PORT CITY INTERNATIONAL UNIVERSITY

Syllabus
of

B.Sc. in Computer Science & Engineering (CSE)

Department of Computer Science & Engineering

(2013-2017)

Bachelor of Science in Computer Science and Engineering

The Department of Computer Science and Engineering offers B. Sc. in Computer Science and Engineering program under the Faculty of Science & Engineering. Computer science and computer engineering are fields of unparalleled excitement and opportunity, and for the future fields where the smartest young men and women are choosing to study and work. If students' goal is graduate study and research, employment in the information technology industry, business leadership, or public service, the PCIU Department of Computer Science and Engineering will be one of the few "short listed." Ranked among the top research programs in the nation along with BUET.

Computer science is the study of information and algorithms within the context of real and abstract computing devices. Computer scientists are interested in such topics as the representation and storage of information; algorithms to access, display, edit, and transform information; programming, languages to express algorithms; and hardware and software processors to execute algorithms. These concerns lead to practical developments in computer systems software, such as operating systems and compilers; in application areas, such as artificial intelligence, computer graphics, and computational biology; and also lead to theoretical investigations of computers, algorithms and data.

Computer engineering is a closely related field that is concerned with the design and practical application of computer hardware and software systems to the solution of technological, economic, and societal problems. The computer engineer analyzes a problem and selects from a variety of tools and technologies those most appropriate for its solution. A computer engineer can expect to be involved in hardware design, software creation, and systems integration. The program provides an in-depth education in computer engineering while retaining strong foundations in traditional electrical engineering and computer science.

The computer engineering program involves digital hardware, software, and architecture. Mathematics, engineering design, laboratory work, and communication-skills development are also emphasized. A major team project must be completed during the senior year. The objective of undergraduate education in computer engineering is to develop broadly educated and competent graduates for professional careers or graduate studies. Especially important is a foundation that will endure technology advances and changes.

1.1 Degree Requirements

To earn a B. Sc. in CSE degree, a student must complete at least 153.0 credit hours with CGPA 2.50. The following is a description of how these credit hours are distributed among the courses.

SL#	Group	Theory	Sessional	Thesis	Total
1	General Education	15.00	1.50	-	16.50
2	Mathematics	27.00	-	-	27.00
3	Computer Science	45.00	21.0	-	66.00
4	Computer Engineering	30.00	10.50	-	40.50
5	Project and Thesis	-	-	3.00	3.00
6	Total	117.00	33.0	3.00	153.00

1.2 Program Details

Duration	: 12 Semesters (48 months)
Total No of Credit Courses	: 61 Courses
Normal Course load per semester	: 5 Courses (15 credits)
Duration of each semester	: 4 Months
Project & Thesis	: 3.0 Credits (minimum 8 months)
Total Credit Hours	: 153.0 Credits
Cumulative Grade Point Average (CGPA)/Passing Grade	: 2.50

1.3 Class Attendance Policy

The university expects all students to attend classes regularly. Students may not be allowed to sit for the examination if his/her percentage of class attendance falls below 70 percent.

1.4 Calculation of GPA

Grade Point Average (GPA) or Cumulative Grade Point Average (CGPA) is the average of the grade points obtained in all the courses passed/completed by a student. For example, if a student passes/completes four courses in a trimester having credit hours of C1, C2, C3, & C4 and his/her grade points in these courses are G1, G2, G3, & G4 respectively then

Suppose a student got grade point "4.0" in a 3 credit hours course and 3.0 in 1.5 credit hours course then his/her GPA/CGPA will be as follows:

$$GPA/CGPA = \frac{(3 \times 4) + (1.5 \times 3)}{3 + 1.5} = 3.67$$

1.5 Marks Distribution

Particulars	% of Marks
Class Attendance	5
Assignment/Project/Class Participation/Presentation	10
Class Tests/Quizzes	15
Mid Term Exam	30
Final Exam	40
Total	100

1.6 Grading System (UGC approved)

The Department of Computer Science and Engineering follows the University Grants Commission (UGC) approved grading system. This grading system is also used by the other departments of Port City International University. The performance of the students in the course work is evaluated by letter grading systems as described below:

Marks Range	Grade	Grade point	Interpretation
80% and above	A+	4.00	Outstanding
75% to below 80%	A	3.75	Excellent
70%to below 75 %	A-	3.50	Very Good
65% to below 70%	B+	3.25	Good
60% to below 65%	B	3.00	Satisfactory
55% to below 60%	B-	2.75	Above Average
50% to below 55%	C+	2.50	Average
45% to below 50%	C	2.25	Below Average
40% to below 45%	D	2.00	Pass
Less than 40%	F	0.00	Fail
	I	0.00	Incomplete

1.7 Applicant's Eligibility & Selection Procedures

All applicants must meet one of the following requirements to apply for admission in B. Sc. In Computer Science and Engineering program:

- Minimum GPA 2.5 both in S.S.C./equivalent and H.S.C./equivalent from science background with mathematics and physics or other fields of study.
- Minimum 5 subjects in O-Level and 2 subjects in A-Level with minimum grade of B in 4 subjects and minimum grade of C in 3 subjects from science background with mathematics and physics or other fields of study.

Applicants will be selected for admission through an admission test which includes written exam as well as viva voce. Applicants who will score satisfactory marks in written tests will be qualified for viva voce.

1.8 Credit Transfer

A student may transfer his/her credits from an educational institution/university with a system similar to Port City International University after his/her admission. Such candidates will have to apply to the Registrar of PORT CITY through the Head of the department with required documents.

LIST OF THE COURSES:

General Educational Courses

SCIENCE

SI.No	Course Code	Title of the course	Credits	Prq.
01.	PHY 111	Physics	3.00	
	PHY 112	Physics Sessional	1.50	
02.	CHEM 111	Chemistry	3.00	

Option I: Any Three (ECG 327 compulsory)

HUMANITIES/ BUSINESS

03.	HUM 103	Introduction to Humanities	3.00	
04.	SOC 104	Introduction to Social Science	3.00	
05.	ACT 110	Principles of Accounting	3.00	
06.	ECO 213	Economics	3.00	
07.	MGT 215	Introduction to Management	3.00	
08.	BIG 218	Introduction to Biological Science	3.00	
09.	MKT 324	Principles of Marketing	3.00	
10.	HUM 100	Bangladesh Studies	3.00	
11.	MIS 435	Management Information Systems	3.00	

English (Students who are weak in English will have to complete ENG 101)

01.	ENG 101	Composition	3.00	
02.	ENG 106	Freshman English-Il	3.00	

Mathematics

01.	MATH 115	Differential Calculus & Coordinate Geometry	3.00	
02.	MATH 125	Integral Calculus & Vector Analysis	3.00	
03.	MATH 135	Discrete Mathematics	3.00	
04.	MATH 215	Linear Algebra	3.00	
05.	STAT 235	Statistics	3.00	
06.	MATH 315	Complex Variable and Laplace Transformation	3.00	
07.	MATH 325	Differential Equation and Fourier Analysis	3.00	
08.	MATH 329	Mathematical Analysis for Computer Science	3.00	
09.	MATH 415	Numerical Methods	3.00	MATH 215

COMPUTER SCIENCE COURSES

Computer Science and Information Technology

SI.No	Course Code	Title of the course	Credits	Prq.
01.	CSE 111	Computer Fundamentals & Programming Techniques	3.00	
	CSE 112	Computer Fundamentals Sessional	1.50	
02.	CSE 121	Structured Programming Language	3.00	
	CSE 122	Structured Programming Language Sessional	1.50	
03.	CSE 211	Object-Oriented Programming	3.00	
	CSE 212	Object-Oriented Programming Sessional	1.50	
04.	CSE 217	Data Structure	3.00	CSE 121
	CSE 218	Data Secure Sessional	1.50	
05.	CSE 221	Database Management Systems	3.00	
	CSE 222	Database Management Systems Sessional	1.50	
06.	CSE 227	Algorithms	3.00	
	CSE 228	Algorithms Sessional	1.50	

07.	CSE 231	Operating System Concepts	3.00	
	CSE 232	Operating System Concepts Sessional	1.50	
08.	CSE 317	Theory of Computing	3.00	
09.	CSE 321	Software Engineering	3.00	
	CSE 322	Software Engineering Sessional	1.50	
10.	CSE 331	Pattern Recognition	3.00	
	CSE 332	Pattern Recognition Sessional	1.50	
11.	CSE 341	Artificial Intelligence	3.00	
	CSE 342	Artificial Intelligence Sessional	1.50	

Option 11: Any Four (CSE 411 & CSE 412 are compulsory)

SI.No	Course Code		Title of the course	Credits	Prq.
1.	CSE	411	Compiler	3.00	CSE 317
	CSE	412	Compiler Sessional	1.50	
2.	CSE	421	Computer Graphics	3.00	
	CSE	422	Computer Graphics Sessional	1.50	
3.	CSE	423	Simulation & Modeling	3.00	
	CSE	424	Simulation & Modeling Sessional	1.50	
4.	CSE	447	Multimedia Systems Design	3.00	CSE 113, 123
	CSE	448	Multimedia Systems Design Sessional	1.50	

COMPUTER ENGINEERING COURSES

01.	CSE	113	Electrical Engineering	3.00	
	CSE	114	Electrical Engineering Sessional	1.50	
02.	CSE	123	Electronics	3.00	
	CSE	124	Electronics Sessional	1.50	
03.	CSE	213	Digital Logic Design	3.00	
	CS1	214	Digital Logic Design Sessional	1.50	
04.	CSE	233	Computer Organization and Architecture	3.00	
	CSE	234	Computer Organization and Architecture Sessional	1.50	
05.	CSE	323	Computer Networks	3. 00	CSE 435
	CSE	324	Computer Networks Sessional	1 50	
06.	CSE	413	Microprocessor and Assembly Programming	3.00	
	CSE	414	Microprocessor and Assembly Prog. Sessional	1.50	
07.	CSE	333	Computer Peripherals and Interfacing	3.00	
	CSE	334	Computer Peripherals and Interfacing Sessional	1.50	

Option Ill: Any Two (CSE   435 is compulsory**)**

SI.No	Course Code	Title of the course	Credits	Prq.
8.	CSE 427	VLSI Design	3.00	
9.	CSE435	Data Communication	3.00	
10.	CSE 441	Optic fiber Communication	3.00	CSE 323
11.	CSE 443	Mobile and Telecommunications	3.00	CSE 433
15.	CSE 449	Fault tolerance Systems	3.00	

PROJECT AND THESIS

1.	CSE 400	Project and Thesis	3.00

General Educational Courses
SCIENCE
PHY 111 Physics
Mechanics: Measurements, Motion one Dimension, Motion in a Plane, Patricia Dynamics, Work & Energy, Circular Motion, Simple Harmonic Motion, Rotation of Rigid Bodies, Central Force, Structure of Matter, Mechanical Properties of Materials. Properties of Matter: Elasticity, Stresses & Strains, Young's Modulus, Bulk Modulus, Rigidity Modulus, Elastic Limit, Poisson's Ratio, Relation between Elastic Constants, Bending of Beams. Fluid Motion, Equation of Continuity, Bernoulli's Theorem, Viscosity, Stokes' Law, Surface Energy & Surface Tension, Capillary, Determination of Surface Tension By Different Methods.

Waves: Wave Motion & Propagation, Simple Harmonic Motion, Vibration Modes, Forced Vibrations, Vibration in Strings & Columns, Sound Wave and its velocity, Doppler Effect, Elastic Waves, Ultrasonic, Practical Applications.

Optics: Theories of light, I-Iuygen's principle, Electromagnetic waves, velocity of light, Reflection, Refraction, Lenses, Interference, Temperature and Zeroth, I t & 2nd Law of Thermodynamics, Calorimetry, Thermal equilibrium and thermal expansion. Specific heat, heat capacities, equation of state, change of phase, heat transfer, Carnot Cycle, Efficiency, Entropy, Kinetic them)' of gasses.

PHY 112 Physics Sessional
Laboratory work based on PHY 111.

CHM 111 Chemistry

Electrostatics, Electric charge, Coulomb's law, Electric field, potential flux. Gauss's law capacitors and dielectrics steady currents, Ohm's law, magnetic field, Biot-Savart Law, Ampere's law. Electromagnetic Induction, Faraday's law, Lcnz's law, Self inductance, Mutual inductance. Magnetic properties of matter, Probability and Ferromagnetism, Maxwell's equations of electromagnetic, waves, Waves in conducting and non—conducting media, Special theory of Relativity, length contraction and hum dilation, inn.a~ relation, photoelectric effect, Quantum theory, X-rays, Compton effect, dual nature of matter and radiation, atomic structure, Nuclear dimensions, electron orbits, atomic spectra, Bohr atom, Radioactive decay, Half life: Isotopes, Nuclear binding energy, lasers, Holography, Scientific method, units, significant figures; Dimensional analysis; Elements, compounds, and mixtures; Periodic properties, nomenclature; Ionization energies, line spectra; Bohr theory and quantization; Quantum theory and orbital configurations; Ionic bonds, nomenclature II; Lewis formulas; Lewis formulas II; VSEPR; Molecular Orbitals; Localized Bond Orbitals; Chemical Reactivity; Moles, Avogadro's number; Formulas and analysis; Stoichiometry and calculations; Limiting reactants; Calculations for solutions; Gasses, pressure, ideal gas law; Molar mass, partial pressures; Kinetic theory of gasses; Work, heat, enthalpy; Hess' law, bond enthalpies; Calorimetry; Intermolecular forces; Phase diagrams and solids.

Option I:

HUM 103 Introduction to Humanities

Literature: Appreciation of literatures: poetry, prose, drama, novel; Contemporary thoughts on literatures; Study. of contemporary literary work.
History: I Introduction; renaissance, reformation, and the beginning of the Modem World; The Scientific Revolution; The industrial Revolution, the age of Democratic Revolution; Nineteenth century Europe; Asia-Pacific region;' Africa; World Wars; South Asia: Colonization, decolonization after; Contemporary world: Cold War and after.

Philosophy: Concept of Philosophy; Science and Philosophy; Science and Philosophy; Science and Philosophy; Region, Literature and Philosophy; Sources of Knowledge; Empiricism, Rationalism Criticism; Concept of value, ethics and Sources of ethical standards.

SOC 104 Introduction to Social Science
Scope and nature sociology, society, social evolution and techniques of production. industrial revolution, political system, social control, society and population, standard of living, nature of social change, urbanization and industrialization in Bangladesh, urban ecology, society and environment and tribal people of Bangladesh.

ACT 110 Principles of Accounting
Accounting, generates reports and communicates them to external decision-makers so that they can evaluate how well the business achieved its goals. These reports to external users are called financial statements. Financial statements reporting directly on the goals of profitability and liquidity are used extensively both inside and outside a business to evaluate the business success, the basic accounting concepts, preparation of trial balance, final statement, accounting for assets and liabilities, accounting system and accounting practices in different type of organization.

ECG 213 Economics
The course introduces the concept, basic kinds of economic systems, demand and supply and interaction of markets, business organization and market structures, the economics of the firm, gross national product, business cycles, unemployment, and inflation, fiscal policy, budget deficits, and the national debt.

MGT 215 Introduction to Management
The course covers functions of management viz., planning, organizing, directing, motivating and controlling, problems of organizational goal attainment in differing managerial environments Each management principal and functions is discussed in detail. The course deals with management science, theory and practice, management and society, global and comparative management. decision making, the nature and purpose of planning, objectives, strategies, policies and planning premises, political and social environment, organizational structure, departmentalization, line and staff authority, decentralization, effective organizing and organizational culture, managing change through manager and organizational development, human factors of motivation, leadership, committees and group decision making, communication, the system and process of controlling, control techniques and information technology, productivity and operations management, management change in organization.

BlO 218 Introduction to Biological Science

Topics include origin of life, cell, genetic bases of life, evolution and diversity, plant structure and functions, heredity -and evolution, animal structure functions, behavior and ecology, basic human anatomy and physiology, microbiology, nutrition and dietetics and biological industries.

MKT 324 Principles of Marketing
This course deals with the study of concepts, principles and problems involved in the transfer of goods and services from' producers' to the ultimate consumer. Contents covered include buyer behavior, demand measurement, segmentation, targeting, product life cycle and positioning, product development, pricing, distribution, sales promotion, marketing institutions, marketing strategy and marketing management process. Marketing is the social and managerial process by which individual and group obtains what they need and want, through creating offering, and exchanging product of value with others. Principles of Marketing course is designed to present a marketing environment which includes marketing and changing the world, the identification of market. developing the marketing mix, marketing in a special field, international marketing, marketing and society, marketing appraisal and prospects, factors affecting the efficiency of marketing.

HUM 100 Bangladesh Studies
History of Bangladesh: People of Bangladesh, Origin and Anthropological identity, British Colonial Rule in Indian Subcontinent, The movements, mass upsurges, programs and elections that took place during time started from 1947 (The Pakistan Movement and the Birth of Pakistan) to 1971(Liberation war and Birth of Bangladesh).
Physical and Natural resources of Bangladesh: Physical features : Location, climate and major Physiographic Units,; River system, Agriculture pattern, Forest types, Mineral resources, Industrial setup and Density and distribution of population in Bangladesh. Political Administrative and Legal Environment of Bangladesh: Forms of Government and State Mechanisms, Constitution and its Amendments, Administrative Structure and Foreign policies. Political Parties and Different political Regimes. Socio-economic Environment of Bangladesh: Social Structure and social problems in Bangladesh, Population Migration from Rural to Urban areas, Ethnic Minorities, Poverty Alleviation and Private sector Development, Macroeconomic Trends in Economy: GDP,Savings, Investment and Employment.

MIS 435 Management Information Systems
This study highlights the effective use of information systems in management builds on a vision-an idea, often not fully articulated, of where a company can go: perhaps new services or unique products it can offer, ways of serving customers better, or ways to help employees be more effective and more satisfied with their work. A vision also means knowing about how things arc at the present time. Information describing current events, trends, and likely occurrences help from an image of what could be - opportunities and challenges.

English

ENG 101 Composition
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 needs considerable repair and as a foundation course for ENG 106. The contents include parts of speech, count and uncountable nouns and articles, agreement between subject and verb, adverbs of frequency, term and the sequence of tenses, active and passive voices, types of sentences, prepositions: time, place, action, directions, questions forms, multi-word verbs, capitalization.

ENG 106 Freshman English-Il

A course to provide a solid foundation on study 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.

Mathematics

MATH 115 Differential Calculus and Coordinate Geometry
Differential Calculus: Limit, Continuity and differentiability, Successive Differentiation of various types of function, Leibnitz's theorem, Roile's theorem, Mean value theorem, Taylor's theorem in finite and infinite form, Mac laurine's theorem in finite and infinite form, Lagrange's form of remainders, Cauchy's form of remainder, Expansion of function, Evaluation of function - of Hospitals rule, Partial- Differentiation, Euler's theorem, Tangent & Normal, Suhtangent and abnormal in Cartesian and polar coordinates, Determination of minimum and maximum values of 'function and point of inflexion, Applications, Curvature, Radius of Curvature, Center of curvature. Coordinate geometry: Changes of axes, Pair of straight line, System of circle, Ellipse Parabola.

MATH 125 Integral Calculus & Vector Analysis
Integral Calculus: Definitions of integration, integration of method of substitution, integration by parts, Standard integrals, Integration by the method of successive reduction, Definite integrals, its properties and use in summing series, Walli's formula, Improper integrals, Beta function and Gamma function, Area under a plane curve in Cartesian and polar coordinates, Trapezoidal rule, Simpson's rule, arc lengths of curves in Cartesian and polar coordinates, parametric and pedal equation, Intrinsic equation, Volumes. of solids of revolutions by shell method, Area of surface revolution.

Vectors Analysis: Scalars and vectors, equality of vectors, Addition and subtraction of vectors, Multiplication of vectors by scalars, Scalar and vectors product of two vectors and their geometrical interpretation, Triple products and multiple products, Linear dependence and independence of vectors together with elementary application, definition of line, surface and volume integrals, Gradient, divergence and curl of point function, -Various formulae, Gauss's theorem, Stroke's , theorem, Green's theorem.

MATH 135 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.

MATH 215 Linear Algebra
Definition of linear (vector) space, subspace, Linear dependence and independence, basis and dimension, linear transformation, rank and nullity, representation of linear transformation by matrices, change matrix, determinant and trace, Eigenvector, Eigenvalue and Eigen space, normal and canonical form of matrices, matrix polynomials.

STAT 235 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 distribution, hypothesis testing, correlation and regression analysis. Sampling methods.

MATH 315 Complex Variable and Laplace Transformation
Complex Variable: Complex number system, General functions of a complex variable, Limit and continuity of a function of complex variable and related theorems, Complex differentiation & the Cauchy-Rieman equations, Mapping by elementary functions, Line integral of a complex function, Cauchy's integral theorem, Tailor's & Laurrent's theorems, Singular points, Residue, Cauchy''s residue theorem, Evaluation of residue, Contour integration, Conformal mapping.

MATH 325 Differential Equations and Fourier Analysis
Differential Equations: Degree and order of ordinary differential equation, Formation of differential equation, Solution of first order differential equation by various methods, Solution of general linear equations of second and higher order with constant coefficient, Solution of homogeneous linear equations. Solution of differential equations of the higher order when the dependent and independent variables are absent. Solution of differential equations by the method based on the factorization of the operations. Fourier Analysis: Real and complex form, Finite transform, Fourier integral, Fourier transform and their uses in solving boundary value problems.

MATH 329 Mathematical Analysis for Computer Science
Recurrent problems, manipulation of sums, number theory, special numbers, generating functions. Random variables, stochastic process, Markov chains, Queuing models, open and closed Queuing network, Application of Queuing model.

MATH 415 Numerical Method
Computational methods for solving problems m Linear algebra, linear programming, nonlinear equations, approximations, iterations, methods of least squares, interpolation, integration and ordinary differential equations.

Computer Science Courses

CSE 111 Computer Fundamentals & Programming Techniques
Introduction and Basic Organization of computers, Types of computer, History and Generations of computers, Number Systems, Codes, Logic Functions, Input and Output Devices, Memory Organizations. Types/levels of languages, Operating Systems, Introduction to C, Program format, Identifiers and keywords. Data types, constant, variable and arrays, declarations, expressions, data input and output, writing complete programs. Looping now controls, if statement, flags, conditional expression operation.

CSE 112 Computer Fundamentals & Programming Techniques Sessional
Laboratory work based on CSE 111.

CSE 121 Structured Programming Language
Data Types and Data Type Qualifier, 1/0 Functions-Character 110, formatted 110, Character Set, Identifiers, Keywords and Contents, Variables, Expressions, Statement and Symbolic Constants, Arithmetic operators, Relational Operators and Logical Operators, Assignment Operators,

increments Decrement Operators, Unary Operator and Conditional Operator., Bitwise Operators, Comma Operator, Precedence and Associativity, Branching: The If' statement (break and continue statement).

Branching: SWITCH statement, GOTO statement arid operator, Looping: FOR statement (break and continue), Looping: WHILE and DO WHILE statement, Storage class: Automatic, Static, Register and Extern. Functions: Access, Prototype, Argument Passing and Value Receiving, Functions: Pass"-by-value, Pass-by reference and Value Receiving, Functions: Command Line Parameter and Library functions, Arrays: initialization, Access, Passing and Receiving, Arrays: 2D handling, Arrays: Sorting and Searching, String Handling, Structure: Initialization, Access, Passing and Receiving, Structure:
Embedded Structure, Union and Bit-fields, File: Types of File, Text File Handling, File: Binary File Handling.
File: Data File Management Program, Pointer: Concept, Passing and Receiving, Memory Allocation and Release, Pointer: List or Tree Management by Self-Referential Structure, Pointer: Pointer and Multidimensional Arrays, Enumeration, Macros, Processor and Compiler, Directives, Library, Compiler and Linker, Segment and Memory Model, Video Adapter, Modes and Graphics Initialization, Graphics Functions.
(Prerequisite CSE 111)

CSE 122 Structured Programming Language Sessional
Laboratory work based on CSE 121.

CSE 211 Object Oriented Programming
Philosophy of Object Oriented Programming (OOP); Advantages of OOP over structured programming; Encapsulation, classes and objects, access specifiers, static and nonstatic members; Constructors, destructors and copy constructors; Array if 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.

CSE 212 Object Oriented Programming Sessional
Laboratory work based on CSE 211.

CSE 217 Data Structure
Concepts and examples, elementary data objects, elementary data structures, arrays, lists, stacks, queues, graphs, trees, Memory management, Sorting and searching, hash techniques. (Prerequisite CSE 111)

CSE 218 Data Structure Sessional
Laboratory work based on CSE 217.

CSE 221 Database Management
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.

CSE 222 Database Management Sessional
Laboratory work based on CSE 221.

CSE 227 Algorithm
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 transformation, lower bound theory, NP hard and NP-complete problems.

CSE 228 Algorithm Sessional
Laboratory work based on CSE 227.

CSE 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.

CSE 232 Operating System Concepts Sessional
Laboratory work based on CSE 231.

CSE 317 Theory of Commuting
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 free grammar. Turning machines: basic machines, configuration, computing with turing machines, combining turing machines.

CSE 321 Software Engineering
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.

CSE 322 Software Engineering Sessional
Laboratory work based on CSE 321.

CSE 331 Pattern Recognition
Introduction to pattern recognition: features, classification, learning, statistical methods, structural methods and hybrid methods. 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.

CSE 332 Pattern Recognition Sessional
Laboratory work based! on CSE 331.

CSE 341 Artificial Intelligence
Survey and concepts in artificial intelligence, Knowledge representation, Search and control techniques, Al machines and features of LISP and PROLOG languages, Problem representation. Search, Inference and learning in intelligent systems, Systems for general problem solving, Game

playing, Expert consultation, Concept formation and natural languages processing, Recognition. Understanding and translation, some expert systems.
(Prerequisite CS1T 227, MATH 135)

CSE 342 Artificial Intelligence Sessional
Laboratory work based on CSE 341.

Optional II:
CSE 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.

CSE 412 Compiler Sessional
Laboratory work based on CSE 411.

CSE 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.

CSE 422 Computer Graphics Sessional
Laboratory work based on CSE 421.

CSE 423 Simulation & Modeling
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 424 Simulation & Modeling Sessional
Laboratory work based on CSE 423.

CSE 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 in an ATM. Mobile multimedia computer. Operating system support for multimedia. Hypermedia system. Standard for multimedia. Multimedia database and multimedia applications.

CS1T 448 Multimedia Systems Design Sessional
Laboratory work based on CSE 447.

Computer Engineering Courses

CSE 113 Electrical Engineering
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.

Diode logic gates, transistor switches, transistor transistor gates, MOS gates, Logic families: Ti'! '. ECL, Ill and CMOS logic with operation details, Propagation delay, product and noise immunity, Open collector and High impedance gates, Electronic circuits for flip-flops, counters and register, memory systems, PLA's. AID, D/A converters with applications, SIH circuits, LED, LCD find optically coupled oscillators, Non-linear applications of OP AMPs, Analogue switches.

CSE 114 Electrical Engineering Sessional
Laboratory work based on CBE 113.

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 OPAMPs gain input and output impedance.

Linear wave shaping: diode wave shaping techniques, clopping and clamping circuits, comparator druids, switching circuits, pulse transformers, pulse transmission, pulse generation, monostable, bistable and astable multivibrators, Schmitt trigger, blocking oscillators and time-base circuit, Timing circuits, Simple voltage sweeps, linear current sweeps.

CSE 124 Electronics Sessional
Laboratory work based on CSE 123.

CSE 213 Digital Logic Design
Number systems and codes, Digital logic, Boolean algebra, DeMorgan'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: asynchronous counters, synchronous counters and their applications, TTL, MOS, CMOS, IlL logic gates and their circuits, PLA design, Synchronous and asynchronous logic design: state diagram, Mealy and Moore machines, State. minimizations and assignments, pulse mode logic, Fundamental mode design.

CSE 214 Digital Logic Design Sessional
Laboratory work based on CSE 213.

CSE 233 Computer Organization and Architecture
Computer Organization: Fundamentals of computer design, Performance and cost, Instruction set design and examples, Measurements, Basic processor implementation techniques: 1-Iardwircd and micro-programmed control; Caches and multiprocessor caches, Design I/O systems, I/O performances, Micro-programmed control.
Information representation and transfer, instruction and data access methods, the control unit: hardwired and micro programmed, memory organization, 1/0 systems, channels, interrupts, OM A, 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 computer and interconnection networks, High level language concept o. computer architecture.

Laplace transform: Definition, Laplace 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 of laplace transforms, Partial fraction, solution of differential equation by laplace transformation, Evaluation of improper integral.

CSE 234 Computer Organization and Architecture Sessional
Laboratory work based on CSE 233.

CSE 323 Compute 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 computer systems.

CSE 324 Compute Networks Sessional
Laboratory work based on CSE 323.

CSE 413 Microprocessor and Assembly Programming
Microprocessor: Introduction to different types of microprocessors. Microprocessor architecture, instruction set interfacing, I/O operation, interrupt structure, DMA, Microprocessor interface ICs, Advanced microprocessor concept I microprocessor-based system design.
Multiprocessors with examples Assembly Language: Machine and Assembly instruction types and their formats, Character representation instructions, instruction execution, Machine language programming, instruction sets and their implementations, The assembly process, Addressing methods, Subroutines, macros and files, i/O programming, interrupts and concurrent processes, (Prerequisite CSE 233)

CSE 414 Microprocessor and Assembly Programming Sessional
Laboratory work based on CSE 413.

CSE 333 Computer Peripherals and Interfacing
Literature 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 334 Computer Peripherals and Interfacing Sessional
Laboratory work based on CSE 333.

Option III :

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. (Prerequisite CSE 213)

CSE 435 Data Communication

Introduction to modulation techniques: pulse modulation, pulse amplitude modulation, pulse width modulation and pulse position modulation, pulse code modulation, quanti7.ation, Delta modulation, TDM, FDM, 00K, FSK, PSK, QPSK, Representation of noise, threshold effects in PCM and FM, Probability of error fur pulse systems, concept of channel coding, and capacity. Asynchronous and synchronous communications, Hardware interfaces, multiplexes, concentrators and buffers, Communication medium, Fiber optics.

CSE 441 Optic Fiber Communication
Principles of fiber optical communication & network, Point to point systems & shared medium networks, Fiber propagation including attenuation, Dispersion and nonlinearities, erbium-doped amplifiers, Bragg and long period grating Fiber transmission based on solitolls and non-return to zero and time and wavelength division-multiplexed networks.

CSE 443 Mobile and Telecommunications
Introduction: Concept, evaluation, and fundamentals of cellular telephony, mobile standards, mobile system architecture, design, performance, and operation. Voice digitization and modulation techniques; Cellular radio system: Frequency reuse, co-channel interference, eel! Splitting and components. Mobile radio propagation: Propagation characteristics, models for radio propagation, antenna at cell site, and mobile antenna. Hand OT and drop calls, diversity techniques.

Fundamentals of telecommunication systems, evaluation, exchange, and international regulatory boundaries. Telephone apparatus: microphone, speakers, ringer, pulse and tone dialing mechanism, sidetone mechanism. Trucking and queuing switching technologies, the design and analysis of telecommunication networks.

CSE 449 Fault Tolerance Systems
Introduction to Fault Tolerant Systems and Architectures, Fault detection and location in combinational and sequential circuits, Fault test generation for combinational and sequential circuits, Digital simulation as a diagnostic tool. Automatic test pattern generator, Fault modeling, automatic test equipment, Faults in memory, memory test pattern and reliability, Performance self-checking circuits, Burst error correction and Triple modular redundancy, Maintenance processor.

CSE 400 Project & Thesis

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