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)/02/4143 on 25/11/2002) 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 the first semester will be held thrice a year as decided by UIU. No interim or supplementary admission test or interview will be arranged.

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 151.0 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

Course Listing of the Proposed Revised Syllabus for B.Sc. in Computer Science and Engineering (CSE) (Total 151 Credits)

1. General Education Courses

	Course Code	Title of the course	Credits
A. SCIENCE			
1	PHY 101	Physics I	3.00
2	PHY 103	Physics II	3.00
3	PHY 104	Physics Laboratory	1.50
B. HUMANITIES/ BUSINESS			
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
C. ENGLISH			
1	ENG 101	English I	3.00
2	ENG 103	English II	3.00

2. Mathematics

1	MATH 151	Differential and Integral Calculus	3.00
2	MATH 155	Ordinary and Partial Differential Equations	3.00
3	MATH 157	Fourier and Laplace Transformation	3.00
4	MATH 201	Coordinate geometry and Vector	3.00

		Analysis	
5	MATH 203	Linear Algebra and Matrices	3.00
6	STAT 205	Probability and Statistics	3.00

3. Computer Science Courses

A. Computer Science and Information Courses

Course Code		Title of the course	Credits
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CSI	112	Computer Fundamentals Laboratory	1.50
CSI	121	Structured Programming Language	3.00
CSI	122	Structured Programming Language Laboratory	1.50
CSI	211	Object-Oriented Programming	3.00
CSI	212	Object-Oriented Programming Laboratory	1.50
CSI	217	Data Structure	3.00
CSI	218	Data Structure Laboratory	1.50
CSI	219	Discrete Mathematics	3.00
CSI	221	Database Management Systems	3.00
CSI	222	Database Management Systems Laboratory	1.50
CSI	227	Algorithms	3.00
CSI	228	Algorithms Laboratory	1.50
CSI	229	Numerical Methods	3.00
CSI	231	Operating System Concepts	3.00
CSI	232	Operating System Concepts Laboratory	1.50
CSI	311	System Analysis and Design	3.00
CSI	312	System Analysis and Design Laboratory	1.50
CSI	317	Theory of Computing	3.00
CSI	321	Software Engineering	3.00

CSI	322	Software Engineering Laboratory	1.50
CSI	341	Artificial Intelligence	3.00
CSI	342	Artificial Intelligence Laboratory	1.50
CSI	411	Compiler	3.00
CSI	412	Compiler Laboratory	1.50

B. Option I: Any Two

CSI	415	Pattern Recognition	3.00
CSI	416	Pattern Recognition Laboratory	1.50
CSI	421	Computer Graphics	3.00
CSI	422	Computer Graphics Laboratory	1.50
CSI	423	Simulation & Modeling	3.00
CSI	424	Simulation & Modeling Laboratory	1.50
CSI	447	Multimedia Systems Design	3.00
CSI	448	Multimedia Systems Design Laboratory	1.50
CSI	425	Distributed database management System	3.00
CSI	426	Distributed database management System Lab	1.50

4. Computer Engineering Courses

CSE	113	Electrical Circuits	3.00
CSE	123	Electronics	3.00
CSE	124	Electronics Laboratory	1.50
CSE	223	Digital Electronics	3.00
CSE	224	Digital Electronics Laboratory	1.50
CSE	234	Computer Organization and Assembly Programming Laboratory	1.50

CSE	313	Computer Architecture	3.00
CSE	315	Data Communication	3.00
CSE	323	Computer Networks	3.00
CSE	324	Computer Networks Laboratory	1.50
CSE	413	Microprocessor	3.00
CSE	414	Microprocessor Laboratory	1.50
CSE	415	Computer Peripherals and Interfacing	3.00
CSE	416	Computer Peripherals and Interfacing Laboratory	1.50

Option II: Any Two

CSE	427	VLSI Design	3.00
CSE	453	Optical Fiber Communication	3.00
CSE	457	Mobile Cellular Communication	3.00
CSE	461	Wireless Communication	3.00

5. Project/ Thesis

CSE	400	Project/Thesis	4.00

Summary of Course Curriculum

Sl#	Group	Theory	Laboratory	Thesis	Total
1.	General Education	24.00	1.50	-------	25.50
2.	Mathematics	18.00	------	-------	18.00
3.	Computer Science	45.00	19.50	-------	64.50
4.	Computer Engineering	30.00	9.00	-------	39.00
5.	Project /Thesis	-------	-------	4.00	4.00
	Total	117.00	30.00	4.00	151.00

Course Contents

Phy 101 Physics I

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.

Waves & Oscillations: Differential equation of a Simple Harmonic Oscillator, Total energy & average energy, Combination of simple harmonic oscillation, Lissajous figures, Spring-mass system, Calculation of time period of torsional pendulum, Damped oscillation, Determination of damping co-efficient. Forced oscillation. Resonance, Two-body oscillation. Reduced mass Differential equation of a progressive wave, Power & intensity of wave motion, Stationary wave, Group velocity & Phase velocity. Architectural acoustics, Reverberation and Sabine's formula.

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 103 Physics II

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.

Properties of Matter: States of matter; Elastic properties of solids: Coefficients of elasticity, Energy calculation; Flow of liquids: Equation of continuity, Laminar and turbulent flow, Reynolds number & its significance, Bernoullis theorem and its application; Viscosity: poiseulles equation, Motion in a viscous medium, Determination of coefficient of viscosity; Surface tension: Surface tension as a molecular phenomenon, Surface tension and surface energy, Capillarity and angle of contact, Quincke's method.

Phy 104 Physics Laboratory

Experiments based on Phy 103

SOC 101 Society, Technology and Engineering Ethics

Engineering Ethics will consider ethical issues in the practice of engineering: safety and liability, professional responsibility to clients and employers, whistle-blowing, codes of ethics, career choice, and legal obligations. The course will relate general ethical theory to concrete problems in engineering, using readings, videotapes, scenarios, and case studies. Class sessions will vary: some possibilities are a discussion in small groups on a software liability scenario, a focused discussion of the full class on bribery, a formal debate on a conflict of interest dilemma, a role play of a meeting of characters in a scenario, and a brief lecture on protection of intellectual property.

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.

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 102 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 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 155 Ordinary and 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.

Math 157 Fourier and Laplace Transformations

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.

Math 201 Co-ordinate 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.

Math 203 Linear Algebra and Matrices

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.

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. 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. Hypothesis testing and regression analysis. Time series analysis and Markov chain.

CSI 112 Computer Fundamentals Laboratory

Laboratory works based on learning basics of operating system and application software packages.

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 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 Algorithm (Pre-requisite CSI 121 and CSI 127)

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 Algorithm 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 231 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 232 Operating System Concepts Laboratory

Laboratory work based on **CTE 231**

CSI 311 System Analysis & 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 & Design Laboratory

Laboratory work based on **CSI 311**

CSI 317 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. Turning machines: basic machines, configuration, computing with turning machine, combining turning machines.

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

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

Introduction to pattern recognition: features, classification, learning, statistical methods, structural methods and hybrid method. Application of pattern recognition, remote sensing and biomedical area. Learning algorithm. Syntactic approach: Introduction to pattern grammars and language. Parsing techniques, Pattern recognition in computer aided design.

CSI 416 Pattern Recognition Laboratory

Laboratory work based on **CSE 415**

CSI 421 Computer Graphics

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

Laboratory work based on **CSI 421**

CSI 423 Simulation & Modeling

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

Laboratory work based on **CSI 423**

CSI 447 Multimedia Systems Design

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
Laboratory work based on **CSI 447**

CSI 425 Distributed database management System *(*Pre-requisite CSI 221*)*
Review of Databases and Computer Network, Levels of distribution Transparency, distributed database design, Translation of global queries to fragment queries, Optimization of access strategies, the management of distributed Transaction, Concurrency Control, Distributed Database Administration, Homogeneous and Heterogeneous distributed Database.

CSI 426 Distributed database management System Laboratory
Laboratory work based on **CSI 425**

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
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 223 Digital Electronics

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 224 Digital Electronics Laboratory

Laboratory work based on **CSE 223**

CSE 234 Computer Organization and Assembly Programming Laboratory

Laboratory work based on microprocessor assembly language

CSE 313 Computer Architecture

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

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

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 413 Microprocessor

Microprocessor: Introduction to different types of microprocessors, Microprocessor architecture, instruction set, interfacing, I/O operation, interrupt structure, DMA, Microprocessor interface ICs, Advanced microprocessor concept of microprocessor based system design.

CSE 414 Microprocessor Laboratory

Laboratory work based on **CSE 413**

CSE 415 Computer Peripherals and Interfacing (Pre-requisite CSE 413)

Interface components and their characteristics, microprocessor I/O, Disk, Drums and Printers, Optical displays and sensors, High power interface devices, transducers, stepper motors and peripheral devices,

CSE 416 Computer Peripherals and Interfacing Laboratory

Laboratory work based on **CSE 415**

CSE 427 VLSI Design

Design and analysis techniques for VLSI circuits, Design of reliable VLSI circuits, noise considerations, design and operation of large fan out and fan in circuits, clocking methodologies, techniques for data path and data control design, Simulation techniques, Parallel processing, special purpose architectures in VLSI, VLSI layouts partitioning and placement routing and wiring in VLSI, Reliability aspects of VLSI design.

CSE 453 Optical Fiber Communication

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

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

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 400 Project/Thesis

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