

SYLLABUS

Distribution of Undergraduate Courses

Course type	% of Credit	Credits
Mathematics and Basic Sciences	12.66	20.25
(a) Mathematics	7.50	12
(b) Physics	2.81	4.50
(c) Chemistry	2.34	3.75
Humanities	6.56	10.50
(a) Economics, Government & Sociology	1.88	3.00
(b) Industrial Management & Accountancy	1.88	3.00
(c) English with Sessional	2.81	4.50
Basic and Major Engineering	80.78	129.25
(i) Electrical Engineering with Sessional	7.50	12.00
(ii) Core Engineering	73.28	117.25
(a) Theoretical	52.50	84
(b) Sessional, Project and Thesis	20.78	33.25
Total	100.00	160.00

Summary of Undergraduate Course Plan

Sl. No.	Year/Semester	Theory		Sessional		Total Credits
		No of Course	Credits	No of Course	Credits	
1	1 st /Odd	5	15.00	5	6.00	21.00
2	1 st /Even	5	15.00	4	5.25	20.25
3	2 nd / Odd	5	15.00	4	5.25	20.25
4	2 nd / Even	5	15.00	4	4.50	19.50
5	3 rd / Odd	5	15.00	5	5.25	20.25
6	3 rd / Even	5	15.00	5	4.50	19.50
7	4 th / Odd	5	15.00	5	4.00	19.00
8	4 th / Even	5	15.00	4	5.25	20.25
Total=		40	120.00	36	40.00	160.00

Courses offered to the Undergraduate students of Computer Science & Engineering Department 1st YEAR ODD SEMESTER

Sl. No.	Course No.	Course Title	Theory Hrs./Week	Sessional Hrs/Week	Credit
1	CSE 1100	Computer Fundamentals and Ethics	0	3	1.50
2	CSE 1101	Computer Programming	3	0	3.00
3	CSE 1102	Sessional Based on CSE 1101	0	3	1.50
4	EEE 1151	Basic Electrical Engineering	3	0	3.00
5	EEE 1152	Sessional Based on EEE 1151	0	3/2	0.75
6	Math 1113	Differential and Integral Calculus	3	0	3.00
7	Hum 1113	Functional English	3	0	3.00
8	Hum 1114	English Language Lab	0	3	1.50
9	Chem1113	Inorganic and Physical Chemistry	3	0	3.00
10	Chem1114	Sessional Based on Chem 1113	0	3/2	0.75
Total=			15	12.00	21.00

1st YEAR EVEN SEMESTER

Sl. No.	Course No.	Course Title	Theory Hrs./Week	Sessional Hrs/Week	Credit
1	CSE 1200	Analytical Programming	0	3/2	0.75
2	CSE 1201	Data Structure	3	0	3.00
3	CSE 1202	Sessional Based on CSE 1201	0	3	1.50
4	CSE 1203	Object Oriented Programming	3	0	3.00
5	CSE 1204	Sessional Based on CSE 1203	0	3	1.50
6	Math1213	Co-ordinate Geometry and Ordinary Differential Equation	3	0	3.00
7	Hum1213	Economics, Government and Sociology	3	0	3.00
8	Phy 1213	Physics	3	0	3.00
9	Phy 1214	Sessional Based on Phy 1213	0	3	1.50
Total=			15	10.50	20.25

2nd YEAR ODD SEMESTER

Sl. No.	Course No.	Course Title	Theory Hrs./Week	Sessional Hrs/Week	Credit
1	CSE 2100	Software Development Project I	0	3/2	0.75
2	CSE 2101	Discrete Mathematics	3	0	3.00
3	CSE 2102	Sessional Based on CSE 2101	0	3	1.50
4	CSE 2103	Numerical Methods	3	0	3.00
5	CSE 2104	Sessional Based on CSE 2103	0	3	1.50
6	EEE 2151	Analog Electronics	3	0	3.00
7	EEE 2152	Sessional Based on EEE 2151	0	3	1.50
8	Math 2113	Vector Analysis and Linear Algebra	3	0	3.00
9	Hum 2113	Industrial Management and Accountancy	3	0	3.00
Total=			15	10.50	20.25

2nd YEAR EVEN SEMESTER

Sl. No.	Course No.	Course Title	Theory Hrs./Week	Sessional Hrs/Week	Credit
1	CSE 2201	Computer Algorithms	3	0	3.00
2	CSE 2202	Sessional Based on CSE 2201	0	3	1.50
3	CSE 2203	Digital Techniques	3	0	3.00
4	CSE 2204	Sessional Based on CSE 2203	0	3	1.50
5	CSE 2205	Finite Automata Theory	3	0	3.00
6	CSE 2206	Sessional Based on CSE 2205	0	3/2	0.75
7	EEE 2251	Electrical Machines and Instrumentations	3	0	3.00
8	EEE 2252	Sessional Based on EEE 2251	0	3/2	0.75
9	Math 2213	Complex Variable, Differential Equations and Harmonic Analysis	3	0	3.00
Total=			15	9.00	19.50

3rd YEAR ODD SEMESTER

Sl. No.	Course No.	Course Title	Theory Hrs./Week	Sessional Hrs/Week	Credit
1	CSE 3100	Web Based Application Lab/Project	0	3/2	0.75
2	CSE 3101	Database Systems	3	0	3.00
3	CSE 3102	Sessional Based on CSE 3101	0	3	1.50
4	CSE 3103	Data Communication	3	0	3.00
5	CSE 3104	Sessional Based on CSE 3103	0	3/2	0.75
6	CSE 3105	Software Engineering	3	0	3.00
7	CSE 3107	Applied Statistics and Queuing Theory	3	0	3.00
8	CSE 3109	Microprocessors and Assembly Language	3	0	3.00
9	CSE 3110	Sessional Based on CSE 3109	0	3	1.50
10	CSE 3112	Technical Writing and Presentation	0	3/2	0.75
Total=			15	10.50	20.25

3rd YEAR EVEN SEMESTER

Sl. No.	Course No.	Course Title	Theory Hrs./Week	Sessional Hrs/Week	Credit
1	CSE 3200	Software Development Project II	0	3/2	0.75
2	CSE 3201	Operating Systems	3	0	3.00
3	CSE 3202	Sessional Based on CSE 3201	0	3/2	0.75
4	CSE 3203	Computer Architecture and Design	3	0	3.00
5	CSE 3205	Computer Networks	3	0	3.00
6	CSE 3206	Sessional Based on CSE 3205	0	3	1.50
7	CSE 3207	Peripherals and Interfacings	3	0	3.00
8	CSE 3208	Sessional Based on CSE 3207	0	3/2	0.75
9	CSE 3209	Artificial Intelligence	3	0	3.00
10	CSE 3210	Sessional Based on CSE 3209	0	3/2	0.75
Total=			15	9.00	19.50

4th YEAR ODD SEMESTER

Sl. No.	Course No.	Course Title	Theory Hrs./Week	Sessional Hrs/Week	Credit
1	CSE 4000	Project/Thesis I	0	2	1.00
2	CSE 4101	Compiler Design	3	0	3.00
3	CSE 4102	Sessional Based on CSE 4101	0	3/2	0.75
4	CSE 4103	Digital Signal Processing	3	0	3.00
5	CSE 4104	Sessional Based on CSE 4103	0	3/2	0.75
6	CSE 4105	Digital Image Processing	3	0	3.00
7	CSE 4106	Sessional Based on CSE 4105	0	3/2	0.75
8	CSE ****	Optional I	3	0	3.00
9	CSE ****	Sessional Based on Optional I	0	3/2	0.75
10	CSE ****	Optional II	3	0	3.00
Total=			15	9.00	19.00

List of Optional Courses

	Course No.	Course Title	Theory Hrs./Week	Sessional Hrs/Week	Credit
Optional I	CSE 4107	Information System Analysis and Design	3	0	3.00
	CSE 4108	Sessional Based on CSE 4107	0	3/2	0.75
	CSE 4109	Unix Programming	3	0	3.00
	CSE 4110	Sessional Based on CSE 4109	0	3/2	0.75
	CSE 4111	Digital System Design	3	0	3.00
	CSE 4112	Sessional Based on CSE 4111	0	3/2	0.75
	CSE 4113	Simulation and Modeling	3	0	3.00
	CSE 4114	Sessional Based on CSE 4113	0	3/2	0.75
	CSE 4115	Wireless Networks	3	0	3.00
	CSE 4116	Sessional Based on CSE 4115	0	3/2	0.75
Optional II	CSE 4117	Parallel and Distributed Processing	3	0	3.00
	CSE 4119	Human Computer Interaction	3	0	3.00

	CSE 4121	Switching Systems	3	0	3.00
	CSE 4123	Control System Engineering	3	0	3.00

4th YEAR EVEN SEMESTER

Sl. No.	Course No.	Course Title	Theory Hrs./Week	Sessional Hrs/Week	Credit
1	CSE 4000	Project/Thesis II	0	6	3.00
2	CSE 4201	Computer Graphics and Animations	3	0	3.00
3	CSE 4202	Sessional Based on CSE 4201	0	3/2	0.75
4	CSE 4203	Neural Networks and Fuzzy Systems	3	0	3.00
5	CSE 4204	Sessional Based on CSE 4203	0	3/2	0.75
6	CSE 4206	Seminar	0	3/2	0.75
7	CSE ****	Optional I	3	0	3.00
8	CSE ****	Optional II	3	0	3.00
9	CSE ****	Optional III	3	0	3.00
Total=			15	10.50	20.25

List of Optional Courses

	Course No.	Course Title	Theory Hrs./Week	Sessional Hrs/Week	Credit
Optional I/II/III	CSE 4207	VLSI Design	3	0	3.00
	CSE 4209	Impact of Computer on Society	3	0	3.00
	CSE 4211	Network Planning	3	0	3.00
	CSE 4213	Knowledge Engineering	3	0	3.00
	CSE 4215	Network Security	3	0	3.00
	CSE 4217	Decision Support System	3	0	3.00
	CSE 4219	Computer Vision	3	0	3.00
	CSE 4221	Data Mining	3	0	3.00

Prerequisite courses are indicated in the detail syllabus.

DETAIL SYLLABUS

1st YEAR ODD SEMESTER

CSE 1100 **Contact hours/week: 3**
Computer Fundamentals and Ethics **Credits: 1.50**
Prerequisite: None

Computer Fundamentals: Introduction to Computer Basics, Types and Generation of Computers; Basic Organization and Functional Units.

Hardware: Basic Units of Computer Hardware; Processors; Input, Output and Memory Devices; Keyboard; Mouse; OMR; OCR; MICR; CD-ROM; Printers; CRT; LCD; LED; Microfilm; Floppy.

Software: Types of Software; System Software: Familiarization with Various Operating Systems (Windows, DOS, UNIX, Android, IOS Etc.); Application Software: Text Processing (MS-WORD, etc); Spread Sheet (MS-EXCEL etc).

Language: Machine Language; Assembly Language; High Level Language; Assembler; Translator; Interpreter and Compiler.

Database Management: Introduction of Data, Information and Management; Studying Various Tools like Foxpro, MS Access, Oracle etc; Mathematical and Simulation (Math Cad, Matlab etc.); Data Communications and Internet.

Computer Ethics: Computers in the Workplace; Computer Crime; Rules of Communications; Privacy; Intellectual Property; Impact on Employment; Professional Responsibility; Globalization.

CSE 1101 **Contact hours/week: 3**
Computer Programming **Credits: 3.00**
Prerequisite: None

Introduction to Computer Programming: Algorithm, Writing, Debugging and Running Programs using C/C++ Compiler.

C/C++ Basics: Different Data Types and their Range, Operator and Operands and its Precedence, Input/Output, Conditional Operators, Loops Nested Structure, Error Handling, Built-in Functions.

Functions and Arrays: Writing & Calling of User-defined Functions, Recursive Functions, Scope of Variables, Introduction to One-Dimensional Arrays, Multi-Dimensional Arrays and Array Manipulation.

Pointers and Strings: Introduction to Pointers, Pointers and Array, Pointers and Functions, String I/O, String-based Built-in Functions, String Operations, Pointer and String.

Files: Introduction to Files in C/C++, Opening, Closing and Updating Binary and Sequential Files.

Advanced Topics: Operations on Bits, Register Variable, Pre-Processors and Graphics in C/C++.

CSE 1102 **Contact hours/week: 3**
Sessional based on CSE 1101 **Credits: 1.50**
Prerequisite: None

Sessional based on the theory course CSE 1101.

EEE 1151 **Contact hours/week: 3**
Basic Electrical Engineering **Credits: 3.00**
Prerequisite: None

Basics of Electrical Circuit: Electrical Units and Standards. Electrical Circuit Elements and Models. Signal and Waveforms. Fourier Representation of Non-Sinusoidal Waveforms. RMS and Average Value of Sinusoidal Waveforms. Introduction to Phasor Algebra. DC & Steady State AC Circuit Solutions: Series, Parallel, Series-Parallel Networks, Loop and Nodal Methods, Delta-Wye Transformations.

Circuit Theorems: KVL, KCL, Thevenin, Norton, Super-position, Reciprocity and Maximum Power Transfer Theorems, Resonance. Circuit Analysis using Popular Simulation Tools.

EEE 1152 **Contact hours/week: 3/2**
Sessional based on EEE 1151 **Credits: 0.75**
Prerequisite: None

Sessional based on the theory course EEE 1151.

Math 1113 **Contact hours/week: 3**
Differential and Integral Calculus **Credits: 3.00**
Prerequisite: None

Differential Calculus: Limit, Continuity and Differentiability. Differentiation of Explicit and Implicit Function and Parametric Equations. Significance of Derivatives, Differentials, Successive Differentiation of Various Types of Functions. Leibnitz's Theorem. Rolle's Theorem, Mean Value Theorems. Taylor's Theorem in Finite and Infinite Forms. Maclaurin's Theorem in Finite and Infinite Forms. Langrange's Form of Remainders. Cauehy's Form of Remainder. Expansion of Functions by Differentiation and Integration. Partial Differentiation. Euler's Theorem. Tangent and Normal, Maxima and Minima, Points of Inflection and Their Applications. Evaluation of Indeterminate Forms by L'Hospitals Rule, Curvature, Evaluate and Inviolate. Asymptotes. Envelopes, Curve Tracing.

Integral Calculus: Definitions of Integration, Integration by The Method of Substitutions, Integration by The Method of Successive Reduction. Definite Integrals. Beta Function and Gamma Function. Area Under a Plane Curve in Cartesian and Polar Co-Ordinates. Area of the Region Enclosed by Two Curves in Cartesian and Polar Co-Ordinates, Parametric and Pedal Equations. Intrinsic Equation. Volumes of Solids of Revolution. Volume of Hollow Solids of Revolution by Shell Method. Area of Surface of Revolution.

Hum 1113 **Contact hours/week: 3**
Functional English **Credits: 3.00**
Prerequisite: None

Grammar: Construction and Transformation of Sentences, Analysis of Sentence, Structure, Use of Preposition, Question Words, WH & Yes/No Question, Phrases & Idioms, Correction, Conditional Sentences, Punctuation, Pronunciation, Phonetic Transcription, Spoken English.

Composition: Definition of Scientific Terms, Comprehension, Précis Writing, Commercial Correspondence, Paragraph Writing, Amplification, Tenders & Schedules, Memos & Press-Release, Report Writing.

Short Stories:

The Diamond Necklace – Guy De Mapausant
Meeting in the Mosque – E. M. Forster
Tickets, Please – D. H. Lawrence
The Dead – James Joyce

Hum 1114 **Contact hours/week: 3**
English Language Lab **Credits: 1.50**
Prerequisite: None

Developing Reading Skill: Strategies of Reading Skimming, Scanning, Predicting, Inferencing; Practicing Comprehension from Literary and Non Literary Texts.

Developing Writing Skill: Sentence Variety; Generating Sentences, Clarity and Correctness of Sentences, Linking Sentences for Paragraphs, Writing Paragraphs, Essays, Reports Formal and Informal Letters.

Developing Listening Skill: Listening to Recorded Texts and Class Lectures and Learning to Take Notes.

Developing Speaking Skill: Oral Skills Including Communicative Expressions for Personal Identification, Life at Home, Giving Advice and Opinion, Instruction and Directions, Requests, Complains Apologies, Describing People and Places, Narrating Events.

Chem 1113 **Contact hours/week: 3**
Inorganic and Physical Chemistry **Credits: 3.00**
Prerequisite: None

Chemical Bond: Different Types of Chemical Bonds; Properties of Ionic and Covalent Compounds, Modern Approach of Covalent Bond.

Thermo-chemistry: Types of Energy, Enthalpy of Reaction, Heat of Combustion, Heat of Formation and Heat of Neutralization, Experimental Determination of Thermal Changes During Chemical Reaction.

Titration: Acid Base Titration and its Problem During the Process of Titration.

Solution: Types of Solution, Factors Influencing the Solubility of Substance. Mechanism of Dissolution; Solution of Gases in Liquids, Different Units of Concentration, Distribution Law and its Application; Properties of Dilute Solution, Raoult's Law - its Application, Elevation of Boiling Point, Depression of Freezing Point and Osmotic Pressure.

Electro-chemistry: Electrolytes, Mechanism of Electrolytic Conduction, Transport Number and Electrolytic Conductance.

Kinetics and Chemical Equilibrium: Rate of a Reaction, Factors Determining the Rate, Law of Mass Action, Evaluation and Characteristics of Equilibrium Constant of Reaction; the Lechatclier's Principle.

Colloid: Colloids and Properties of Colloidal System and its Application.

Chem 1114 **Contact hours/week: 3/2**
Sessional based on Chem 1114 **Credits: 0.75**
Prerequisite: None

Sessional based on the theory course Chemistry 1114.

1st YEAR EVEN SEMESTER

CSE 1200
Analytical Programming
Prerequisite: CSE 1101

Contact hours/week: 3/2
Credits: 0.75

Student will Solve at least 30 (Thirty) Problems using C, C++ or Java. Among them at Least three Problems should be Submitted from Geometry, Mathematics, String Processing, Tree, Graph and Sorting Techniques.

CSE 1201
Data Structure
Prerequisite: CSE 1101

Contact hours/week: 3
Credits: 3.00

Introduction: Concepts and Examples of Elementary Data Objects, Necessity of Structured Data, Types of Data Structure, Ideas on Linear and Nonlinear Data Structure.

Linear Array: Linear Array & its Representation in Memory, Traversing LA, Insertion & Deletion in LA, Bubble Sort, Linear Search & Binary Search, Multidimensional Array & its Representation in Memory, Algebra of Matrices, Sparse Matrices.

Stack: Stack Representation & Applications; PUSH and POP Operation on Stack. Polish Notation, Reverse Polish Notation; Evaluation of a Postfix Expression; Transforming Infix Expression into Postfix Expression.

Queue: Its Representation, Insertion & Deletion in Queue, Priority Queues, Recursion [Factorial Function, Fibonacci Sequence, Ackermann Function, Towers of Hanoi].

Linked List: Linked List & its Representation in Memory, Traversing, Searching, Insertion & Deletion Operation on Linked List, Circular List, Header Linked Lists, Two Way Lists.

Complexity: Algorithm and Flow Chart, Complexity of Algorithms, Rate of Growth, Big O Notation, Complexity of Linear Search, Binary Search & Bubble Sort Algorithm.

Sorting: Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Searching & Data Modification, Hash Function, Collision Resolution, Chaining.

Tree: Tree Terminology, Representation of Binary Trees in Memory, Traversing Binary Tree, Binary Search Tree, Insertion & Deletion on Binary Search Tree, Insertion & Deletion on Heap, Heap Sort, B Trees, General Tree.

CSE 1202
Sessional based on CSE 1201
Prerequisite: None

Contact hours/week: 3
Credits: 1.50

Sessional based on the theory course CSE 1201

CSE 1203
Object Oriented Programming
Prerequisite: CSE 1101

Contact hours/week: 3
Credits: 3.00

Fundamentals of OOP: Introduction to Object Oriented Programming, Principles of Object Oriented Design, Encapsulation and Information-hiding, Inheritance, Polymorphism, Data Binding, Static and Dynamic Binding.

Classes and Objects: Structure of Class, Access Modifiers, Nested Classes, Abstract Classes, Arrays of Objects, Pointer to Objects, Friend function, Data abstraction.

Constructors and Destructors: Default Constructor, Copy Constructor, Dynamic Constructor, Constructor Function for Derived Class and their Order of Execution, Destructor.

Inheritance: Single Inheritance vs. Multiple Inheritance, Mode of Inheritance, Virtual Inheritance.

Polymorphism: Operator and Function Overloading, Run-Time and Compile Time Polymorphism, Virtual Function, Errors and Exception Handling.

Advanced Topics: Persistent Objects, Objects and Portable Data, UML Basics, Design Patterns, Multithreading.

Reference Programming Language(s): C++ and Java.

CSE 1204
Sessional based on CSE 1203
Prerequisite: None

Contact hours/week: 3
Credits: 1.50

Sessional based on the theory course CSE 1203

Math 1213
Co-ordinate Geometry and Ordinary Differential Equation
Prerequisite: None

Contact hours/week: 3
Credits: 3.00

Co-ordinate Geometry: Co-ordinate Geometry of Two Dimensions: Change of Axes, Transformation of Co-Ordinates, Simplification of Equations of Curves.

Co-ordinate Geometry of Three Dimensions: System of Co-Ordinates, Distance between two Points, Section Formula, Direction Cosines and Projection, Planes and Straight Lines.

Ordinary Differential Equation: Degree and Order of Ordinary Differential Equations. Formation of Differential Equations. Solutions of First Order Differential Equations by Various Methods, Solutions of General Linear Differential Equations of Second and Higher Orders with Constant Coefficients, Solution of Homogeneous Linear Differential Equations. Solution of Higher Order Differential Equations when the Dependent of Independent Variables are Absent. Solution of Differential Equation with Constant Coefficients by Operator Method. Differential Equations with Variable Coefficients.

Hum 1213

Economics, Government and Sociology

Prerequisite: None

Contact hours/week: 3

Credits: 3.00

Economics: Nature of the Economics Theory Applicability of Economic Theory to the Problems of Developing Countries, Some Basic Concepts Supply, Demand and their Elasticity. Economics and Technology. Producer's Equilibrium-Isoquant. Production - Factors of Production, Production Possibility Curve-Equilibrium of a Firm, Fixed Cost and Variable Cost, Laws of Returns, Internal and External Economics and Dis-Economics, Input Output Analysis. Economic Growth and Economic Development and Planning Basic Concept-Saving, Investment, GNP, NNP, Per-Capita Income, Growth Rate, Fiscal Policy, Monetary Policy and Trade Policy and their Relative Applicability in Bangladesh, Planning-Five Year Plans of Bangladesh, Development Problems Related to Agriculture. Industry and Population of Bangladesh.

Government: Basic Concepts of Government and Politics. Functions, Organs and Forms of Modern State and Government, Socialism. Capitalism, UNO, Government and Politics of Bangladesh, Some Major Administrative Systems of Developed Countries. Local Self - Government. Central Government, Public Opinion.

Sociology: Scope, Culture and Civilization Relationship, Social Structure of Bangladesh. Industrial Revolution, Urbanization and Industrialization, Urban Ecology, Cyber Crime and Delinquency, Sociology of Education. Relationship-Sociology and Cyber Crime. Causes and Remedies of Cyber Crime.

Phy 1213

Physics

Prerequisite: None

Contact hours/week: 3

Credits: 3.00

Structure of Matter: Structure of Matter. Different Types of Bonds in Solids: Metallic, Van Der Waals', Covalent and Ionic Bond, Packing in Solids: Inter Atomic Distances and Forces of Equilibrium, X-Ray Diffraction, Bragg's Law. Distinction Insulator, Semiconductor and Conductor.

Atomic Physics: Atom Models: Thomson Atom Model, Rutherford Atom Model, Rutherford Scattering Formula, Electron Orbits, Bohr Atom Model, Energy Levels and Spectra, Particle Properties of Waves: Photoelectric Effect, Einstein's Photoelectric Equation, Laws of Photoelectric Emission, Photovoltaic Cells, Compton Effect. Wave Properties of Particle: De Broglie Waves, Group Velocity, Phase Velocity.

Waves and Oscillations: Oscillations: Simple Harmonic Motion, Composition of Simple Harmonic Motions and Lissajous' Figures, Damped and Forced Oscillations. Resonance. Waves: Travelling and Standing Waves, Energy Calculation of Traveling and Standing Waves, Intensity of Waves. Beats, Doppler Effect.

Theories of Light: Wave Theory: Huygens Wave Theory. Huygen's Principle and Construction, Superposition of Light Waves. Electromagnetic Theory. Particle Theory: Newton's Corpuscular Theory, Quantum Theory of Light.

Interference: Introduction, Conditions of Interference, Young's Double Slit Experiment, Fresnel's Biprism. Thin Film Interference, Interference Due to Multiple Reflection, Newtons Ring.

Diffraction: Fresnel's and Fraunhofer Diffraction, Diffraction by Single and Double Slit, Diffraction Gratings.

Polarization: Introduction, Methods of Producing Polarized Light, Polarization by Reflection and Refraction, Polarization by Double Refraction, Construction of Nicol Prism, Production and Analysis of Polarized Light, Optical Activity, Optics of Crystals, Polarimeters.

Phy 1214

Sessional based on Phy 1213

Prerequisite: None

Sessional based on the theory of course Phy 1213.

Contact hours/week: 3

Credits: 1.50

2nd YEAR ODD SEMESTER

CSE 2100
Software Development Project-I
Prerequisite: None

Contact hours/week: 3/2
Credits: 0.75

Students will Develop one or more Programs / Projects on some Practical Problems with Sound Software Engineering Practices as Assigned by Teacher.

CSE 2101
Discrete Mathematics
Prerequisite: None

Contact hours/week: 3
Credits: 3.00

Set: Operations on Sets, Algebraic Properties of Set, Computer Representation of Set, Cantor's Diagonal Argument and the Power Set Theorem, Schroeder-Bernstein Theorem.

Relation: Property of Relation, Binary Relations, Partial Ordering Relations, Equivalence Relations.

Function: Type of Functions, Growth of Function.

Propositional Logic: Syntax, Semantics, Valid, Satisfiable and Unsatisfiable Formulas, Encoding and Examining the Validity of Some Logical Arguments, Predicate and Quantifier, Universal and Existential Quantification; Modus Ponens and Modus Tollens.

Proof Techniques: The Structure of Formal Proofs, Direct Proofs, Proof by Counter, Proof by Contraposition, Proof by Contradiction, Mathematical Induction, Proof of Necessity and Sufficiency.

Number Theory: Theorem of Arithmetic, Modular Arithmetic, GCD, LCM, Prime Number, Congruence, Application of Congruence, Application of Number Theory, Chinese Remainder Theory.

Introduction to Counting: Basic Counting Techniques - Inclusion and Exclusion, Pigeon-Hole Principle, Permutation, Combination, Sequence and Summations, Introduction to Recurrence Relation and Generating Function.

Introduction to Graphs: Graphs and their Basic Properties - Degree, Path, Cycle, Sub-Graphs, Isomorphism, Euclidian and Hamiltonian Walks, Graph Coloring, Planar Graphs.

CSE 2102
Sessional based on CSE 2101
Prerequisite: None

Contact hours/week: 3
Credits: 1.50

Sessional based on the theory of course CSE 2101.

CSE 2103
Numerical Methods
Prerequisite: None

Contact hours/week: 3
Credits: 3.00

Modeling, Computers and Error Analysis: Mathematical Modeling and Engineering Problem Solving, Programming and Software, Approximations and Round-Off Errors, Truncation Errors and the Taylor Series.

Roots of Equations: Bracketing Methods, Open Methods, Roots of Polynomials,

Linear Algebraic Equations: Gauss Elimination, LU Decomposition and Matrix Inversion, Gauss-Seidel.

Optimization: One-dimensional Unconstrained optimization.

Curve Fitting: Least-square Regression

Interpolation: Interpolation with one and two Independent Variables, Formation of Different Difference Table, Newton's Forward and Backward Difference, Lagrange's Interpolation.

Numerical Differentiation and Integration: Newton-Cotes Integration Formulas, Integration of Equations, Numerical Differentiation.

Ordinary Differential Equations: Runge-Kutta Methods, Boundary-Value and Eigenvalue Problems, Numerical Solution of Partial Differential Equations.

CSE 2104
Sessional based on CSE 2103
Prerequisite: None

Contact hours/week: 3
Credits: 1.50

Sessional based on the theory of course CSE2103.

EEE 2151
Analog Electronics
Prerequisite: None

Contact hours/week: 3
Credits: 3.00

Semiconductor Diodes: Semiconductor, n-and p-Type Semiconductors, p-n Junction as a Diodes and their V-I Characteristics, Zener Diode, Half-and Full Wave Rectifiers, Voltage Regulation using Zener Diodes.

Filters: Properties of Symmetrical Networks, Characteristics Impedance, Filter Fundamentals, Different Types of Filters, High Pass, Low Pass, Band Pass and Band Elimination Filter, Active Filters.

Linear Wave Shaping: Diode Wave Shaping Techniques, Clipping and Clamping Circuits, Comparator Circuits, Switching Circuits; Schmitt Trigger.

555 Timer: Architecture of 555 Timer, Different Application of 555 Timer, 555 as Monostable, Bistable and Astable Multivibrators.

Transistor: Transistor Action, Transistor Biasing, DC Characteristics of CE, CB and CC Configurations.

Transistor Amplifiers and Oscillators: CE, CB and CC Amplifiers, Current, Voltage and Power Gains, Frequency Responses, Principles of Feedback, Positive and Negative Feedback, and Oscillators.

EEE 2152

Sessional based on EEE 2151

Prerequisite: None

Contact hours/week: 3

Credits: 1.50

Sessional based on the theory of course EEE 2111.

Math 2113

Vector Analysis and Linear Algebra

Prerequisite: None

Contact hours/week: 3

Credits: 3.00

Vector Analysis: Vectors, Differentiation and Integration, Line, Surface and Volume Integrals, Gradient of a Function, Divergence and Curl of Vector and their Applications, Physical Significance of Gradient, Divergence and Curl, Vector Identities, Integral Forms of Gradient, Divergence and Curl, Green's Theorem, Stock's Theorem, Gauss's Divergence Theorem.

Matrix: Definition of Matrices, Equality of two Matrices, Addition, Subtraction and Multiplication of Matrices, Equivalence of Matrices, Positive and Negative Matrices, Adjoint of Matrices, Transpose and Inverse of Matrices, Rank and Normal form of Matrices, System of Linear Equations, Solution of Homogeneous and Non-Homogeneous Systems, Determination of Eigen Values and Eigen Vectors, Solutions of Matrix Differential Equations.

Linear Algebra: Vector Space, Subspace, Sum and Direct Sum, Hilbert Space, Normed Linear Space, Branch Space, Basis and Dimension. Linear Transformation: Range, Kernel, Nullity, Singular and Non-Singular Transformation. Linear Operations: Matrix Representation of a Linear Operator. Change of Basis, Similarity and Linear Mapping.

Hum 2113

Industrial Management and Accountancy

Prerequisite: None

Contact hours/week: 3

Credits: 3.00

Industrial Management: Management: Principle of Management, Management Functions, Management Skills, Authority & Responsibility, Span of Control, Management by Objective, Consultative Management, Participative Management, Decision Making, Manpower Motivation. Human Resources Management: Manpower Planning, Recruitment & Selection, Employee Training & Development, Performance Appraisal, Wages & Salary Administration. Production Management: Plant Layout: Definition, Basic Layout Types, Problem Solving, Problem Solving, Linear Programming. EOQ, Lead Time, Safety Stock, Re-Order Point.

Accountancy: Basic Accounting Principles, Objectives of Accounting, Transaction, Double Entry Systems, Accounts and its Classification, Journals Cash Book, Ledger, Trial Balance, Financial Statement. Cost Accounts & Objectives; Costs; Classification, Preparation of Cost Sheet, Cost Volume Profit (CVP) Analysis, Standard Costing, Process Costing.

2nd YEAR EVEN SEMESTER

CSE 2201

Computer Algorithms

Prerequisite: CSE 1201, CSE 2101

Contact hours/week: 3

Credits: 3.00

Asymptotic Notations: Complexity Analysis of Algorithms, Worst Case, Best Case and Average Case.

Sorting Algorithms: Divide and Conquer Approach, Merge Sort and Quick Sort Algorithm, Complexity Analysis, Worst and Average Case Analysis, Heap Construction Algorithm, Heap Sort, Application of Heap: Priority Queue, Decision Tree Model and (Worst Case) Lower Bound on Sorting, Sorting in Linear Time - Radix Sort, Bucket Sort, Counting Sort, etc.

Graph Algorithms: Representation of Graphs, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal and Prim's Algorithm.

Shortest Path: Dijkstra's Algorithm, Bellman-Ford Algorithm. Floyd Warshall Algorithm.

Searching Algorithms: Binary Search Trees, Balanced Binary Search Trees, AVL Trees and Red-Black Trees, B-Trees, Skip Lists, Hashing. Priority Queues, Heaps, Interval Trees.

Dynamic Programming: Longest Common Subsequence (LCS), Matrix Chain Multiplication (MCM), Knapsack Problem, Multistage Graphs.

Greedy Algorithm: Greedy Algorithm, Activity Selection Problem, Huffman Codes and its application, Knapsack problem, Tree Vertex Splitting.

Recurrences & Backtracking: Recurrences, *NP*-Hard and *NP*-Complete Problems, Backtracking, *n*-Queen Problem, Branch and Bounds.

Reducibility between Problems and NP-completeness: Lower Bound Theory, Discussion of Different *NP*-Complete Problems like Satisfiability, Clique, Vertex Cover, Independent Set, Hamiltonian Cycle, TSP, Knapsack, Set Cover, Bin Packing, etc. Computational Geometry, Line Segment Properties, Convex Hull, Graham Scan Algorithm of Convex Hull.

CSE 2202 **Contact hours/week: 3**
Sessional based on CSE 2201 **Credits: 1.50**
Prerequisite: None

Sessional based on the theory of course CSE 2201.

CSE 2203 **Contact hours/week: 3**
Digital Techniques **Credits: 3.00**
Prerequisite: None

Information and Digital Systems: Introduction to Digital Systems, Number Systems, Weighted and Non-Weighted Codes, Error Detection Code, Binary Addition and Subtraction, 2's Complement Methods.

Boolean Algebra and Combinational Logic Circuits: Digital Logic, Boolean Algebra, Boolean Function, Canonical Forms, Karnaugh Maps, Minimization of Boolean Functions, Logic Gates and their Truth Tables, Design Methodologies, Combinational Logic Circuit Design, Arithmetic and Data Handling Logic Circuits. Decoders, Encoders, Multiplexer, Demultiplexer.

Flip Flop and Sequential Logic Circuits: Transistor Latch, NAND Gate Latch, NOR Gate Latch, D Latch. Clock Signals and Clocked Ffs: Clocked SR, JK and D Flip-Flops, Master/Slave JK FF, Timing Diagram of Different Ffs, Edge-Triggered and Level-Triggered Timing Diagrams., Counters, Registers, Memory Devices and their Applications.

Technology Parameters: Fan In, Fan Out, Propagation Delay, Power Dissipation and Noise Immunity.

Others: Diode Logic Gates, Transistor Gates, MOS Gates, Logic Families: TTL and CMOS Logic with Operation Details.

CSE 2204 **Contact hours/week: 3**
Sessional based on CSE 2203 **Credits: 1.50**
Prerequisite: None

Sessional based on the theory of course CSE 2203.

CSE 2205 **Contact hours/week: 3**
Finite Automata Theory **Credits: 3.00**
Prerequisite: None

Finite State Machine: Fundamental of Finite State Machine, State Equivalence and Minimization of Machine, Incompletely Specified Machine and Minimal Machine, Merger Graph and Compatibility Graph, Finite Memory and Definite Memory Machine, Information Lossless Machine and Inverse Machine.

Finite Automata: Introduction to Finite Automata, Structural Representations, Automata and Complexity, an Informal Picture of Finite Automata, Deterministic Finite Automata, Non-Deterministic Finite Automata, an Application (i.e. Text Search or other), Finite Automata with Epsilon-Transitions.

Regular Expressions and Languages: Regular Expressions, Finite Automata and Regular Expression, Application of Regular Expressions, Algebraic Laws for Regular Expressions; Closure Properties of Regular Language, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

Context-Free Grammar and Languages: Context-free Grammars, Parse Trees, Application of Context-Free Grammars, Ambiguity in Grammars and Languages, Normal Form for Context-Free Grammars, The Pumping Lemma for Context-Free Languages, Closure Properties of Context-Free Languages, Decision Properties of CFL's.

Pushdown Automata: Definition of the Pushdown Automata, the Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

Introduction to Turing Machines: The Turing Machine, Programming Techniques for Turing Machines, Extensions to the Basic Turing Machine, Restricted Turing Machines, Turing Machines and Computers.

Undecidability: A language that is not recursively enumerable, an undecidable problem that is RE, undecidable problems about turing machines, post's correspondence problem, other undecidable problems.

CSE 2206 **Contact hours/week: 3/2**
Sessional based on CSE 2205 **Credits: 0.75**
Prerequisite: None

Sessional based on the theory of course CSE 2205.

EEE 2251

Electrical Machines and Instrumentations

Prerequisite: EEE 1151

Contact hours/week: 3

Credits: 3.00

DC Machines: Operation and Performance Characteristics of Generators and Motors. Starting, Speed Control and Braking of Motors. Different Application of DC Motors.

AC Machines: Transformer: Principle of Operation of Transformer. Single Phase Induction Motors and its Methods Of Starting.

Synchronous Machines and Motors: Principles of Operation and Equivalent Circuit. Method of Synchronization. Special Motors: Stepper Motor, Servomotor, Brush Less Motors.

Measuring Instruments: Electromechanical and Electronic Meters and their Uses. Extension of Instrument Range.

Transducers: Different Types of Transducers and their Principle of Operations: Position and Displacement Transducers, Potentiometer, Linear Variable Differential Transformers (LVDT), Pressure Transducer, Temperature Transducer, Optical Transducer, Ultrasonic Transducer; Humidity Transducer, Hall Effect Transducer, and Speed Transducer.

EEE 2252

Sessional based on EEE-2251

Prerequisite: None

Contact hours/week: 3/2

Credits: 0.75

Sessional based on the theory of course EEE 2221.

Math 2213

Complex Variable, Differential Equations and

Harmonic Analysis

Prerequisite: None

Contact hours/week: 3

Credits: 3.00

Complex Variable : Complex Number Systems, General Functions of a Complex Variable, Limits and Continuity of a Function of Complex Variable and Related Theorems, Complex Differentiation and the Cauchy-Riemann Equations, Infinite Series, Convergence, Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Liouville's Theorem, Taylor's and Laurent's Theorems, Singular Points, Residue, Cauchy's Residue Theorem, Contour Integration.

Differential Equations: Series Solution: Singular Points, Series Solutions: Frobenius Method, Bessel's and Legendre's Differential Equations.

Partial Differential Equation: Partial Differential Equations, Solution of First Order Partial Differential Equation by Lagrange and Charpit Methods, Solution of Laplace Equation and Wave Equation.

Harmonic Analysis and Laplace Transform: Fourier Series and Fourier Transformations and its Applications to Solve Boundary Value Problems. Laplace Transforms, Inverse Laplace Transforms, Solution of Differential Equation by Laplace Transforms.

3rd YEAR ODD SEMESTER

CSE 3100

Web Based Application Lab/Project

Prerequisite: None

Contact hours/week: 3/2

Credits: 0.75

Students will Work in Groups or Individually to Develop Web based Applications and Design a Web Site by Adding Client Side and Server Side Scripting and Interfacing the Web Applications to a Database.

CSE 3101

Database Systems

Prerequisite: None

Contact hours/week: 3

Credits: 3.00

Concepts of Database Systems: Files and Databases, Database Management Systems; Transaction Management, Structure of a DBMS, Applications.

Entity-Relationship Concepts: Entity Types, Entity Set, Attribute and Key, Relationships, Relation Types, Entity Relationship, ER Modeling, ER Diagrams, Database Design using ER Diagrams, Enhanced Entity-Relationship (EER) Model.

Normalization: Normal Forms, Normalized Relations and Database Performance; De-Normalization.

Relational Model: Structure of Relational Databases, Relational Algebra, Relational Algebra Operations, Modification of the Database, Introduction to Views, Pitfalls in Relational Database Design.

SQL: Data Definition Language, Data Manipulation Language, Basics of SQL, Query Designing in SQL using Aggregate Functions and Nested Queries, Embedded SQL, Triggers, Procedures; Indexes; Declarative Constraints and Database Triggers.

Concurrency Control: Lock based Protocols, Timestamp based Protocols, Validation based Protocols, Deadlock.

Recovery System: Failure Classification, Storage Structure, Recovery and Atomicity, Log-based Recovery, Recovery with Concurrent Transactions, Advanced Recovery Techniques, RAID Model.

Advanced Database Management Systems: No SQL Systems, Distributed Systems, Object-Oriented System, Temporal, Database Security, Data Warehousing and Data Mining, Database Administration and Tuning.

CSE 3102 **Contact hours/week: 3**
Sessional based on CSE 3101 **Credits: 1.50**
Prerequisite: None

Sessional based on the theory of course CSE 3101.

CSE 3103 **Contact hours/week: 3**
Data Communication **Credits: 3.00**
Prerequisite: None

Fundamental: Representation of Signals in Time and Frequency Domain, Properties of Fourier Transform, Delta Function, Auto-Correlation and Cross-Correlation.

Data Communication and Network Model: Data Communication, Fundamental of Networks, History of the Internet, Protocols and Standards.

Signal and System, Transmission Media, Interfaces: Analog and Digital Data, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data Rate Limits and Performance.

Digital and Analog Transmission: Digital to Digital Conversion, Line Encoding Schemes, Block Coding, Scrambling, Analog to Digital Conversion, Transmission Modes, Digital to Analog Conversion, Bandwidth Utilization, Analog to Digital Conversion.

Multiplexing, Spreading and Switching: Multiplexing, Spread Spectrum, Packet-Switched Data Networks, Circuit Switched Data Networks, Virtual Circuit Networks.

Transmission Medium: Guided Media and Unguided Media.

CSE 3104 **Contact hours/week: 3/2**
Sessional based on CSE 3103 **Credits: 0.75**
Prerequisite: None

Sessional based on the theory of course CSE 3103.

CSE 3105 **Contact Hours/week: 3**
Software Engineering **Credits:3.00**
Prerequisite: None

Introduction: Introduction to Software and its Nature, Software Engineering Methods, Professional and Ethical Responsibility of a Software Engineer.

Software Process Model: Different Types of Software Process Model and their Implementations, Costs of Software Engineering.

Software Requirement Analysis: Software Requirements Analysis and their Applications, Software Prototyping, Basic Concepts of Different Formal Software Specification.

Design of Software: Software Design and its Different Techniques, Software Configuration Managements. System Structuring, Control Models, Modular Decomposition, Domain-Specific Architecture.

Software Testing: Software Validation and Verification: Verification and Validation Planning, Software's Testing Strategies and Different Type of Testing Techniques, Art of Debugging.

Software Quality Assurance: Management and its Quality Assurance, Software Cognitive Fundamentals, Concepts of Software Reengineering and Web Engineering.

Advance Topics: Software Reliability Metrics, Software Reliability Specification, Statistical Testing and Reliability Growth Modeling, Use of CASE Tools and Technological Support in Engineering Software, Introduction to Unified Modeling Language-UML.

CSE 3107 **Contact Hours/week: 3**
Applied Statistics and Queuing Theory **Credits:3.00**
Prerequisite: None

Introduction: Statistics and its Importance, Population and Sample, Variable and Constants, Statistical Data, Data Collection and Presentation, Construction of Frequency Distribution and Graphical Presentation.

Measures of Central Tendency: Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode, Weighted Mean.

Measures of Dispersion: Range, Standard Deviation, Variance, Moments, Skewness and Kurtosis.

Correlation Theory: Linear Correlation and its Measures and Significance, Rank Correlation.

Regression Analysis: Linear and Non-Linear Regression, Least-Square Method of Curve Fittings.

Probability: Elementary Concepts, Laws of Probability – Additive and Multiplicative Law, Conditional Probability and Bay's Theorem, Random Variables, Mathematical Expectation.

Probability Distributions: Binomial Distribution, Poisson Distribution and Normal Distribution.

Queuing Theory: Stochastic Processes, Discrete Time Markov Chain and Continuous Time Markov Chain. Birth-Death Process in Queuing. Queuing Models: M/M/1, M/M/C, M/G/1, M/D/1, G/M/1 Solution of Network of Queue-Closed Queuing Models and Approximate Models. Application of Queuing Models in Computer Science.

CSE 3109
Microprocessors and Assembly Language
Prerequisite: CSE 2103

Contact Hours/week: 3
Credits: 3.00

Microcomputer System: Introduction to Different Types of Microprocessors and its Applications, Organization of Intel 8086/8088 Microprocessor, the Component of Microcomputer System, I/O Device, Interrupt Structures, I/O Interfacing, DMA, Co-Processors, RISC Processors, Power PC Processor, CISC Processor, Direct Video RAM Accessing, Memory Module.

Introduction of Assembly Language: Program Structure and its Components, Few Basic Instruction, Input/Output Instruction.

Flag Register and Flow Control: The Flag Register, Flow Control Instructions, Conditional and Unconditional Jumps, Branching and Looping Structures.

Logic and Arithmetic Operation: Logic, Shift and Rotate Instruction, Multiplication and Division Instructions.

Arrays and Data Structure: Arrays and Related Addressing Modes, DUP Operator, Register Indirect Modes, Based and Indexed Addressing Modes, Basic Stack Operations, Procedures Declaration, Communication between Procedures, Calling a Procedure.

String Manipulation: The String Instructions, Director Flag, Moving a String, Storing a String, Loading a String, Scanning a String, Comparing Strings, Substring Operation.

CSE 3110
Sessional based on CSE 3109

Contact Hours/week: 3
Credits: 1.50

Prerequisite: None

Sessional based on the theory of course CSE 3109.

CSE 3112
Technical Writing and Presentation
Prerequisite: None

Contact Hours/week: 3/2
Credits: 0.75

Introduction: Issues of Technical Writing and Effective Oral Presentation in Computer Science and Engineering.

Writing Issues: Writing Styles of Definitions, Propositions, Theorems and Proofs; Preparation of Reports, Research Papers.

Thesis and Books: Abstract, Preface, Contents, Bibliography and Index; Writing of Book Reviews and Referee Reports.

Writing and Presentation Tools: LATEX; Diagram Drawing Software; Presentation Tools.

3rd YEAR EVEN SEMESTER

CSE 3200
Software Development Project II
Prerequisite: None

Contact Hours/week: 3/2
Credits: 0.75

Students will Work in Groups or Individually to Develop High Quality Software/Projects Including New I/O Drivers or Similar Projects Involving Operating Systems Modules in Different Types of Data Base Systems or Project Oriented and Visual Languages, Students will Writes Structure Program and use Proper Documentation.

CSE 3201
Operating Systems
Prerequisite: None

Contact Hours/week: 3
Credits: 3.00

Introduction to Operating System: Operating System Concepts, its Role in Computer Systems, Computer System Structure, Fundamental of Different Types of Computer System, Operating System Structure and Operation, Protection and Security.

Process Management: Process Concept, Model and Implementation, Process State, Process Scheduling, Inter-Process Communication (IPC), Multiprocessing and Timesharing, Interaction between Process and Operating System; CPU Scheduling: Scheduling Concepts, Scheduling Criteria, Scheduling Algorithms (SJF, FIFO, Round Robin, etc.).

Memory Management: Memory Portioning, with and without Swapping, Virtual Memory – Paging and Segmentation, Demand Paging, Page Replacement Algorithms, Implementation.

File Systems: FS Services, Disk Space Management, Directory and Data Structures;

Deadlocks and Case Study: Modeling, Detection and Recovery, Prevention and Avoidance; Case Study of Some Operating Systems.

Others: Introduction to the Different Smart Device Operating System and their Usage.

CSE 3202 **Contact Hours/week: 3/2**
Sessional based on CSE 3201 **Credits: 0.75**
Prerequisite: None

Sessional based on the theory of course CSE 3201.

CSE 3203 **Contact Hours/week: 3**
Computer Architecture and Design **Credits: 3.00**
Prerequisite: CSE3109

Introduction to Computer Architecture: Internal Structure of Processor/CPU–Registers, PC, ALU, CU, etc. Bus Architecture and Processor Interaction with Memory and Peripherals, Memory Hierarchy in Terms of Cache Memory, Main Memory, Secondary Storage, Memory Organization into Bytes and Words; Big-Endian and Little-Endian Organization, Computer Peripherals, Introduction to Von Neumann SISD Organization, RISC and CISC Machines.

Review: Representation of Strings, Binary and Hex Integer Representations and Conversions, Signed and Unsigned Formats; 2's Complement, Computer Integer Arithmetic, Fixed-Point Arithmetic, IEEE Floating Point Representation and Arithmetic.

Process and Control: Fetch-Execute Cycle, Encoding and Decoding of MIPS Machine Instructions, the MIPS CPU Instruction Set Syntax and Semantics, Addressing Modes, MIPS Assembly Language Programming, Register Usage Conventions, use of Stack and Stack-Frame for Supporting Function Calling with Parameters, Operating System Calls and I/O Operations. CPU and its Instruction Sets Design.

Application HDL and FPGA for Microcomputer Design: Introduction to FPGA and HDL/VHDL for Digital Design Implementation.

CSE 3203 **Contact Hours/week: 3**

Computer Networks **Credits: 3.00**
Prerequisite: None

Introduction: Definition, uses of Computer Networks, Network Topology, Network Media, Network Devices, Different Types of Network: LAN, MAN, WAN etc.

IP Addressing: Classification of IP Addressing, Subnet Mask, CIDR, Private IP Address, Public IP Address, Sub Netting, VLSM etc.

Network Model: OSI Reference Model, TCP/IT Reference Model, ATM Reference Model, Functions of the Layers of Different Models, Network Protocols Working at Different Layers.

Data Link Layer Design Issues and Framing: Character Count, Byte Stuffing, Bit Stuffing, Error Detection: Cyclic Redundancy Check, Parity Bit Checking and Correction: Hamming Code, Windowing Protocols: Go Back N ARQ, Selective Repeat ARQ, Elementary Data Link Protocols, High-Level Data Link Control, Point to Point Protocol, the Medium Access Control Sub-Layer.

Multiple Access: Random Access; ALOHA, CSMA, CSMA/CD, CSMA/CA, Channelized Access, CDMA, TDMA, FDMA, Controlled Access, Reservation, Poling, Token Passing, Ethernet, Wireless Lans and Bluetooth.

Switching: Circuit Switching, Packet Switching, Message Switching, Routing Algorithms, Virtual Circuit and Datagram, Congestion Control Algorithms, Quality of Service, Internetworking, Internetworking Devices etc.

Network Layer Protocols: Address Resolution Protocol, Internet Protocol, Internet Control, Message Protocol, IPV6, Routing Information Protocol, Open Shortest Path First, Border Gateway Protocol, User Datagram Protocol, Transmission Control Protocol.

Network Security: Cryptography, Substitution Cipher, Transposition Cipher, One Time Pads, Public Key Cryptography, Encryption and Decryption, Authentication Protocol 1.0 to 5.0, Digital Signature, Key Distribution Center, Different Symmetric Key Algorithm, Certificate Authority, DNS, Electronic Mail, World Wide Web.

Others: HTTP and Recent Advances in Internet Protocols, Web Server Performance, Proxy Servers, Load Balancing in Web Servers, IP Security, Queuing Models for Networks and Protocols, Real Time Protocols such as RTP, RTCP and RTSP, Voice over IP, Cloud Computing.

CSE 3206 **Contact Hours/week: 3**
Sessional based on CSE 3205 **Credits: 1.50**
Prerequisite: None

Sessional based on the theory of course CSE 3205.

CSE 3207
Peripherals and Interfacings
Prerequisite: CSE 3109

Contact Hours/week: 3
Credits: 3.00

Microprocessor Based System Design: Hardware and Software Interfacing in Microcomputer System Design, Hardware and I/O Design, Building, Debugging, Testing and Linking Program Modules, Programming EPROM.

Interfacing Components: 8284A Programmable Timer, Bus Architecture, Bus Timing, 8286 Transceiver Device, 8282 Latches, 8288 Bus Controller, Characteristics of Memory and I/O Interface, Synchronous and Asynchronous Communication, Serial I/O Interface, 8251A Communication Interface, 8255A Programmable Peripheral Interface.

Interrupt System: Sources of Interrupt, Types of Interrupt, Handling Interrupt Request, Interrupt Vector and Table, 8259A Priority Interrupt Controller, Daisy Chain.

I/O Controller and Peripheral Components: Interfacing ICs of I/O Devices, I/O Ports, Programmable Peripheral Interface, DMA Controller I.E. 8237A DMA Controller, Interrupt Controller, Communication Interface, Interval Timer, etc.

Memory Device: Memory Terminology, CPU-Memory Connections, ROM Architectures and Time Diagram, Different Type of ROM, Flash Memory, RAM Architectures and Time Diagram, Different Type of RAM and Read/Write Cycle, Programmable Logic Device Architectures.

Multi-processor Configurations: Co-Processor Configurations, Numeric Data Processor, I/O Processors.

Analog and Digital Interface: Sensors, Transducers, D/A Interface, A/D Interface, AD and DA Converters Related Chips, High Power Devices.

CSE 3208
Sessional based on CSE 3207
Prerequisite: None

Contact Hours/week: 3/2
Credits: 0.75

Sessional based on the theory of course CSE 3207.

CSE 3209
Artificial Intelligence
Prerequisite: None

Contact Hours/week: 3
Credits: 3.00

Fundamental: Definition of AI, Historical Development of AI, Application of AI.

Production Systems: Introduction of Product System, Production Rules, the Working Memory, the Control Unit Interpretation, Conflict Resolution Strategies, Alternative Approach for Conflict Resolution, Types of Production Systems, Forward Versus Backward Production Systems, Knowledge Base Optimization in a Production System.

General Problem Solving Approaches: Breadth First Search, Depth First Search, Iterative Deepening Search, Hill Climbing, Simulated Annealing, Heuristic Search, A* Algorithm, Adversary Search, the Minimax Algorithm, Constraint Satisfaction Problems.

Logic and Structural Knowledge Representation: Propositional Logic, First-Order Logic, Resolution Principle, Frames, Semantic-Nets, Petri Nets, Relational Data Model.

Reasoning under Uncertainty: Bayesian Reasoning, Fuzzy Knowledge, Probability Theory, Dempster-Shafer Theory, Fuzzy Set Theory, Expert Systems.

Machine Learning and Natural Language Processing: Naive Bayes Algorithm, Syntactic Semantics and Pragmatic, Top-Down Parsing, Bottom-Up Parsing, Lexicon.

Programming Languages for AI Research: Historical Overview, Features of AI Programming Languages, Major AI Programming Languages LISP, PROLOG, Implementation of AI Algorithms Through PROLOG.

CSE 3210
Sessional based on CSE 3209
Prerequisite: None

Contact Hours/week: 3/2
Credits: 0.75

Sessional based on the theory of course CSE 3209.

4th YEAR ODD SEMESTER

CSE 4000
Project / Thesis I
Prerequisite: None

Contact Hours/week: 2
Credits: 1.00

Study of Problems in the Field of Computer Science and Engineering.
N.B. The Project/Thesis Topic Selected in this Course is to be continued in the CSE 4000 Course.

CSE 4101
Compiler Design
Prerequisite: CSE 2205

Contact Hours/week: 3
Credits: 3.00

Introduction to Compiler: Compiler Structure, Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool based Approach to Compiler Construction, Compiler-Compilers and Translator Writing Systems.

Lexical Analysis: Interface with Input, Parser and Symbol Table, Token, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting, Implementation, Regular Definition, Transition Diagrams, Lex.

Syntax Analysis: CFGs, Ambiguity, Associativity, Precedence, Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing, Bottom Up Parsing, Operator Precedence Grammars, LR Parsers (SLR, LALR, LR), YACC.

Syntax Directed Definitions: Inherited and Synthesized Attributes, Dependency Graph, Evaluation Order, Bottom Up and Top Down Evaluation of Attributes, L- and S-Attributed Definitions.

Type Checking: Type System, Type Expressions, Structural and Name Equivalence of Types, Type Conversion, Overloaded Functions and Operators, Polymorphic Functions.

Run Time System: Storage Organization, Activation Tree, Activation Record, Parameter Passing, Symbol Table, Dynamic Storage Allocation, and Heap Storage Management.

Intermediate Code Generation: Intermediate Representations, Translation of Declarations, Assignments, Control Flow, Boolean Expressions and Procedure Calls, Implementation Issues.

Code Generation and Instruction Selection: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, Dag Representation of Programs, Code Generation from Dags, Peep Hole Optimization, Code Generator Generators, Specifications of Machine.

CSE 4102
Sessional based on CSE 4101
Prerequisite: None

Contact Hours/week: 3/2
Credits: 0.75

Sessional based on the theory of course CSE 4101.

CSE 4103
Digital Signal Processing
Prerequisite: None

Contact hours/week: 3
Credits: 3.00

Introduction: Signals, Systems and Signal Processing, Classification of Signals, the Concept of Frequency in Continuous Time and Discrete Time Signals, Analog to Digital and Digital to Analog Conversion, Sampling and Quantization.

Discrete Time Signals and Systems: Discrete Time Signals, Discrete Time Systems, Analysis of Discrete Time Linear Time Invariant Systems. Discrete Time Systems Described by Difference Equations, Implementation of Discrete Time Systems, Correlation and Convolution of Discrete Time Signals.

The Z-Transform: Introduction, Definition of the Z-Transform, Z-Transform and ROC of Infinite Duration Sequence, Properties of Z-Transform Inversion of the Z-Transform, the One-Sided Z-Transform.

Frequency Analysis of Signals and Systems: Frequency Analysis of Continuous Time Signals, Frequency Analysis of Discrete Time Signals, Properties of Fourier Transform of Discrete Time Signals, Frequency Domain Characteristics of Linear Time Invariant System, Linear Time Invariant Systems as Frequency Selective Filters, Inverse Systems and De-convolution.

Discrete Fourier Transform (DFT): Discrete Fourier Series (DFS), Properties of DFS, Discrete Fourier Transformation (DFT), Properties and Application of DFT.

Fast Fourier Transform Algorithms: FFT Algorithms, Applications of FFT Algorithm.

Digital Filter Design Techniques: Differential and Difference Equations, Digital Transfer Functions, Frequency Response, Digital Filter Realization Scheme, Finite Impulse Response (FIR) Infinite Impulse Response (IIR) Filter Design.

Application of DSP: Speech Processing, Analysis and Coding, Matlab Application to DSP.

CSE 4104
Sessional based on CSE 4103
Prerequisite: None

Contact hours/week: 3/2
Credits: 0.75

Sessional based on the theory of course CSE 4103.

CSE 4105
Digital Image Processing
Prerequisite: None

Contact hours/week: 3
Credits: 3.00

Digital Image Fundamentals: Different Types of Digital Images, Sampling and Quantization, Imaging Geometry, Image Acquisition Systems.

Bi-level Image Processing: Basic Concepts of Digital Distances, Distance Transform, Medial Axis Transform, Component Labeling, Thinning, Morphological Processing, Extension to Grey Scale Morphology.

Binarization of Grey Level Images: Histogram of Grey Level Images, Optimal Thresholding using Bayesian Classification, Multilevel Thresholding.

Detection of Edges : First Order and Second Order Edge Operators, Multi-Scale Edge Detection, Canny's Edge Detection Algorithm, Hough Transform for Detecting Lines and Curves, Edge Linking.

Images Enhancement: Point Processing, Spatial Filtering, Frequency Domain Filtering, Multi-Spectral Image Enhancement, Image Restoration.

Image Segmentation: Segmentation of Grey Level Images, Water Shade Algorithm for Segmenting Grey Level Image. Image Representation and Description, Recognition and Interpretation.

Image Compression: Lossy and Lossless Compression Schemes, Prediction based Compression Schemes, Vector Quantization, Sub-Band Encoding Schemes, JPEG Compression Standard, Fractal Compression Scheme, Wavelet Compression Scheme.

CSE 4106 **Contact Hours/week: 3/2**
Sessional based on CSE 4105 **Credits: 0.75**
Prerequisite: None
Sessional based on the theory of course CSE 4105.

Optional I

CSE 4107 **Contact hours/week: 3**
Information System Analysis and Design **Credits: 3.00**
Prerequisite: CSE 3105

Application Development Policy and Strategies: Planning of Information System, Policy in Information System Development, Strategies for Achieving Information System Goals.

Application System Development Life Cycle: Phases in Application System Development, Interrelationship among Each Phase.

Feasibility Assessment: Problems and Needs in Information System Development, Preliminary Application Requirements Determination, Feasibility Assessment: Economic, Technical, Operational and Schedule Feasibility.

Information Requirements Determination: Strategies for Obtaining Information Requirements, Technique for Information Requirements Determination, Methods for Providing Assurance that Requirement are Correct and Complete.

Structured Systems Analysis: Steps in Structured Systems Analysis, Activity Diagrams and Related Documentation, Data Dictionary, Problem Analysis, Structured Walk Through.

Systems Design Methodology: Check List Methodology, Process-Oriented Methodology, Application Generator, Structured Design, Program Development and Testing: Structured Programming and Method for Testing.

CSE 4108 **Contact Hours/week: 3/2**
Sessional based on CSE 4107 **Credits: 0.75**
Prerequisite: None

Sessional based on the theory of course CSE 4107.

CSE 4109 **Contact hours/week: 3**
Unix Programming **Credits: 3.00**
Prerequisite: None

Introduction: Introduction to Unix Programming.

Unix Environment: Command Line, Globbing, I/O Redirection, Piping, Basic Commands, Memory Layout.

Debugging: GDB, Valgrind, Essential X86, Fork, Exec, Wait, Process Status, Bit Manipulation, Sending Signals Unix I/O Implementing I/O Redirection, Piping Directories and Files. Walking a Directory Tree, Exploring Attributes. Implementing Ls-L. Permissions, File Owner / Group, Time-Stamps. Signals and Signal Handling Design / Implementation of Sleep Process Relationships Backgrounding. Popen / Pclose Midterm Terminal Handling Review Midterm Networking Client / Server. I/O Multiplexing.

Multi-threading: Basics, Mutual Exclusion Multi-Threading: Bounded Buffers, Condition Variables Multi-Threading: Deadlocks Non-Blocking I/O. Regular Expressions. Sys V IPC. Semaphores and Shared Memory. Shell Scripting.

CSE 4110 **Contact hours/week: 3/2**
Sessional based on CSE 4109 **Credits: 0.75**
Prerequisite: None

Sessional based on the theory of course CSE 4109.

CSE 4111 **Contact hours/week: 3**
Digital System Design **Credits: 3.00**
Prerequisite: CSE 2203

System Design: Designing I/O System; I/O Devices; Designing Microprocessor based System with Interfacing Chips.

Programmable Design: Programmable Peripheral Interface (Interface to A/D and D/A Converter); Keyboard/Display Interface; Programmable Timer; Programmable Interrupt Controller, DMA Controller.

Memory Design: 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 4112
Sessional based on CSE 4101
Prerequisite: None

Contact hours/week: 3/2
Credits: 0.75

Sessional based on the theory of course CSE 4111.

CSE 4113
Simulation and Modeling
Prerequisite: None

Contact hours/week: 3
Credits: 3.00

Simulation Modeling Basics: Systems, Models and Simulation; Classification of Simulation Models; Steps in a Simulation Study.

Concepts in Discrete-Event Simulation: Event-Scheduling vs. Process-Interaction Approaches, Time-Advance Mechanism, Organization of a Discrete-Event Simulation Model; Continuous Simulation Models; Combined Discrete-continuous models; Monte Carlo Simulation; Simulation of Queuing Systems.

Building Valid and Credible Simulation Models: Validation Principles and Techniques, Statistical Procedures for Comparing Real-World Observations and Simulated Outputs, Input Modeling; Generating Random Numbers and Random Variates; Output Analysis. Simulation Languages; Analysis and Modeling of Some Practical Systems.

CSE 4114
Sessional based on CSE 4113
Prerequisite: None

Contact hours/week: 3/2
Credits: 0.75

Sessional based on the theory of course CSE 4113.

CSE 4115

Contact hours/week: 3

Wireless Networks
Prerequisite: CSE 3205

Credits: 3.00

Introduction to Wireless Networks: Wireless Access Networks, Wireless Mesh Networks, Personal Area Networks (Wireless Sensor Networks, Body Area Networks, Lowpan, and Bluetooth), Wireless and Mobile Ad Hoc Networks, Challenged Networks (Dtns, Vanets).

Wireless MAC Protocols: IEEE 802.11, IEEE 802.11e, IEEE 802.11n, IEEE 802.11s, IEEE 802.15.4, S-MAC, B-MAC, IEEE 802.22/20, IEEE 802.16d/e.

Wireless Routing: Routing Matrix – ETX, ETT, WCETT, Air Time Metric, Routing Protocols – AODV, DSR, DSDV, HWMP, Sensor Network Routing, VANET Routing etc.

Others: Wireless Transport Protocols; Wireless TCP and its Variants, Hop by Hop Congestion Control, Rate based Congestion Control etc. Quality of Service in Wireless Networks.

CSE 4116
Sessional based on CSE 4116
Prerequisite: None

Contact hours/week: 3/2
Credits: 0.75

Sessional based on the theory of course CSE 4115.

Optional II

CSE 4117
Parallel and Distributed Processing
Prerequisite: None

Contact Hours/week: 3
Credits: 3.00

Multithreaded Computing: Basic Concepts: Processes, Threads, Scheduling, Multithreaded Programming, Thread Synchronization: Semaphores, Locks, Monitors, Concurrency Issues: Deadlock, Starvation, Multi-Core Computers.

Networked Computers: Basic Concepts: Client-Server, Connections, Datagrams, Application Protocol Design, Client-Side Socket Programming, Server-Side Socket Programming, Datagram Programming.

Network Protocols and Security: Physical/Data Link/Network/Transport/Application Layers, Network Security.

Distributed Systems: Architectures: Two-Tier, Multi-Tier, Peer-To-Peer, Many-To-Many, Middleware: Distributed Objects, Web Services.

Parallel Computing: Architectures: SMP, Cluster, Hybrid, Grid, GPGPU ,Middleware: Openmp, MPI, Grid Middleware.

CSE 4119 **Contact Hours/week: 3**
Human Computer Interaction **Credits:3.00**
Prerequisite: None

Process and Model: Introduction to Human-Computer Interaction (HCI), Human Information Processing Systems, Models of Interaction, Approaches to HCI, User Interface, HCI in Software Process, Cognitive Models.

Issues and Requirements: Socio-organizational Issues and Stakeholders Requirements, Communication and Collaboration Models, Task Analysis, Dialog Notation and Design, Groupware, CSCW and Social Issues.

User System Interaction: Analysis and Design, User Interface Design, Interface Technique and Technology, Case Studies.

CSE 4121 **Contact Hours/week: 3**
Switching Systems **Credits:3.00**
Prerequisite: None

Evolution of Switching Systems: The Role of Switching Systems in Telecommunication Networks, Step by Step and Crossbar, Stored Program Control (SPC), Digital Switching, ATM Switching.

Switching System Architecture: Subscriber and Line Interface, Switching Network: Matrix and Channel Graph Representations, Blocking, Non-Blocking, and Rearrangeable Networks, Control Unit, Operation and Maintenance, Switching Process: Call Detecting, Number Analysis, Call Routing, Supervision, and Metering, Signaling Equipment.

Hardware and Software Structure of the Digital Switch: Time Switches and Space Switches, Path Searching, Processor Systems Architecture and Functions, Reliability and Fault Recovery, Man Machine Interface (MMI), Examples of the Present Digital Switching Systems.

ATM Switching Architectures and Performance: ATM Switch Architectures, Full-, and Partial-Connection Multistage Networks, Self-Routing Networks, ATM Switching.

Structures: Minimum-Depth Blocking Networks, Non-Blocking Single-, and Multiple-Queuing Networks, Arbitrary-Depth Blocking Networks, Fault-Tolerant ATM Switching Architectures.

New Trends in Switching: Photonic Switching, IP Switching.

CSE 4123 **Contact Hours/week: 3**
Control System Engineering **Credits:3.00**
Prerequisite: None

Introduction to Control System: Conventional Control System, Steady State Response to Step, Ramp, and Parabolic Inputs, Transient Response, Poles and Zeros, Frequency Response from Pole-Zero Diagram, Routh's Stability Criterion; Block Diagrams, Canonical Forms, Transfer Functions and Signal Flow Graph, Root Locus, Frequency Response, Nyquist's Stability Criterion.

Modern Control System: Introduction, State Variable Analysis, Controllability and Observability, Application of Eigen Value, Linear Control System Design by State Feedback.

Controller Design: On-Off, Fuzzy, P, PI, PD and PID Types, Introduction to Programmable Logic Controllers (PLC), Temperature Control System, Position Control System.

4th YEAR EVEN SEMESTER

CSE 4000 **Contact Hours/week: 6**
Project / Thesis II **Credits:3.00**
Prerequisite: None

Continuation of Project/Thesis Topic Under Taken in CSE 4000.

CSE 4201 **Contact Hours/week: 3**
Computer Graphics and Animations **Credits:3.00**
Prerequisite: None

Introduction: History, Application of Computer Graphics (Computer Aided Design Animation), a Survey of Graphics I/O Devices and Types.

Graphics Software Design: Survey of Desired Function, Toward a Universal Graphic Language. Display Files, Databases for Pictorial Applications.

Graphics Techniques: Point-Plotting Techniques, Line Drawing, Geometric Transformations, Windowing and Clipping, Raster Graphics.

Hardware for Computer Graphics: Typical Small and Large System, Graphic Terminals, Plotters, Graphic Display Processors, Device Independent Graphics Systems.

Graphics Software: A Simple Graphic Package, Segmented Display Files, Geometric Models, Picture Structure.

Interactive Graphics: Input Techniques, Event Handling, Three-Dimensional Graphics, Curves and Surfaces, 3-D Transformation.

Hidden Surface Problem: Back Face Removal, Hidden-Line Removal Curved Surfaces, Describing Points, Lines and Polygons, Some Hints for Building Polygonal Models, Color Perception, RGBA and Color Index Mode, Dithering, Blending, 3-D Blending with the Depth Buffer, Antialiasing, Fog, Fog Equations, the OpenGL ARB.

API Specifics: Data Types, Function Naming Conventions, Platform Independence, Drawing Shapes with OpenGL, Animation with OpenGL and GLUT.

Drawing in Space: Lines, Points and Polygons.

Co-ordinate Transformations: Understanding Transformations, Matrix Munching Projections, Matrix Manipulation Color Lighting and Materials, Texture Mapping.

CSE 4202 **Contact hours/week: 3/2**
Sessional based on CSE 4201 **Credits: 0.75**
Prerequisite: None

Sessional based on the theory of course CSE 4201.

CSE 4203 **Contact Hours/week: 3**
Neural Networks and Fuzzy Systems **Credits:3.00**
Prerequisite: None

Introductory Concept: Introduction Human Brain Mechanism, Neural Machine Intelligence.

Fundamental Concept of Neural Network: Basic Models of Artificial Neuron, Activation Function, Network Architecture, Neural Network Viewed as Directed Graph, Basic Learning Rules, Overview of Perceptrons, Single Layer of Perceptrons, Mathematical Model of Single Layer Perceptrons, Perceptrons Learning Algorithm, Delta Learning Rule, Multi-Layer Perceptrons, Back Propagation Learning Algorithm, Mathematical Model of MLP Network.

Function Approximation: Basis Function Network, Radial Basis Function Networks (RBF), MLP vs. RBF Networks, Support Vector Machine (SVM).

Competitive Network and Associative Memory Network: Adaptive Resonance Theory (ART), ART-1 Architecture and Algorithm, Kohonen Self-Organizing Maps (SOMs), Linear Feed-Forward Associative Memory Network, Recurrent Associative Memory Network, Bidirectional Associative Memory Network (BAM), Hopfield Networks.

Fuzzy System: Introduction to Fuzzy System, Fuzzy Relations, Fuzzy Numbers, Linguistic Description and their Analytical Form, Fuzzy Control.

Defuzzification: Defuzzification Methods, Centroid Method, Center of Sum Method, Mean of Maxima Defuzzification, Applications, Equilibrium of Learning System, Concept of Neuro-Fuzzy and Neuro-GA Network.

Genetic Algorithm: Basic Concepts, Offspring, Encoding, Reproduction, Crossover, Mutation Operator, Application of GA.

CSE 4204 **Contact hours/week: 3/2**
Sessional based on CSE 4203 **Credits: 0.75**
Prerequisite: None

Sessional based on the theory of course CSE 4203.

CSE 4206 **Contact hours/week: 3/2**
Seminar **Credits: 0.75**
Prerequisite: None

Students will Works in Groups or Individually to Prepare Review Papers on Topics Assigned by the Teachers and will Present before Audience.

CSE 4207 **Optional I** **Contact Hours/week: 3**
VLSI Design **Credits:3.00**
Prerequisite: None

VLSI Design Methodology: Top-Down Design Approach, Technology Trends.

MOS Technology: Introduction to Microelectronics and MOS Technology, Basic Electrical Properties and Circuit Design Processes of MOS and Bi CMOS Circuits., MOS, NMOS, CMOS Inverters, Pass Transistor and Pass Gates, DC and Transient Characteristics.

Overview of Fabrication Process: NMOS, PMOS, CMOS, Bi-CMOS Process.

NMOS and CMOS Layout: Color Plate Stick Diagram, and Design Rules.

CMOS Circuit Characteristics: Resistance and Capacitance, Rise and Fall Time, Power Estimation.

Introduction to Bi-CMOS Circuits: Shifter, an ALU Sub-System, Adder, Counter, Multipliers, Multiplexer, Data Path And Memory Structures, Buffer Circuit Design, DCVS Logic.

Design and Test-Ability: Circuit Partitioning, Floor Planning and Placement, Routing, Practical Aspects of Design Tools and Test-Ability MOS Design, Behavioral Description, Structural Description, Physical Description and Design Verification.

CSE 4209

Impact of Computer on Society

Prerequisite: None

Contact Hours/week: 3

Credits:3.00

Introduction: History of Computer Hardware, Software, Networking; Overview of Technological Change; Impact of Information Technology on Some Sectors.

Privacy and Personal Information: Personal Privacy, Computer Technology Effect Privacy, Moral Problems from Privacy Violation, Privacy Protection: Ethical and Legal Basis, Technological Strategies, Implications of Database Systems.

Freedom of Expression in Cyberspace: Offensive Speech and Censorship in Cyberspace, Pornography, Anonymity, Spam.

Computer & Software Reliability: Liability in Hardware and Software Failure, Responsibility s. Liability vs. Accountability, Historical Software Risks (such as the Therac-25 Case).

Intellectual Property: Intellectual Property, Copyrights, Patents, and Trade Secrets, Software Piracy, Software Patents, Pirated Software, Use of Licensed Software.

Computer Crime: History and Examples of Computer Crime; "Cracking" ("Hacking") and its Effects; Viruses, Worms, and Trojan Horses; Online Scams, Identity Theft; Moral Issues Related to These Crimes.

Computer and Work: Impact of Employment, Work Environment, Employee Monitoring, Health Issues.

Professional Ethics and Responsibilities: Ethics, Computer Ethics, Ethical Guidelines for Computer Professionals, Examine and Discuss Professional Codes of Ethics, Conduct, and Practice (IEEE, ACM, SE, AITP, and so forth).

Optional II

CSE 4211

Network Planning

Prerequisite: None

Contact Hours/week: 3

Credits:3.00

Introduction: Network components, Theoretical Network, Real World Networks.

Network Architectural Design: Designing the LAN, Configuring the Network Server and Client, Network Administration, Remote Access, Expanding the Network, Wide Area Network Troubleshooting, Major Protocol Suites.

Network Simulation: Network Simulation and Optimization, Network Operations, Control and Maintenance, Network Administration, Network Management Database and Tools, Capacity Planning.

Network Optimization: Network Security and Integrity, Linear Programming and Network Algorithms for Planning, Reliability Theory and Network Planning.

CSE 4213

Knowledge Engineering

Prerequisite: None

Contact Hours/week: 3

Credits:3.00

Introduction: Key Concepts of Knowledge Representation and Reasoning, Language of First Order Logic, Syntax, Semantics Pragmatics, Expressing Knowledge, Levels of Representation, Knowledge Acquisition and Sharing, Sharing Ontologies, Language Ontologies, Language Patterns, Tools for Knowledge Acquisition.

Resolution and Reasoning: Proportional Case, Handling Variables and Qualifies, Dealing with Intractability, Reasoning with Horn Clauses, Procedural Control of Reasoning, Rules in Production, Description Logic, Vivid Knowledge, Beyond Vivid.

Representation: Object Oriented Representations, Frame Formalism, Structured Descriptions, Meaning and Entailment, Taxonomies and Classification, Inheritance, Networks, Strategies for Defensible Inheritance, Formal Account of Inheritance Networks.

Defaults, Uncertainty and Expressiveness: Closed World Reasoning, Circumscription, Default Logic Limitations of Logic, Fuzzy Logic, Non-monotonic Logic, Theories and World, Semiotics, Auto epistemic Logic, Vagueness, Uncertainty and Degrees of Belief, Noncategorical Reasoning, Objective and Subjective Probability.

Actions and Planning: Explanation and Diagnosis, Syntax, Semantics of Context, First Order Reasoning, Modal Reasoning in Context, Encapsulating Objects in Context, Agents, Actions, Situational Calculus, Frame Problem, Complex Actions, Planning, Strips – Planning as Reasoning – Hierarchical and Conditional Planning.

CSE 4215
Network Security
Prerequisite: None

Contact Hours/week: 3
Credits:3.00

Introduction: Network Security Policies, Strategies and Guidelines; Network Security Assessments and Matrices.

Different Attacks: Denial of Service (Dos) Attack, Distributed Denial of Service (Ddos) Attack, Eavesdropping, IP Spoofing, Sybil Attack, Blackhole Attack, Grayhole Attack, Man-In-The-Middle Attack, Passwords-based Offline Attacks.

Network Security Threats and Attackers: Intruders, Malicious Software, Viruses and Spy-Ware; Security Standards: DES, RSA, DHA, Digital Signature Algorithm (DSA), SHA, AES; Security At Transport Layer: Secure Socket Layer (SSL) and Transport Layer Security (TLS).

Security on Network Layer: Ipsec; Network Security Applications: AAA Standards, E-Mail Securities, PGP, S/MIME; PKI Smart Cards; Sandboxing; Firewalls and Proxy Server;

Security for Wireless Network Protocols: WEP, WPA, TKIP, EAP, LEAP; Security Protocols for Ad-Hoc Network; Security Protocols for Sensor Network; Security for Communication Protocols; Security for Operating System and Mobile Agents; Security for E-Commerce; Security for LAN and WAN; Switching and Routing Security; other State-Of-The-Art Related Topics.

Optional III

CSE 4217
Decision Support System
Prerequisite: None

Contact Hours/week: 3
Credits:3.00

Introduction to Decision Support System: DSS Characteristics, Applications of Decision Support Systems, Capabilities of Decision Support Systems, Components of Decision Support Systems, Benefits of using DSS Systems.

Making Decisions in the Decision Support Systems Environment: Activities in the Decision Support Systems Environment, the Decision Making Process, Information Use for Strategic Management, Making Decisions in the Decision Support Systems.

Environment: Strategic Analysis for the Organization, Types of Problems in the Decision Making Process.

Developing Decision Support System: Approaches to DSS Development, DSS Software Tools, DSS Hardware and Operating System Platforms, Building and Implementing Decision Support Systems. Decision Support Systems in Detail: Types of Decision Support Systems, DSS Models, Data Mining, Group Decision, Support Systems, Executive Information Systems (EIS). Artificial Intelligence and Expert Systems, Systems Integration and the Future of DSS: Brainstorming.

CSE 4219
Computer Vision
Prerequisite: None

Contact Hours/week: 3
Credits:3.00

Introduction: Introduction to Computer Vision, Case Study-Face Recognition, Linear Algebra/Probability Review.

Image Structure: Linear Filters, Finding Lines-From Detection to Model Fitting, Clustering and Segmentation.

Camera Models: Camera Models, Camera Calibration, Epipolar Geometry, Stereo & Multi-view Reconstruction.

Recognition (Building blocks): Detectors and Descriptors, SIFT & Single Object Recognition, Optical Flow & Tracking.

Recognition (Objects, Scenes, and Activities): Introduction to Object Recognition and Bag-of-Words Models, Object Classification and Detection- A Part-based Generative Model (Constellation Model), Object Classification and Detection: A Part-Based Discriminative Model (Latent SVM), Human Motion Recognition.

Computer Vision: State-of-the-art and the Future.

CSE 4221
Data Mining
Prerequisite: None

Contact Hours/week: 3
Credits:3.00

Data Mining and Applications: Relational Databases, Data Warehouses, Transactional Databases, Advanced Data and Information Systems, Characterization and Discrimination, Mining Frequent Patterns, Associations, and Correlations, Classification and Prediction, Cluster Analysis, Outlier Analysis, Evolution Analysis.

Data Preprocessing: Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

Classification, Clustering and Prediction: Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation, Support Vector Machines, Clustering by Partitioning/ Hierarchical/ Density-based/ Grid-based/ Model-based Methods, Clustering High-Dimensional Data, Outlier Analysis, Prediction, Linear Regression, Nonlinear Regression, Other Regression-Based Methods of Prediction, Evaluating the Accuracy and Error Measures of a Classifier or Predictor.

Web Mining: Anatomy of a Search Engine, Crawling the Web, Web Graph Analysis, Extracting Structured Data from the Web, Classification and Vertical Search, Web Log Analysis.

Advanced Analysis: Mining Stream, Time-Series, and Sequence Data, Graph Mining, Social Network Analysis, and Multirelational data Mining, Mining Object, Spatial, Multimedia, and Text Data.