	Microprocessor, Microcontroller and Interfacing	3.00
CSE 426	Microprocessor, Microcontroller and Interfacing Laboratory	1.00

Option II: Any Three (9 credits)

CSE 453	Optical Fiber Communication	3.00

CSE 457	Mobile Cellular Communication		3.00
CSE 461	Wireless Communication		3.00
CSE 463	E-Commerce		3.00
CSE 465	Web Programming		3.00
CSE 467	Advanced DBMS		3.00
CSE 469	Project Management		3.00
CSE 471	Advanced Object Oriented Programming		3.00
CSE 473	Advanced Network Services and Management	3.00	
CSE 475	Mobile Computing	3.00	

5. Project/ Thesis   (4 Credits)

CSE   400   Project/Thesis   4.00

Summary of Course Curriculum

Sl#	Group	Theory	Laboratory	Thesis	Total
1.	General Education	18.00	1.00	-------	19.00
2.	Mathematics	15.00	------	-------	15.00
3.	Computer Science	45.00	13.00	-------	58.00
4.	Computer Engineering	33.00	6.00	-------	39.00
5.	Project /Thesis	-------	-------	4.00	4.00
	Total	111.00	19.00	4.00	135.00

Details of the Course Contents

Phy 105

Heat & thermodynamics: Principle of temperature measurements: Platinum resistance thermometer, Thermo-electric thermometer, Pyrometer; Kinetic theory of gases: Maxwell's distribution of molecular speeds, Mean free path, Equipartition of energy, Brownian motion, van der Waal's equation of state, Review of the First law of thermodynamics and its application, Reversible & irreversible processes, Second law of thermodynamics, Carnot; Efficiency of heat engines, Carnot theorem, Entropy and Disorder, Thermodynamic Functions, Maxwell relations, Clausius-Clapeyron equation, Gibbs phase rule, Third law of thermodynamics.

Physical Optics: Theories of light: Interference of light, Young's double slit experiment, Displacements of fringes & its uses. Fresnel Bi-prism, Interference at wedge shaped films, Newton's rings, Interferometers; Diffraction of light: Fresnel and Fraunhoffer diffraction. Diffraction by single slit. Diffraction from a circular aperture, Resolving power of optical instruments, Diffraction at double slit & N-slits-diffraction grating; Polarization: Production & analysis of polarized light, Brewster's law, Malus law, Polarization by double refraction. Retardation plates. Nicol prism. Optical activity. Polarimeters, Polaroid.

Modern Physics: Michelson-Morley's experiment. Galilean transformation, Special theory of relativity & its consequences; Quantum theory of Radiation: Photo-electric effect, Compton effect, wave particle duality. Interpretation of Bohr's postulates, Radioactive disintegration, Properties of nucleus, Nuclear reactions, Fission. Fusion, Chain reaction, Nuclear reactor.

Phy 106 Physics Laboratory

Experiments based on Phy 105

SOC 101 Society, Technology and Engineering Ethics

Historical Background for the emergence of Sociology as moral lessons for society. French Revolution, Industrial Revolution. Commonsense and Knowledge. Basics of Sociology. Culture, Elements of Culture, Cultural Lag, What is Ethics? Socialization, Agents of Socialization, Basic Institutions in society. Basic Association and Institutions in society, Type of Societies. Some recent social issues around us (poverty, rehabilitation, Gender discrimination, environment) Some social issues around us (Social Change, Urbanization, development, deviance and control). What is Engineering Ethics about? Moral reasoning. Engineering as Social Experimentation. The Engineer's Concern for safety. Professional Responsibility. Employer Authority. Rights of Engineers. Global Issues. Career Choice and Professional Outlook. Ethical Problems are like Design Problems.

ACT 111 Financial and Managerial Accounting

Financial Accounting: Objectives and importance of accounting; Accounting as an information system; Computerized system and applications in accounting. Recording system: double entry mechanism; accounts and their classification; Accounting equation; Accounting cycle: journal, ledger, trial balance; Preparation of financial statements considering adjusting and closing entries; Accounting concepts (principles) and conventions.

Financial statement analysis and interpretation: ratio analysis.

Cost and Management Accounting: Cost concepts and classification; Overhead cost: meaning and classification; Distribution of overhead cost; Overhead recovery method/rate; Job order costing: preparation of job cost sheet and quotation price; Inventory valuation: absorption costing and marginal/variable costing techniques; Cost-Volume-Profit analysis: meaning breakeven analysis, contribution margin approach, sensitivity analysis.

Short-term investment decisions: relevant and differential cost analysis. Long-term investment decisions: capital budgeting, various techniques of evaluation of capital investments.

ECO 213 Economics

Definition of Economics; Economics and engineering; Principles of economics
Micro-Economics: Introduction to various economic systems – capitalist, command and mixed economy; Fundamental economic problems and the mechanism through which these problems are solved; Theory of demand and supply and their elasticities; Theory of consumer behavior; Cardinal and ordinal approaches of utility analysis; Price determination; Nature of an economic theory; Applicability of economic theories to the problems of developing countries; Indifference curve techniques; Theory of production, production function, types of productivity; Rational region of production of an engineering firm; Concepts of market and market structure; Cost analysis and cost function; Small scale production and large scale production; Optimization; Theory of distribution; Use of derivative in economics: maximization and minimization of economic functions, relationship among total, marginal and average concepts.
Macro-Economics: Savings; investment, employment; national income analysis; Inflation; Monetary policy; Fiscal policy and trade policy with reference to Bangladesh; Economics of development and planning.

IPE 401 Industrial Management

Introduction, evolution, management function, organization and environment.

Organization: Theory and structure; Coordination; Span of control; Authority delegation; Groups; Committee and task force; Manpower planning.

Personnel Management: Scope; Importance; Need hierarchy; Motivation; Job redesign; Leadership; Participative management; Training; Performance appraisal; Wages and incentives; Informal groups; Organizational change and conflict.

Cost and Financial Management; Elements of costs of products depreciation; Break-even analysis; Investment analysis; Benefit cost analysis.

Management Accounting: Cost planning and control; Budget and budgetary control; Development planning process.

Marketing Management: Concepts; Strategy; Sales promotion; Patent laws.

Technology Management: Management of innovation and changes; Technology life cycle; Case studies.

PSY 101 Psychology

The objective of this course is to provide knowledge about the basic concepts and principles of psychology pertaining to real-life problems. The course will familiarize students with the fundamental processes that occur within organism-biological basis of behavior, perception, motivation, emotion, learning, memory and forgetting and also to the social perspective-social perception and social forces that act upon the individual.

MGT 101   Principles of Management

Meaning and Importance of Management; Evolution of Management thought; Decision making process; environmental impact on management; Corporate social responsibility; Basic functions of management - Planning; setting objectives; Implementing plans; Organizing; Organization design; Human resource management: Direction; Motivation; Leadership; Managing work groups; Controlling: Control principles; Process; and problems; Managers and Changing Environment.

SOC 103 Sociology

The objective of this course is to introduce students to key societal concepts, primary social institutions, social structure and stratification, religion and so on. They will also be familiar with the methods and different techniques of social research.

ENG 101 English I

The course aims at developing proficiency in speaking, listening, reading, and writing of English. It is generalized as a remedial course for students whose English need considerable repair and as a foundation course for ENG 102. The contents include parts of speech, count and uncountable nouns and articles, agreement between subject and verb, adverbs of frequency, tense and the sequence of tenses, active and passive voices, types of sentences, prepositions: time, place, action, directions, questions forms, multi-word verbs, capitalization.

ENG 103 English II

A course to provide a solid foundation on perfecting skills in English reading, writing, listening comprehension and speaking. The course emphasizes the practice of pronunciation, speed-reading, and effective writing and listening. The course contents include the grammar parts of revision of tenses, use of idioms, prepositions, modals, conditional sentence, use of linking words, use of suffixes and prefixes, synonyms and antonyms, words with multi names, reading parts include the skills in skimming, scanning, selecting information, writing parts include planning, outlining, organizing ideas, topic sentences, paragraph writing, essay writing, job applications, writing reports, writing research report.

Math 003 Elementary Calculus

Number System, Functions; New functions from old, Families of functions, Inverse function, Exponential and Logarithmic function, Limit and Continuity, Tangent line and rate of change. The derivative function, Chain Rule, Integration: An overview of the area problem, the Indefinite Integral, Integration by substitution, The definition of area as a limit, The definite integral, Fundamental theorem of calculus, Area between two curves, Volumes by slicing, disk and Washers , Area of a surface of revolution, length of a plane curve, Cylindrical Shells.

Math 151 Differential and Integral Calculus

Differential Calculus: Limits, Continuity and differentiability. Successive differentiation of various types of functions, Leibnitz's theorem, Roller's theorem, Mean value theorem. Taylor's and Maclaurin's theorems in finite and infinite forms. Lagrange's form of remainders. Cauchy's form of remainders. Expansion of functions by differentiation and integration. Evaluation of indeterminate forms by L'Hospitals rule. Partial differentiation. Euler's theorem. Tangent and Normal. Subtangent and subnormal in cartesian and polar co-ordinates. Determination of Maximum and minimum values of functions and points of inflection with applications. Curvature: radius, circle, centre and chord of curvature, asymptotes and curved tracing.

Integral Calculus : Integration by the method of substitution. Standard integrals. Integration by successive reduction. Definite integrals, its properties and use in summing series. Walli's formulate. Improper integrals. Beta function and Gamma function. Area under a plane curve and area of a region enclosed by

two curves in cartesian and polar co-ordinate. Volumes of solids of revolution. Volume of hollow solids of revolution by shell method Area of surface of revolution. Jacobians. Multiple integrals with applications.

Math 183 Linear Algebra, Ordinary & Partial Differential Equations

Ordinary Differential Equations: Degree and order of ordinary differential equations. Formation of differential equations, Solutions of first order differential equations by various methods. Solutions of general linear equations of second and higher orders with constant coefficients.
Solution of homogeneous linear equations. Solution of differential equation of the higher order when the dependent or independent variable is absent. Solution of differential equation by the method based on the factorization of the operators. Frobenius method.

Partial differential equations: Wave equations, Particular solutions with boundary and initial conditions.

Matrices: Definition, equality, addition, subtraction multiplication, transposition, inversion, rank. Equivalence, solution of equations by matrix method. Vector space, Eigen values and Eigen vectors. Bassel's and Legendre's differential equations.

Math 187 Fourier and Laplace Transformations and Complex Variables
Laplace Transforms: Definition. Laplace transforms of some elementary functions. Sufficient conditions for existence of Laplace transforms. Inverse Laplace transforms. Laplace transforms of derivatives. The unit step function. Periodic function. Some special theorems on Laplace transforms. Partial fraction. Solution of differential equations by Laplace transforms. Evaluation of improper integrals.

Fourier Analysis: Real and complex forms of Fourier series. Finite transform. Fourier integral. Fourier transforms and their uses in solving boundary value problems.

Complex Variable: Complex number system. General functions of a complex variable. Limits and continuity of a function of a complex variable and related theorems. Complex differentiation and the Cauchy-Riemann equations. Infinite series. Convergence and uniform convergence. Line integral of a complex function Cauchy integral formula. Liouville's theorem. Taylor's and Laurent's theorem. Singular points. Residue, Cauchy's residue theorem.

Math 201 Coordinate Geometry and Vector Analysis

Two-dimensional co-ordinate Geometry: Change of axes-transformation of co-ordinates, simplification of equations of curves.
Three-dimensional co-ordinate Geometry: System of co-ordinates, distance between two points, section formula, projection, direction cosines, equations of planes and lines.
Vector Analysis: Definition of vectors. Equality, addition and multiplication of vectors. Linear dependence and independence of vectors. Differentiation and integration of vectors together with elementary applications. Definitions of line, surface and volume integrals. Gradient of a scalar function, divergence and curl of a vector function. Physical significance of gradient, divergence and curls. Various formulae. Integral forms of gradient, divergence and curl. Divergence theorem. Stoke's theorem, Green's theorem and Gauss's theorem.

STAT 205 Probability and Statistics

Statistics: frequency distribution. Mean, median, mode and other measures of central tendency. Standard deviation and other measures of dispersion. Moments, skewness and kurtosis, correlation and regression analysis. Elementary probability theory and discontinuous probability distribution, e.g., binomial, Poisson and negative binomial. Continuous probability distributions, e.g. normal and exponential. Characteristics of distributions. Elementary sampling theory. Estimation of parameter, Hypothesis testing, Index number. Time series analysis and Markov chain.

CSI 121 Structured Programming Language

Overview, Structure of C program, Data Types, I/O Functions, Identifiers, Expressions, Statement and Symbolic Constants, Arithmetic operators, Relational Operators and Logical Operators, Bit-wise Operators, Precedence and Associativity, Control statements, Storage class, Functions, Command Line Parameters and Library Functions, Arrays, Strings, Structure, Union and Bit-fields, Pointer, Memory Allocation and Release, Pointer and Multi-Dimensional Arrays, File Handling, Video Adapter, Modes and Graphics Initialization, Graphics Functions.

CSI 122 Structured Programming Language Laboratory

Laboratory work based on **CSI 121**

CSI 124 Advanced Programming Laboratory

Advanced topics on structure, pointer, and file operations in C. A Project work will be a part of this course. Introduction to Object Oriented Programming using C++.

CSI 211 Object Oriented Programming (Pre-requisite CSI 121)

Object oriented fundamentals, Java Application, Java applets, Methods, Arrays, String & characters, Graphics & java2D, Basic graphical user interface components, Multithreading, Multimedia, Files & streams, JDBC, Servlets, RMI, Networking, Java beans.

CSI 212 Object Oriented Programming Laboratory

Laboratory work based on **CSI 211**

CSI 217 Data Structure (Pre-requisite CSI 121)

Concepts and examples, elementary data objects, elementary data structures, arrays, lists, stacks, queues, graphs, trees, Memory management, Sorting and searching, hash techniques.

CSI 218 Data Structure Laboratory

Laboratory work based on **CSI 217**

CSI 219 Discrete Mathematics

Set theory, Elementary number theory, Graph theory, Paths and trees, Generating functions, Algebraic structures, Semi graph, Permutation groups, Binary relation, Mathematical logic, Propositional calculus and predicate calculus.

CSI 221 Database Management Systems

Concepts and methods in database system, File organization and retrieval, Data manipulation, Query formulation and language, Database models, Data description languages, database integrity and security, Data dictionary/directory systems, database administration, Database design, Survey of some existing database management systems, Some applications using commercial languages.

CSI 222 Database Management Systems Laboratory

Laboratory work based on **CSI 221**

CSI 227 Algorithms (Pre-requisite CSI 217 and CSI 219)

Techniques for analysis of algorithms, Methods for the design of efficient algorithms: divide and conquer, greedy method, dynamic programming, back tracking, branch and bound, Basic search and traversal techniques, graph algorithms, Algebraic simplification and transformations, lower bound theory, NP-hard and NP-complete problems.

CSI 228 Algorithms Laboratory

Laboratory work based on **CSI 227**

CSI 229 Numerical Methods

Computational methods for solving problems in linear algebra, linear programming, nonlinear equations, approximations, iterations, methods of least squares, interpolation, integration and ordinary differential equations.

CSI 233 Theory of Computing

Finite Automata: Deterministic finite automata, Non-deterministic finite automata, equivalence and conversion of deterministic and non-deterministic finite automata, pushdown automata. Context free language, context frees grammar. Turing machines: basic machines, configuration, computing with turning machine, combining turning machines.

CSI 309 Operating System Concepts

Principles of operating systems, design objectives, sequential processes, concurrent processes, concurrency, functional mutual exclusion, processor cooperation and deadlocks, processor management, Control and scheduling of large information processing systems, Resource allocation, dispatching, processor access methods, job control languages, Memory management, memory addressing, paging and store multiplexing, Multiprocessing and time sharing, batch processing, Scheduling algorithms, file systems, protection and security, design and implementation methodology, performance evaluation and case studies.

CSI 310 Operating System Concepts Laboratory

Laboratory work based on **CSI 309**

CSI 311 System Analysis and Design

Information, general concepts of formal information systems, analysis of information requirements for modern organizations, modern data processing technology and its application, information systems structures, designing information outputs, classifying and coding data, physical storage media considerations, logical data organization, systems analysis, general systems design, detail system design, Project management and documentation, Group development of an information system project: includes all

phases of software life cycles from requirement analysis to the completion of a fully implemented system.

CSI 312 System Analysis and Design Laboratory

Laboratory work based on **CSI 311**

CSI 321 Software Engineering ((Pre-requisite CSI 311)

Concepts of software engineering: requirements definition, modularity, structured design, data specifications, functional specifications, verification, documentation, software maintenance, Software support tools, Software project organization, quality assurance, management and communication skills.

CSI 322 Software Engineering Laboratory

Laboratory work based on **CSI 321**

CSI 341 Artificial Intelligence (Pre-requisite CSI 227)

Survey and concepts in Artificial Intelligence, Problem solving agents, Uninformed and Informed search techniques, Game playing, Knowledge representation, Inference in Propositional and First Order logic, Theorem Proving, Decision tree learning, Neural Network, Bayesian learning, planning.

CSI 342 Artificial Intelligence Laboratory

Laboratory work based on **CSI 341**

CSI 411 Compiler (Pre-requisite CSI 233)

The grammar of programming languages, Lexical analyzers, Parsers, Code emitters and interpretation, Code optimization, Run time support, Error Management, Translator writing system, A small project.

CSI 412 Compiler Laboratory

Laboratory work based on **CSI 411**

CSI 415 Pattern Recognition (Pre-requisite CSI 341)

Introduction to pattern recognition: Sensing, Segmentation, feature Extraction, Calssification, post processing, Design Cycle, learning, statistical methods, Bayes theorem, structural methods and hybrid method. Linear Classifier, Perceptron Algorithm, Least Sqaure Method, Non-Linear Classifier, Two Layer Perceptron, BackPropagation Algorithm, Template Matching – Bellman's Principle, Edit Distance, Correlation Based Measurement, Context Dependent Classification-Bayes Classifier, Markov Chain, Viterbi Algorithm, Non-Parmetric Decision Making, Clustering.

CSI 416 Pattern Recognition Laboratory (Pre-requisite CSI 342)

Laboratory work based on **CSE 415**

CSI 421 Computer Graphics (Pre-requisite MATH 201 & CSI 227)

Introduction to Graphical data processing, Fundamentals of interactive graphics programming, Architecture of display devices and connectivity to a computer, Implementation of graphics concepts of two-dimensional and three-dimensional viewing, clipping and transformations, Hidden line algorithms, Raster graphics concepts: Architecture, algorithms and other image synthesis methods, Design of interactive

graphic conversations.

CSI 422 Computer Graphics Laboratory (Pre-requisite CSI 228)

Laboratory work based on **CSI 421**

CSI 423 Simulation & Modeling (Pre-requisite STAT 205)

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

CSI 424 Simulation & Modeling Laboratory (Pre-requisite STAT 205 & CSI 122)

Laboratory work based on **CSI 423**

CSI 447 Multimedia Systems Design (Pre-requisite CSE 323)

Overview to multimedia systems, multimedia storage. Data compression techniques for audio and video. Synchronization. Multimedia networking and protocols, QOS principles. Video streams on ATM. Mobile multimedia computations. Operating system support for multimedia. Hypermedia system. Standard for multimedia. Multimedia database and multimedia applications

CSI 448 Multimedia Systems Design Laboratory (Pre-requisite CSE 324)

Laboratory work based on **CSI 447**

CSE 427 VLSI Design (Prerequisite CSE 225)

VLSI technology: Top down design approach, technology trends and design styles. Review of MOS transistor theory: Threshold voltage, body effect, I-V equations and characteristics, latch-up problems, NMOS inverter, CMOS inverter, pass-transistor and transmission gates. CMOS circuit characteristics and performance estimation: Resistance, capacitance, rise and fall times, delay, gate transistor sizing and power consumption. CMOS circuit and logic design: Layout design rules and physical design of simple logic gates. CMOS subsystem design: Adders, multiplier and memory system, arithmetic logic unit. Programmable logic arrays. I/O systems. VLSI testing.

CSE 428 VLSI Design Laboratory (Pre-requisite CSE 226)

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in CSE 427. In the second part, students will design simple systems using the principles learned in CSE 427.

CSE 113 Electrical Circuits

Fundamental electrical concepts and measuring units, D.C. voltages, current, resistance and power, laws of electrical circuits and methods of network analysis, principles of D.C. measuring apparatus, laws of magnetic fields and methods of solving simple magnetic circuits. Alternating current, Instantaneous and RMS current, voltage and power, average power combinations of R, L & C circuits, Phasor, representation of sinusoidal quantities.

CSE 123 Electronics (Pre-requisite CSE 113)

Semiconductors, junction diode characteristics, Bipolar transistors: characteristics, small signal low frequency h-parameter model, hybrid-pi model, amplifiers, voltage and current amplifiers, oscillators, differentials amplifiers, operational amplifiers, linear application of operational amplifiers, gain input and output impedance.

CSE 124 Electronics Laboratory

Laboratory work based on **CSE 123**

CSE 225 Digital Logic Design

Digital logic, Boolean algebra, De-Morgan's law, 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 and their applications, PLA design, Synchronous and asynchronous logic design: state diagram, Mealy and Moore machines, State minimizations and assignments, Pulse mode logic, Fundamental mode design.
Diode logic gates, transistor switches, transistor transistor gates, MOS gates, Logic families: TTL, ECL, IIL and CMOS logic with operation details, Propagation delay, product and noise immunity, Open collector and High impedance gates, memory systems, A/D and D/A converters with applications

CSE 226 Digital Logic Design Laboratory

Laboratory work based on **CSE 225**

CSE 236 Assembly Programming Laboratory (Pre-requisite CSE 113)

Laboratory work based on microprocessor assembly language

CSE 313 Computer Architecture (Pre-requisite CSE 225 & CSE 226)

Information representation and transfer, instruction and data access methods, the control unit: hardwired and microprogrammed, memory organization, I/O systems, channels, interrupts, DMA, Von Neumann SISD organization, RISC and CISC machines.
Pipelined machines, interleaved memory system, caches, Hardware and architectural issues of parallel machines, Array processors, associative processors, multiprocessors, systolic processors, data flow computers and interconnection networks, High level language concept of computer architecture.

CSE 315 Data Communication (Pre-requisite MATH 187)
Introduction to modulation techniques: Pulse modulation, pulse amplitude modulation, pulse width modulation and pulse position modulation, Pulse code modulation, quantization, Delta modulation, TDM, FDM, OOK, FSK, PSK, QPSK, Representation of noise, threshold effects in PCM and FM, Probability of error for pulse systems, concept of channel coding and capacity, Asynchronous and synchronous communications, Hardware interfaces, multiplexers, concentrators and buffers, Communication medium, Fiber optics.

CSE 323 Computer Networks (Pre-requisite CSE 315)

Network architectures- layered architectures and ISO reference model: data link protocols, error control, HDLC, X.25, flow and congestion control, virtual terminal protocol, data security, Local area networks, satellite networks, packet radio networks, Introduction to ARPANET, SNA and DECNET, Topological design and queuing models for network and distributed computing systems.

CSE 324 Computer Networks Laboratory

Laboratory work based on **CSE 323**

CSE 429 Digital System Design (Pre-requisite CSE 425 & CSE 426)

Designing I/O system; I/O devices; Designing Microprocessor based system with interfacing chips; Programmable peripheral interface (interface to A/D and D/A converter); Keyboard/display interface; Programmable timer; Programmable interrupt controller, DMA controller; Design using MSI and LSI components; Design of memory subsystem using SRAM and DRAM; Design of various components of a computer: ALU, memory and control unit: hardwired and micro programmed; Microprocessor based designs; Computer BUS standards; Design special purpose controllers.

CSE 430 Digital System Design Laboratory (Pre-requisite CSE 426)

Students will design simple systems using the principles learned in CSE 429.

CSE 425 Microprocessor, Microcontroller and Interfacing (Pre-requisite CSE 236)

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; interfacing: programmable peripheral interface, programmable timer, serial communication interface, programmable interrupt controller, direct memory access, keyboard and display interface, Integrating microprocessor with interfacing chips; Microcontroller: Introduction to micro-controllers(i.e. 8051), How to Program an 8-bit Microcontroller using C and assembly language, Introduction to Embedded System, Embedded Systems programming.

CSE 426 Microprocessor, Microcontroller and Interfacing Laboratory (Pre-requisite CSE 236)

Students will design simple systems using the principles learned in CSE 425.

CSE 453 Optical Fiber Communication (Pre-requisite CSE 323)

Introduction. Light propagation through optical fiber: Ray optics theory and mode theory. Optical fiber: Types and characteristics, transmission characteristics, fiber joints and fiber couplers. Light sources: Light emitting diodes and laser diodes. Detectors: PIN photo-detector and avalanche photo-detectors. Receiver analysis: Direct detection and coherent detection, noise and limitations. Transmission limitations: Chromatic dispersion, nonlinear refraction, four wave mixing and laser phase noises. Optical amplifier: Laser and fiber amplifiers, applications and limitations. Multi-channel optical system: Frequency division multiplexing, wavelength division multiplexing and co-channel interference.

CSE 457 Mobile Cellular Communication (Pre-requisite CSE 323)

Introduction: Concept, evolution and fundamentals. Analog and digital .cellular systems. Cellular Radio System: Frequency reuse, co-channel interference, cell splitting and components. Mobile radio propagation: Propagation characteristics, models for radio propagation, antenna at cell site and mobile antenna. Frequency Management and Channel Assignment: Fundamentals, spectrum utilization, fundamentals of channel assignment, fixed channel assignment, non-fixed channel assignment, traffic and channel assignment. Handoffs and Dropped Calls: Reasons and types, forced handoffs, mobile assisted handoffs and dropped call rate. Diversity Techniques: Concept of diversity branch and signal paths, carrier to noise and carrier to interference ratio performance. Digital cellular systems: Global system for mobile, time division multiple access and code division multiple access.

CSE 461 Wireless Communication (Pre-requisite CSE 323)

Basics of Antenna; gain and effective area, radiation pattern. Propagation of radio waves – broadcast and line of sight, transmission and reception of radio waves, effect of earth's curvature; long, medium and short wave propagation, ionospheric propagation. RADAR and its principle; communication systems for ships and aircrafts. Scattering in radio links. Overview of satellite communication; location of geo-stationary satellites and orbit calculation. Lasers and optical detectors; line of sight laser communication.

CSE 463   E-Commerce (Pre-requisite CSE 323)

History, business models; Ecommerce channels: Portals, auctions, communities, marketplace; Managing the marketplace: Demographics and advertising; Customer relationship management, web services for B2B and B2C ecommerce, electronic payment systems; Network security, cryptography, digital certificates; Markup for ecommerce: XML, M-commerce, wireless and U-commerce, digital money and electronic banking; Ethical, legal, and regulatory environment: Intellectual property, copyright, trademark, patents.

CSE 465 Web Programming (Pre-requisite CSI 211 & CSI 212)

Web architecture and HTTP: History and architecture of the World Wide Web, overview of the Hyper Text Transfer Protocol, other related protocols; Hyper Text Markup Language: The concept of markup, overview of HTML (table, form, frame, window, link etc.); Client side scripting: Variables, data types, control structure, functions, Document Object Model (DOM), event handlers, properties, methods, cookies; Server side scripting: Concepts, variables, data types, control structure, functions, objects; Database: Content generation, data exchange; Regular expressions, mails, cookies, sessions.

CSE 467   Advanced Database Management Systems (Pre-requisite CSI 221)

Database system architecture; managing primary and secondary storage; query processing; metadata and catalog management; language processing; query optimization and plan generation; concurrency; failures and recovery; extensibility; client-server interactions. Object-oriented database systems, XML, database and the web, data management in distributed mobile computing environment, data broadcasting, text database, digital library design and implementation, multimedia database: Basic concept, design and optimization of access strategies; parallel database, spatial database, temporal database.

CSE 469 Project Management (Pre-requisite CSI 321)

Software project management; software development team configuration and maintenance; software project documentation; communication in a software project (reporting and presentations); project management tools; advanced life cycle models; measurement, metrics and control; testing; systems integration; maintenance; systems development automation.

CSE 471 Advanced Object Oriented Programming (Pre-requisite CSI 211)

Introduction to Object Oriented Design, Modeling Concept: Modeling as a Design Technique, Object Modeling, Dynamic Modeling and Functional Modeling; Design Methodology: Methodology Preview, Analysis, system Design, Object Design and Comparison of Methodologies.

Design Implementation: Design Implementation, Programming Style, Object Diagram Compiler; Future of Object-Oriented Technology. In addition, the course covers areas of object storage and retrieval, distributed systems, business rules and objects and introduces architecture for supportable systems. Emphasizing

productivity and quality, the course concludes with pragmatic guidelines on how to incorporate testing and quality assurance into the development process of object-oriented systems.

CSE 473 Advanced Network Services and Management (Pre-requisite CSE 323)

Application specific protocols: Domain Name Services, Electronic mail, World Wide Web and Web caching, Network Management (SNMP), Error Reporting Mechanism (ICMP), Socket Interfaces, File Transfer and Remote File Access, Multimedia application: RTP, Session Control; Network security: Cryptographic algorithm, security mechanism, authentication protocol, firewall.

CSE 475 Mobile Computing (Pre-requisite CSE 323)

Introduction to mobile computing; Data link layer considerations: Channel allocation, Wireless LANs, Bluetooth; Network layer considerations: Mobile IPv4 and Mobile IPv6, Micro-mobility solutions to the host mobility problem, Routing in mobile ad hoc networks; Transport layer considerations: TCP in wired/wireless environments; Application layer considerations: Adaptation, Disconnected operation, Mobile agents, Security; Wireless sensor networks.

CSE 400 Project/Thesis

All candidates are required to undertake supervised study and research culminating in a Thesis/Project in their field of specialization.