

Khulna University, Khulna
Science, Engineering and Technology School
Computer Science and Engineering Discipline
 Summary of Courses for the Degree of B.Sc.Engg.(CSE)
 (Effective from Academic Session 2010-2011)

FIRST YEAR, FIRST TERM

Course No.	Course Title	Hours/Week	Credit
CSE 1101	Computer Fundamentals	2-0	2.00
CSE 1103	Structured Programming	3-0	3.00
CSE 1104	Structured Programming Laboratory	0-3	1.50
ME 1151	Mechanics and Heat Engineering	3-0	3.00
MATH 1153	Calculus	3-0	3.00
PHY 1153	Physics I	3-0	3.00
PHY 1154	Physics Laboratory I	0-3/2	0.75
CHEM 1151	Chemistry	3-0	3.00
CHEM 1152	Chemistry Laboratory	0-3/2	0.75
ENG 1151	English	2-0	2.00
Total:	7 Theory + 3 Sessional	19-6	22.00

FIRST YEAR, SECOND TERM

Course No.	Course Title	Hours/Week	Credit
CSE 1201	Object Oriented Programming	3-0	3.00
CSE 1202	Object Oriented Programming Laboratory	0-3	1.50
CSE 1203	Discrete Mathematics	3-0	3.00
ECE 1251	Electrical Circuits	3-0	3.00
ECE 1252	Electrical Circuits Laboratory	0-3/2	0.75
ME 1252	Engineering Drawing and CAD Project	0-3/2	0.75
MATH 1253	Geometry and Differential Equations	3-0	3.00
PHY 1253	Physics II	3-0	3.00
PHY 1254	Physics Laboratory II	0-3/2	0.75
HSS 1253	Government and Sociology	2-0	2.00
Total:	6 Theory + 4 Sessional	17-7.5	20.75

SECOND YEAR, FIRST TERM

Course No.		Course Title	Hours/Week	Credit
CSE	2101	Data Structure	3-0	3.00
CSE	2102	Data Structure Laboratory	0-3	1.50
CSE	2111	Digital Logic Design	3-0	3.00
CSE	2112	Digital Logic Design Laboratory	0-3	1.50
CSE	2114	Advanced Programming Laboratory	0-3	1.50
ECE	2151	Electronic Devices and Circuits	3-0	3.00
ECE	2152	Electronic Devices and Circuits Laboratory	0-3	1.50
MATH	2153	Vector Analysis and Matrix	3-0	3.00
ECON	2151	Economics	2-0	2.00
Total:		5 Theory + 4 Sessional	14-12	20.0

SECOND YEAR, SECOND TERM

Course No.		Course Title	Hrs/Week	Credit
CSE	2200	Software Development Project	0-3	1.50
CSE	2201	Algorithms	3-0	3.00
CSE	2202	Algorithms Laboratory	0-3	1.50
CSE	2203	Computer Architecture	3-0	3.00
CSE	2208	Assembly Language Laboratory	0-3	1.50
ECE	2251	Electrical Drives and Instrumentation	3-0	3.00
ECE	2252	Electrical Drives and Instrumentation Laboratory	0-3/2	0.75
MATH	2253	Statistics and Complex Variable	3-0	3.00
HSS	2251	Psychology	2-0	2.00
Total:		5 Theory + 4 Sessional	14-10.5	19.25

THIRD YEAR, FIRST TERM

Course No.	Course Title	Hours/Week	Credit
CSE 3100	Technical Writing and Presentation	0–3/2	0.75
CSE 3101	Database Systems	3–0	3.00
CSE 3102	Database Systems Project/Fieldwork	0–3	1.50
CSE 3105	Numerical Methods	3–0	3.00
CSE 3106	Numerical Methods Laboratory	0–3/2	0.75
CSE 3111	Microprocessors and Microcontrollers	3–0	3.00
CSE 3112	Microprocessors and Microcontrollers Laboratory/Project	0–3/2	0.75
ECE 3151	Digital Electronics	2–0	2.00
MATH 3153	Mathematical Methods	3–0	3.00
BA 3151	Accounting	3–0	3.00
Total:	6 Theory + 4 Sessional	17–7.5	20.75

THIRD YEAR, SECOND TERM

Course No.	Course Title	Hours/Week	Credit
CSE 3200	Web Programming Project/Fieldwork	0–3	1.50
CSE 3201	Operating System and Systems Programming	3–0	3.00
CSE 3202	Operating System and Systems Programming Laboratory/Project	0–3	1.50
CSE 3203	Software Engineering and Information System	4–0	4.00
CSE 3204	Software Engineering and Information System Project	0–3	1.50
ECE 3251	Data Communication	3–0	3.00
BA 3251	Industrial Management and Law	3–0	3.00
Option I		3–0	3.00
Option I		0–3	1.50
Sessional			
Total:	5 Theory + 4 Sessional	16-12	22.00

List of Optional Courses

Option I with Sessional should be selected from the following Courses

Course No.	Course Title	Hours/Week	Credit
CSE 3221	Simulation and Modeling	3–0	3.00
CSE 3222	Simulation and Modeling Laboratory/Fieldwork	0–3	1.50
CSE 3223	Neural Networks and Fuzzy Systems	3–0	3.00
CSE 3224	Neural Networks and Fuzzy Systems Laboratory	0–3	1.50
CSE 3225	Digital Image Processing	3–0	3.00
CSE 3226	Digital Image Processing Laboratory/Project	0–3	1.50
CSE 3227	Geographical Information System	3–0	3.00
CSE 3228	Geographical Information System Laboratory/Fieldwork	0–3	1.50

FORTH YEAR, FIRST TERM

Course No.	Course Title	Hours/Week	Credit
CSE 4100	Project and Thesis I	0–6	3.00
CSE 4103	Computer Graphics	3–0	3.00
CSE 4104	Computer Graphics Laboratory/Project	0–3/2	0.75
CSE 4105	Compiler Design	3–0	3.00
CSE 4106	Compiler Design Laboratory/Project	0–3/2	0.75
CSE 4111	Computer Networks	3–0	3.00
CSE 4112	Computer Networks Laboratory/Fieldwork	0–3	1.50
Option I		2–0	2.00
Option II		2–0	2.00
Option III		3 weeks	0.00
Total :	5 Theory + 4 Sessional+ 1 Non Credit Training	13–12, 3 weeks	19.00

List of Optional courses

Option I and Option II should be selected from the following Courses

Course No.	Course Title	Hours/Week	Credit
CSE 4121	Applied Probability and Queuing Theory	2–0	2.00
CSE 4123	Parallel and Distributed Processing	2–0	2.00
CSE 4125	Computational Geometry	2–0	2.00
CSE 4127	Multimedia	2–0	2.00
CSE 4129	Human Computer Interaction	2–0	2.00
CSE 4131	E-Commerce	2–0	2.00
CSE 4133	Distributed Database System	2–0	2.00
CSE 4135	Graph Theory	2–0	2.00
CSE 4137	Theory of Computation	2–0	2.00
ECE 4151	Digital Signal Processing	2–0	2.00
ECE 4153	VLSI Design and Testability	2–0	2.00
ECE 4155	Wireless and Optical Networks	2–0	2.00

Option III should be selected from the following Courses

Course No.	Course Title	Hours/Week	Credit
CSE 4160	Industrial Training	3 weeks	0.00
CSE 4170	Advanced Business Venture	3 weeks	0.00

FORTH YEAR, SECOND TERM

Course No.	Course Title	Hours/Week	Credit
CSE 4200	Project and Thesis II	0–6	3.00
CSE 4205	Artificial Intelligence	3–0	3.00
CSE 4206	Artificial Intelligence Laboratory/Project	0–3	1.50
Option I		3–0	3.00
Option I		0–3/2	0.75
Sessional			
Option II		3–0	3.00
Option II		0–3/2	0.75
Sessional			
Option III		3–0	3.00
Total:	4 Theory + 4 Sessional	12–12	18.00

List of Optional Courses

Option I with Sessional and Option II with Sessional should be selected from the following Courses

Course No.	Course Title	Hours/Week	Credit
CSE 4221	Pattern Recognition	3–0	3.00
CSE 4222	Pattern Recognition Laboratory/Project	0–3/2	0.75
CSE 4223	Data Warehousing and Mining	3–0	3.00
CSE 4224	Data Warehousing and Mining Laboratory/Fieldwork	0–3/2	0.75
CSE 4231	Digital System Design	3–0	3.00
CSE 4232	Digital System Design Laboratory/Project	0–3/2	0.75
CSE 4233	Client Server Technology	3–0	3.00
CSE 4234	Client Server Technology Laboratory/Fieldwork	0–3/2	0.75
CSE 4235	Computer Peripherals and Interfacing	3–0	3.00
CSE 4236	Computer Peripherals and Interfacing Laboratory/Project	0–3/2	0.75
CSE 4237	Computer Animation and Virtual Reality	3–0	3.00
CSE 4238	Computer Animation and Virtual Reality Laboratory/Project	0–3/2	0.75

Option III should be selected from the following Courses

Course No.	Course Title	Hours/Week	Credit
CSE 4241	Knowledge Engineering	3–0	3.00
CSE 4243	Machine Learning	3–0	3.00
CSE 4245	Robotics and Computer Vision	3–0	3.00
CSE 4247	Information Security and Control	3–0	3.00
CSE 4249	Decision Support System	3–0	3.00

FIRST YEAR

FIRST TERM

CSE 1101 Computer Fundamentals 2 Hrs. per week 2 Credits

Section A:

Introduction to Computer: Introduction, types and generations of computers, basic organization and functional units, hardware and software; Number systems and Code: binary, octal, decimal and hexadecimal numbers, conversion between different number systems, binary arithmetic, BCD and ASCII codes, integer and floating point number representation; Input, output and memory devices: Keyboard, mouse, OMR, OCR, MICR, CD-ROM, different types of printers, CRTs, computer microfilm, floppy disks, hard disks, magnetic tapes, touch screen, touch pad, light pen, optical mouse, USB devices, Mobile HDD, Overview about microprocessor and other recent I/O devices, memory devices and recent microprocessors.

Section B:

Computer language: machine language, assembly language, mid-level language, high level language; Language translators: interpreters, assemblers and compilers; Software: types of software, system software and application software; Examples of operating systems software: DOS, Windows, UNIX and system utilities; Classifications of application software (word processors, spreadsheet, database management, graphics, mathematical and statistical, modeling and simulation, business and financial, communication packages);

Recommended Books:

1. V. Rajaraman, "Fundamentals of Computers", 4th Edition, Prentice-Hall of India Private Ltd.
2. S.K. Sarkar & A.K. Gupta, "Elements of Computer Science", 1st Edition, S. Chand and Company Ltd.
3. Peter Norton & John Goodman, "Inside the PC", 8th Edition, Addison-Wesley, Techmedia.

CSE 1103 Computer Programming 3 Hrs. per week 3 Credits

Section A:

Background of C; Programming Algorithms and flow chart construction; Structured Programming Concepts; Identifiers, variables, constants, operators and expressions; Program control statements; Arrays; String.

Section B:

Function: User define functions, recursion, Structure and Union, Preprocessors, Pointers, File managements, Dynamic Memory Allocation and Linked lists, Screen and graphics functions.

Recommended Books:

1. E. Balaguruswamy, "Programming in ANSI C", Second Edition, McGraw-Hill Publishing Company Ltd.
2. Herbert Schildt, "Turbo C/C++: The Complete Reference", Second Edition, McGraw-Hill Publishing Company Ltd.
3. Byron Gottfried, "Programming with C", Second Edition, Tata-McGraw-Hill Publishing Company Ltd.

CSE 1104 Computer Programming Laboratory 3 Hrs. per week 1.5 Credits.

Laboratory works based on CSE 1104.

ME 1151 Mechanics and Heat Engineering 3 Hrs. per week 3 Credits.

Section A:

Resultant and components of forces. Equilibrium of coplanar forces. Centroids. Moment of inertia of area and mass. Kinetics of absolute motions. Kinetics of relative motions. Frictions. Maximum and minimum forces. Kinetics of plane motion of rigid bodies. Principles of work and energy.

Section B:

Working principles of a few representative boilers. Introduction to the principle of operation of steam turbine. Introduction to internal combustion engine, working principle of petrol engine, diesel engine and gas turbine. Basic concepts of refrigeration and air conditioning.

Recommended Books:

1. K.P. Roy, "An Introduction to Heat Engineering, Vol. I".
2. V.P. Vansandani & D.S. Kumar, "Heat Engineering", 4th Edition, Metropolitan Books.
3. V.M. Faires & S.D. Chambers, "Analytic Mechanics", 3rd Edition, The Macmillan Co.

Math 1153 Calculus

3 Hrs. per week 3 Credits.

Section A:**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. Lagrange's form of remainders. Cauchy's form of remainder, Euler's theorem. Tangent, Normal, Sub-tangent and subnormal in Cartesian and polar coordinates, Determination of maximum and minimum values of functional and points of inflection, Applications, Evaluation of indeterminate forms by L'Hospital's rule, Curvature, Circle of curvature, center of curvature and chord of curvature, Evaluate and involute, Asymptotes, Envelopes, Curve tracing.

Section B:**Integral Calculus:**

Definitions of integration, Integration by method of substitution. Integration by parts, Standard integrals, Integration by the method of successive reduction. Definite integrals, its properties and use in summing series. Wallis's formulae. Improper Integrals, Beta function and Gamma function, application of Beta and Gamma function. Area under a plane curve in Cartesian and Polar coordinates. Area of the region enclosed by two curve in Cartesian and Polar coordinates. Elements of numerical integration, Trapezoidal rule, Simpson's rule. Arc lengths of curves in Cartesian and Polar coordinates, 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.

Recommended Books:

1. Swokowski, Olinick & Pence, "Calculus of Several Variables", Brooks/Cole Pub Co, 1995.
2. Das & Mukherjee, "Differential Calculus", 37th Edition, U.N. Dhur and Sons and Pvt. Ltd.
3. Das & Mukherjee, "Integral Calculus", 37th Edition, U.N. Dhur and Sons and Pvt. Ltd.
4. Howard Anton, Albert, Herr, "Calculus with Applications", 6th Edition, John Wiley and Sons Inc.
5. F. Ayres, "Calculus (Differential and Integral)", 2nd Edition, Schaum's Outline.

Phy 1153 Physics I

3 Hrs. per week 3 Credits

Section A:**Heat and Thermodynamics:**

Kinetic theory of gases: Deduction of gas law, Principle of equipartition of energy, Equation of state- Andrew's experiment, Vander Waals equation, Critical constants, Transmission of heat - Conduction, Convection and Radiation. Laws of thermodynamics: First law of thermodynamics, Internal energy, Specific heats of gases, Work done by expanding gas, Elasticity of a perfect gas, second law of thermodynamics, Carnot's cycle, Efficiency of heat engines. Absolute scale of temperature, Entropy and its physical concept, Maxwell's thermodynamic relations, Statistical mechanics.

Optics:

Combination of lenses: Equivalent lens and equivalent focal length. Defects of images formed by lenses: Spherical aberration, Astigmatism, Coma, Distortion, Curvature of the image, Chromatic absorption. Theories of light: Huygen's principle and construction. Interference of light: Young's double slit experiment, Bi-prism, Newton's rings, Interferometers, Interference by multiple reflection. Differentiation of light: Fresnell and Fraunhofer diffraction gratings. Polarization: Production and analysis of polarized light, optical activity. Optics of crystals.

Section B:**Waves and Oscillation:**

Oscillation: Simple harmonic motion, Combination of S. H. M. and Lissajous figures, Damped Oscillations, Forced Oscillations, Resonance, Vibrations of membranes and columns. Waves: Traveling waves, the principle of superposition, Wave velocity, Group velocity and phase velocity, Power and intensity in wave motion, Interference of waves, Diffraction of waves, Reflection and transmission of waves at a boundary, Standing waves. Sound waves: Audible, Ultrasonic, Infrasonic and supersonic waves; Propagation and speed of longitudinal waves, Traveling longitudinal waves, Standing longitudinal waves, Vibrating systems and sources of sound, Beats, The Doppler effect. Acoustics: Re-vibration, Noise insulation and reduction, Compound absorption, Sound distribution, Room acoustics, Room acoustics, Recording.

Recommended Books:

1. Brijlal, "Heat and Thermodynamics".
2. A.P. French, "Vibrations and Waves". The M.I.T. Introductory Physics Series.
3. G.F. Lothian, "Optics & its Uses", N.Y.: Van Nostrand Reinhold, 1975.

Phy 1154 Physics Laboratory I
3 Hrs. in every alternate week 0.75 Credit.

Experiments based on **Phy 1153.**

Chem 1151 Chemistry
3 Hrs. per week 3 Credits.

Section A:

Aqueous Solution: Types of solution, Factors influencing the solubility of a substance, The Lechatelier's principle, Mechanism of dissolution, Evolution and absorption of heat. Different units of concentration, Problems involving acid base titration. Solution o gases in liquids. Distribution of solute between two immiscible solvent, Application of distribution law. Properties of dilute solution, Vapor pressure, Raoult's law - its application. Elevation of boiling point, Depression of freezing point and osmotic pressure. Colloids and properties of Colloidal system. Chemical Bond: Different types of chemical bond, General properties of ionic and covalent compounds. Modern approach of covalent bond.

Section B:

Physical Chemistry: Kinetic and chemical equilibrium; rate fo a reaction, Factors determining the rate. Law of mass action, Evaluation and characteristics of equilibrium constant of reaction. Thermo-chemistry: Types of energy, Enthalpy Heat of reaction, heat of combustion, Heat of formation and heat of neutralization. Electrolytes, Mechanism of electrolytic conduction, Transport number and electrolytic conductance.

Recommended Books:

1. D. Lygre, W. Smith, G.T. Miller, "Chemistry", 2nd Edition, Wadsworth Publishing Co.,Belmont, CA.
2. W.H. Brown, "Introduction to Organic Chemistry", John Wiley & Sons.
3. C. Mortimer, Belmont, Calif., "Chemistry", 5th Edition, Wadsworth Publishing.

Chem 1152 Chemistry Laboratory
3 Hrs. in every alternate week 0.75 Credits.

Experiments based on **Chem 1151.**

Eng 1151 English
2 Hrs. per week 2 Credits

Section A

Study of English sounds: English phonemes, word-transcription, intonation and stress; Using a Dictionary; Study of Words: Formation and transformation; Sentence: Types, structures and transformations; Phrase and clause: Types and structures beyond the sentence; Punctuation

Section B

Oral communication: pronunciation, vocabulary and grammar, audience awareness context: speaker-listener report; body language; Guidelines for effective oral communication; Reading comprehension: intensive and extensive reading, scanning, skimming, contextual understanding and understanding the whole text; Writing: Product approach and process approach (planning, arrangement, drafting, revision and final product); Modes of writing: definition, classification, description, narrative, argumentative, cause and effect; Art of good writing; Writing situations and tasks: summarizing, paragraph and essay writing, letters and applications, writing assignments, report writing.

Recommended Books:

1. Quirk, Randolph & Greenbaum, "Sidney. A University of Grammar of English", Chennai: Longman 2000.
2. A.S. Hornby, "Oxford learner's dictionary of Current English".
3. Thompson & Martinet, "A Practical English Grammar".
4. R.C. Sharma & K. Mohan, Business Correspondence and Report Writing (2nd Edition), New Delhi: Tata-MaGraw Hill Publishing Company Ltd, 1999.
5. R.L. Gordon, "Interviewing Strategy, Techniques and Tactics", Dorsey, Homewood, Illinois 1976.
6. A. Pease, "Body language" (New Ed.), New Delhi: Sudha Publications Pvt Ltd. 1999.
7. A.W.J. Heffernan, "Writing: A College Handbook", Fifth Edition, New York and London: Norton, 2000.
8. Lewis, Norman, "How to read Better and Faster".
9. K.K. Sinha, "Business Communication", New Delhi: Galgotia Publishing Co., 2000.

FIRST YEAR

SECOND TERM

CSE 1201 Object Oriented Programming 3 Hrs. per week 3 Credits

Section A:

Fundamentals of Object Oriented Programming; Overview of Java Language; Constants, Variables, data types; Operators, expressions, Control statements; Classes, objects, methods; Programs with interactive input; Inheritance, packages and interfaces; Arrays, strings, vectors; Exception handling.

Section B:

Multithreaded programming, I/O files; Applet programming; Introduction the AWT: working with Windows, Graphics, text, layout managers and menus; Introduction to Java Beans; Introduction to Swing; Introduction to Servlets; Introduction to J2EE, RPC, Database connectivity with java; Socket programming with java.

Recommended Books:

1. H.M. Deitel & P.J. Deitel, “Java How to Program”, 4th Edition, Prentice-Hall of India Pvt. Ltd.
2. E. Balagurusamy, “Programming with Java”, 2nd Edition, Tata McGraw-Hill Publishing Company Ltd.
3. Herbert Schildt, “The Complete Reference Java 2”, 4th Edition, Tata McGraw-Hill Publishing Company Ltd.
4. Ivor Horton, “Beginning Java 2”, Wrox Press Limited.

CSE 1202 Object Oriented Programming Laboratory 3 Hrs. Per week , 1.5 Credits.

Laboratory works based on **CSE 1201**.

CSE 1203 Discrete Mathematics 3 Hrs. per week 3 Credits.

Section A:

Mathematical logic: Propositional calculus, Predicate calculus. Set theory: Sets, Relations, Partial Ordered Sets, Lattices, Functions.

Section B:

Graph Theory, Algebraic Structures, Algorithms and Complexity, Combinatorics, Proof Methods.

Recommended Books:

1. Kenneth H. Rosen, “Discrete Mathematics and its applications”, 6th Edition, McGraw-Hill Company Ltd.
2. Bernard Kolman, Robert C. Busby & Sharon Cutler Ross, “Discrete Mathematical Structure”, 4th Edition, Prentice-Hall of India Private Ltd.
3. C. Liu, “Elements of Discrete Mathematics”, 2nd Edition, Tata McGraw-Hill Publishing Company Ltd.
4. Seymour Lipschutz & Marc Lipson, “Discrete Mathematics”, 2nd Edition, Tata McGraw-Hill Publishing Company Ltd.

ECE 1251 Electrical Circuits 3 Hrs. per week 3 Credits.

Section A:

Fundamental electric concepts and measuring units, D.C. voltage, Current, Resistance and power, Laws of electrical circuits; $\Delta - Y$, $Y - \Delta$ conversion and Network Theorems; Methods of Network Analysis, Principles of D.C. measuring apparatus, Laws of magnetic fields and circuits and methods of solving simple magnetic circuit.

Section B:

Alternating current - instantaneous and r. m. s. current, Voltage and power, Average power for various combinations of R, L and C circuits, Phasor representation of sinusoidal quantities. Single phase AC circuit analysis, Resonance (Series, parallel)

Recommended Books:

1. Robert L. Boylestad, "Introductory Circuit Analysis", 11th Edition, Prentice-Hall of India Private Ltd.
2. Russell M Kerchner and George F. Corcoran, "Alternating Current Circuits", 4th Edition.
3. Robert P. Ward, "Introduction to Electrical Engineering", 3rd Edition.

ECE 1252 Electrical Circuits Laboratory
3 Hrs. in every alternate week 0.75 Credit.

Laboratory works based on ECE 1251.

ME 1252 Engineering Drawing and CAD Project
3 Hrs. in every alternate week 0.75 Credit.

Introduction, Scale drawing, Sectional view, Isometric views. Missing line, Auxiliary view, Detail and assembly drawing Project on Engineering Drawing and CAD using contemporary packages.

Math 1253 Geometry and Differential Equations
3 Hrs. per week 3 Credits.

Section A:**Coordinate Geometry:**

Coordinate Geometry of two dimensions: Change of axes, Transformation of coordinates, simplification of equations of curves. Coordinate Geometry of three dimensions: System of coordinates. distance of two points, Section formula, Projection. Direction cosines. Equation of planes and lines, Sphere, cone, cylinder, paraboloid, hyperboloid and general equation of second degree and reduction to standard forms.

Section B:

Ordinary Differential Equations: Degree and order of ordinary differential equations. Formation of differential equations. Solutions of first order differential equations by various methods. Solutions of general linear equations of second and higher orders with constant coefficients. Solution of homogeneous linear equations. Solution of differential equations of the higher order when the dependent of independent variables are absent. Linear equation with variable coefficient.

Recommended Books:

1. R.J.T. Bell, "An Elementary Treatises on Solid Geometry".
2. H.T.H. Piaggio, "Differential Equations", C.B.S. Publishing and Distributions.
3. S.L. Ross, "Introduction to ordinary Differential Equations". 4th Edition.
4. M.D. Raisinghania, "Ordinary and Partial Differential Equations", 8th Edition, S. Chand and Company.

Phy 1253 Physics II
3 Hrs. per week 3Credits.

Section A:**Properties of Matter:**

Atomic structure of Matter: Atoms, Ions and molecules, States of matter, solids, Liquids and gases, Inter-particle forces. Elasticity: Stress strain, Elastic constants. Viscosity : Critical Velocity and Reynolds' number, Poiseulli's equation, Stock's law. Hydrodynamics Equation of continuity, Bernoulli's equation and its application. Surface Tension: Surface effects, Free surface energy, Molecular theory of surface tension, Excess-pressure theorem, Contact angle, Capillarity. Crystallography: Types of bonds, Types of crystals, X-ray diffraction and Bragg's law, Plasticity and crystal effects, Metals, Insulators and Semiconductor, Elementary band theory, Superconductors and plasma.

Modern Physics:

Relativity: Michelson - Morley experiment, Lorentz-Einstein transformation, Mass energy relation. Quantum effect: Photo electric effect, Compton effect. Wave mechanics: de-Broglie wave, Correspondence principle, Uncertainty principle, Schrodinger's wave equation. Atom, Bohr's theory of one electron atoms, Vector atom model. Radioactivity: Radio active decay, Half life, Law of successive disintegration, Radioactive equilibrium. The Nucleus, Properties of a Nucleus - binding energy, Nuclear reactions- nuclear reactors.

Section B:**Electricity and Magnetism:**

Electrostatics: Charge and matter, Coulomb's law, The electric field, Gauss's law, electrical potential Capacitance and resistance, Ohmic and non-Ohmic material, Variation of resistance with temperature - resistance thermometer, Thermoelectricity - thermoelectric thermometer. Electromagnetism: Magnetic fields, Maxwell's equations. Ampere's law, Faraday's law, Lenz's law, Inductance - Self and mutual inductance. Magnetic Properties of matter: Magneto-motive force, Magnetic field intensity, Permeability and susceptibility, Classification of magnetic material, Magnetization curves of Ferromagnetic materials, Magnetic circuits, Magnetostriction.

Recommended Books:

1. Arthur Beiser, "Perspectives of Modern Physics", McGraw-Hill Publishing Company.
2. Robert Resnick & David Halliday, "Physics Part II".

Phy 1254 Physics Laboratory II
3 Hrs. in every alternate week 0.75 Credit.

Experiments based on **Phy 1253.**

HSS 1253 Government and Sociology
2 Hrs. per week 2 Credits.

Section A:**Government:**

Some basic concepts of government and politics. Functions, Organs and forms of modern state and Government, Socialism, Fascism, Marxism, U.N.O. Government and politics of Bangladesh. Some major administrative systems of developed countries. Local self government.

Section B:**Sociology:**

Scope, Nature, Methods and relation with other branches of Social Science; Stages of Social development (primitive, slavery, feudalism, Capitalism and Socialism); Culture and civilization; Social structure of Bangladesh. Population and world resources. Occidental societies, Industrial revolution. Family - Urbanization and industrialization, Urban Ecology, Cooperative and socialist movements, Rural sociology.

Recommended Books:

1. R.T. Schaefer, "Sociology", 2nd Edition, McGraw-Hill Company, Inc.
2. Anthony Giddens, "Sociology", 4th Edition, Policy Press Ltd, UK.

Computer Science and Engineering Discipline
SET School, Khulna University
Syllabus

SECOND YEAR

FIRST TERM

CSE 2101 Data Structure
3 Hrs. per week, 3 Credits

Section A:

Concepts and examples of elementary data types and objects, concept of data structures, Arrays, Linked lists, Stacks, Recursion, Queues.

Section B:

Trees, Graphs, Sorting and Searching, Hash techniques, Memory Management.

Recommended Books:

1. Seymour Lipschutz, “Theory and Problems of Data Structures”, TATA McGRAW-HILL Edition.
2. Md. Rafiqul Islam, Ph.D, M.A. Mottalib, Ph.D, “Data Structures Fundamentals”, IUT.
3. Alfred V.Aho, John E. Hopcroft & Jeffrey D. Ullman, “Data Structures and Algorithms”, Addison-Wesley.

CSE 2102 Data Structure Laboratory
3 Hrs. per week, 1.5 Credits

Laboratory based on the course **CSE 2101**.

CSE 2111 Digital Logic Design
3 Hrs. per week, 3 Credits

Section A:

Number Systems and Codes, Review of Set theory, Boolean Algebra, Boolean Function, Canonical Forms, Minimization of Boolean Functions, Logic Gates and their Truth Tables, Combinational Logic Design, Arithmetic and Data handling logic circuits – Decoders, Encoders, Multiplexer and Demultiplexer. NAND and NOR circuits. Reliable Design and Fault Diagnosis Hazards. Fault Detection in Combinational circuits, Fault Location Experiments, Threshold Logic.

Section B:

Flip-flops, Introduction to synchronous sequential circuits and iterative networks. Sequential machine state equivalence and machine minimization. Asynchronous Sequential Circuits. Finite State Recognizer - regular expressions, Transition Graphs, Counters, Asynchronous Counters, Synchronous counter, Registers.

Recommended Books:

1. Zvi Kohavi, “Switching and Finite Automata Theory”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited.
2. Ronald J. Tocci, “Digital Systems: Principles and Applications”, 8th Edition, Prentice-Hall of India Private Limited.

CSE 2112 Digital Logic Design Laboratory
3 Hrs. per week, 1.5 Credits

Laboratory based on the course **CSE 2111**.

CSE 2112 Advanced Programming Laboratory
3 Hrs. per week, 1.5 Credits

Laboratory based on .Net Framework, PHP, Visual C++, Android, Objective C, Game Programming etc.

ECE 2151 Electronic Devices and Circuits
3 Hrs. per week, 3 Credits

Section A:

Semiconductors, Junction Diode Characteristics, Bipolar Transistor Characteristics, C.E., C.B. and C.C. analysis, Transistor Biasing, Small-Signal Low Frequency h-parameter model, Hybrid pie model, Amplifiers, High Impedance Transistor Circuits, Darlington Pairs, Introduction to Oscillators, Differential Amplifiers, Linear Application of op-amp, gain, input and output impedances, offset null adjustments, frequency response and noise.

Section B:

Introduction to JFET, MOSFET, NMOS and CMOS, Biasing and application in switching circuits. SCR, TRIAC, UJT: Characteristics and applications, Introduction to rectifiers, active filters, regulated power supply, SMPS, Stabilizer and UPS, Basic Idea about IC Fabrication Techniques.

Recommended Books:

1. Jacob Millman & Christos C, Halkais, "Electronic Devices and Circuits", TATA McGRAW-HILL publishing company limited.
2. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", 8th Edition, Pearson Education Asia.
3. Albert Paul Malvino, "Electronic Principles", 5th Edition.

ECE 2152 Electronic Devices and Circuits Laboratory
3 Hrs. per week, 1.5 Credits

Laboratory based on the course **ECE 2151**.

Math 2153 Vector Analysis and Matrix
3 Hrs. per week, 3 Credits

Section A:

Vector Analysis:

Definition of Vectors. Equality of Vectors. Addition and Multiplication of Vectors. Dependence and independence of Vectors. Differentiation and Integration of Vectors together with elementary applications. Definitions of line, surface and volume integrals. Gradient of a scalar function. Divergence and Curl of a Vector Function. Physical Significance of Gradient, Divergence and Curl, Various Formulate. Integral Forms of Gradient, Divergence and Curl Divergence Theorem. Stoke's Theorem, Green's Theorem and Gauss's Theorem, Curvilinear coordinates.

Section B:

Matrix:

Definition of Matrix, Equality of two Matrices, Addition, Subtraction and Multiplication Matrices, Transpose of Matrices, Inverse of Matrices, Rank of Matrices. System of Linear Equations.

Recommended Books:

1. M. R. Spiegeell, “Vector Analysis and Introduction to Tensor Analysis”, 2nd Edition, TATA McGRAW-HILL publishing company limited.
2. JR Frank Ayers, “Theory and Problems of Matrices”, 2nd Edition, TATA McGRAW-HILL publishing company limited.

ECON 2151

Economics

2 Hrs. per week, 2 Credits

Section A:

Basic Concepts: Definition of Economics. Nature and Scope of Economics. Micro versus Macro Economics. Positive versus Normative Economics. Scarcity, Choice, Want, Commodity, Utility, Wealth, Value, Price, Welfare, Production, Exchange, Distribution, Consumption, Economic good versus free good Economic System, Basic Economic Problems, Solution of these Problems, Production Possibility Curve. Demand and supply: Concept of Demand and supply, Law of Demand and supply, determinants of Demand and supply, Movement along Demand and supply Curves, Shifting of Demand and supply Curves, Market Demand Curve, Market Equilibrium. Consumer's Surplus and Producer's Surplus. Shift of Equilibrium, Various Concepts of Demand Elasticity- price income and cross and supply elasticity. Economics of Consumer Behavior and Utility Analysis: Cardinal versus Ordinal Measurement of Utility, Concept of Total and Marginal Utility. Marshallian utility analysis indifference curve analysis. Budget Constraints. Consumer's Equilibrium, Substitution Effect, Income effect and Price effect. Economics of Production: Factors of production, Production function, Total, Average and Marginal products, Stages of Production, Law of Diminishing Return, Law of Variable Proportion, returns to scale. Isoquants, isocost lines and producer's Equilibrium. Theory of Cost and Revenue: short run and long run cost. Fixed and Variable Cost, Average, Marginal and Total Cost, envelope curve, concept of total, average and marginal Revenue.

Section B:

National Income: definition, concepts, roles. GNP. GDP. NNO. Personal Income, Disposal Income, Normal vs Real GNP. Methods of Measuring National Income-Product. Expenditure. Income and Value added approach. Circular Flow of Income and Expenditure-two sector Economy. Money: Definition and Function of Money , Kinds of Money. Money and the Price Level. Velocity and Quantity Equation. Banking: Transition from Goldsmith Banking to Modern Banking, Central Bank and its Function, Commercial Bank and its Function, Money Stock, Money Supply, Open Market Operation. High Powered Money. Economics of Development and Planning: Basic Concepts. Growth vs Development, per capita income as an index of economic development, policy instruments of development. Fiscal Policy. Trade Policy and the relative applicability in Bangladesh, planning in Bangladesh-Five Years Plan of Bangladesh.

Recommended Books:

1. Dominic Salvator, “Theory and Problems of Microeconomics Theory”, 3rd Edition, McGraw-Hill Inc. New York, 1992.
2. Jack Nobbs & IAN Hopkins, “Economics –A Core Text”, 4th Edition, McGraw International (UK) Ltd, 1995.
3. Roy J. Ruffin and Paul R. Gregory, “Principles of Economics”, 5th Edition, Foreman and Company. Illinois, 1983.

SECOND YEAR

SECOND TERM

CSE 2200 Software Development Project 3 Hrs. per week, 1.5 Credits

Students will develop structured Programs/Projects with proper documentation in high level language as assigned by teachers and will run on micro/mainframe computers.

CSE 2201 Algorithms 3 Hrs. per week, 3 Credits

Section A:

Techniques for analysis of algorithms, Methods for design of efficient algorithms, Divide and Conquer, Greedy Method, Dynamics Programming, Backtracking, Branch and Bound.

Section B:

Basic Search and Traversal Techniques, Branch and Bound, Graph Algorithms, Algebraic Simplification and Transformations, Lower Bound Theory, NP Hard and NP Complete Problems.

Recommended Books:

1. Elias Horowitz, Sartaj Sahni & Sanguthever Rajasekaran, “Fundamentals of Computer Algorithms”, Galgotia Publications Pvt. Ltd.
2. Thomas H. Cormen, Charles E. Leiserson & Robert L. Rivest, “Introduction to Algorithms”, Prentice-Hall of India Private Limited.

CSE 2202 Algorithms Laboratory 3 Hrs. per week, 1.5 Credits

Laboratory based on the course **CSE 2201**.

CSE 2203 Computer Architecture 3 Hrs. per week, 3 Credits

Section A:

Introduction to Computers- Evolution, Programming and Architecture. Addressing Modes, Instruction Sets, Machine Level Instructions, Central processing Unit, Arithmetic Logic Unit, Control Unit Design. Microprogrammed Control Unit.

Section B:

Input Output Operations: Programmed I/O, Interrupt I/O, DMA. Memory Organisation: Main Memory Design, Cache Memory, Associative Memory, Virtual Memory. Fundamentals of Parallel Processing: Array Processing, Pipeline Processing, Multiprocessing, Structures and Algorithms for Array Processors, Multiprocessor Architecture and Programming.

Recommended Books:

1. John P. Hayes, “Computer Architecture and Organization”, Third edition, McGraw-Hill.
2. M. Morris Mano, “Computer System Architecture”, Third Edition, Prentice-hall of India Private Limited.
3. Richard Y. Kain, “Advanced Computer Architecture: A System Design Approach”, Third Edition, Prentice-hall of India Private Limited.

4. William Stallings, “Computer Organization and Architecture: Designing for Performance”, Forth Edition, Prentice-hall of India Private Limited.
5. Dr. H. Rafiquzzaman, “Fundamentals of Computer System architecture”, West Publishing Company.
6. Kai Hwars, faye A. Briggs, “Computer Architecture and Parallel Processing”, McGraw Hill Publication Limited.

CSE 2205 Numerical Methods
3 Hrs. per week, 3 Credits

Section A:

Numerical Approximations and Round-off errors, Roots of Equations: Bracketing Methods, Open Methods, Roots of Polynomials; Solving Simultaneous Set of Linear Equations: Gauss Elimination, LU Decomposition and Matrix Inversion, Special Matrices and Gauss-Seidal; Curve Fitting: Least-Squares Regression.

Section B:

Optimization: One Dimensional Unconstrained Optimization, Multidimensional Unconstrained Optimization; Interpolations: Newton’s Divided-Difference Interpolating Polynomials, Lagrange Interpolating Polynomials, coefficients of an Interpolating Polynomial, Inverse Interpolation; Integration: the Trapezoidal rule, Simpson’s rule; Ordinary Differential Equations: Newton-cotes Algorithm for Equations, Romberg Integration, Gauss Quadrature, Euler’s method, Runge-Kutta Methods, Systems of Equations.

Recommended Books:

1. M.K. Jain, S.R.K. Lyengar & R.K. Jain, “Numerical Methods for Scientific and Engineering Computation”, Third Edition, New Age International (P) Limited.
2. John H. Mathews, “Numerical Methods for Mathematics, Science and Engineering”, Second Edition, Prentice-hall of India Private Limited.
3. Gerald & Wheatley, “Applied Numerical Analysis”, Addison-Wesley Publishing Company.

CSE 2206 Numerical Methods Laboratory
3/2 Hrs. per week, 0.75 Credits

Laboratory based on the course **CSE 2205**.

ECE 2251 Electrical Drives and Instrumentation
3 Hrs. per week, 3 Credits

Section A:

Coupled Circuits – Self and Mutual Inductance, Transient Analysis of Simple Circuits, Polyphase Circuit Analysis and Power Management. Single-phase Transformer, Equivalent Circuits, Vector Diagram, Transformer Tests, Three Phase Transformers.

Section B:

D. C. Generator and Motor: Operation and Characteristics, Speed control of D.C. Motors, 3-Phase Induction Motor: Types, Operations, Equivalent Circuit, Characteristics, Starting, Introduction to 3 Phase Alternators and Synchronous Motors, Fractional Horse-Power Motors, Stepper Motors.

Recommended Books:

1. A.F. Puschstein, T.C. Lloyd & A.G. Concored, “Alternating Current Machines”, 3rd Edition, John Wiley and Sons, Inc. New York.
2. A.E. Fitzgerald Charles, Ingsley Jr & Stephen D. Ullman, “Electric Machinery”, 5th Edition, Pearson Education Asia.

ECE 2252 Electrical Drives and Instrumentation Laboratory
3/2 Hrs. per week, 0.75 Credits

Laboratory based on the course ECE 2251.

Math 2253 Statistics and Complex Variable
3 Hrs. per week, 3 Credits

Section A:

Statistics:

Frequency Distribution. Mean Median Mode and Other Measure of Central Tendency. Standard Deviation and Measures of Dispersion. Moments. Skewness and Kurtosis. Elementary Probability Theory, Characteristics of Distribution. Elementary Sampling Theory, Estimation, Hypothesis testing and Regression Analysis.

Section B:

Complex Variable:

Complex Number System, General Functions of a Complex Variable. Limits and Continuity of a function of Complex Variable and Related Theorems. Complex Differentiation and the Cauchy – Riemann Equation. Infinite Series. Convergence and Uniform Convergence. Line Integral of a Complex Function. Cauchy Integral Formula. Liouville's Theorem. Taylor's and Laurent's Theorem. Singular Points Residue, Cauchy's Residue Theorem.

Recommended Books:

1. T.H. Piaggio, "Differential Equations", C.B.S Publishers and Distributions.
2. M.R. Spiegel, "Complex Variable", 3rd Edition, McGraw-Hill Book Company.
3. B.D. Gupta, "Mathematical Physics".

HSS 2251 Psychology
3 Hrs. per week, 3 Credits

Section A:

Introduction to Psychology. Cognitive Science; Reasoning, Object Recognition and Language Understanding. Learning Industrial Psychology; Introduction to Job and Job Analysis, Methods of Selection.

Section B:

Training in Industry; Motivation and Work, Job Satisfaction, Introduction to Ergonomics, System Engineering, Accident and Safety.

THIRD YEAR

FIRST TERM

CSE 3100 Technical Writing and Presentation 1.5 Hrs. per week 0.75 Credits.

Overview of Technical Research and Technical Writing: Technical Writing, Why Technical Writing, Role of a Technical Writer. Information Structure/Techniques in Technical Writing, Types of Technical Report, Business Letters, Graphic Aids, Software Development Life Cycle, DDLC, Documentation Process, and Technical Writing Process: Writing from rough draft, Audience Analysis, Task Analysis, Libraries, documentation and cross-referencing, Grammar and Editing, Technical Writing Software Tools: Microsoft Word, Macromedia Robohelp, Adobe Framemaker, MS Visio, Microsoft PowerPoint, and Adobe Photoshop. Contemporary communication

Recommended Books and Links:

1. Pickett and Laster, "Technical English: Writing, Reading and Speaking", 8th Edition.
2. <http://faculty.jsc.edu/technical-writing-syllabus.html>.

CSE 3101 Database Systems 3 Hrs. per week, 3 Credits

Section A:

Database, Database Management System, Purpose of Database System. Data Models: Object-based logical model, Record-based Logical Model. Database Languages: DDL and DML. Database Administrator, Database Users. ER Model: Basic Concepts, Design Issues, Mapping Constraints, ER Diagram, Extended ER Features, Design of an ER Database Schema, Reduction of an ER Schema to Tables. Relational Model: Structures of Relational Database, Relational Algebra. SQL: Basic Operations, Set Operations and joined Relations. Integrity Constraints: Domain Constraints, Referential Integrity and Functional Dependencies. Relational Database Design: Normalization using Functional Dependencies, Normalization using Multivalued Dependencies.

Section B:

Query Processing: Measures of Query Cost, Sorting, Join Operations and Evaluation of Expressions. Object-Oriented Databases: Object Oriented Data Model, Object Oriented Languages. Indexing and Hashing: Basic Concepts, Ordered Indices, B+- Tree Index Files, Static Hashing, Dynamic Hashing. Transactions: Basic Concepts, Transaction State, Concurrency Executions, Serializability and Recoverability. Concurrency Control: Different Control Protocols, Deadlock Handling. Recovery System: Failure Classification, Log-based Recovery, Shadow Paging. Distributed Databases: Distributed Data Storage, Network Transparency. Security and Integrity.

Recommended Books:

1. Henry F. Korth, Abraham Silverchatz & S. Sudarshan, "Database System Concepts", Third Edition, McGraw-Hill, Inc.
2. Ulman & Jeffery D., "Principle of Database System", Galgotia Publication Ltd.
3. C. J. Date. "An Introduction to Database Systems", Seventh Edition, Addison-Wesley.

CSE 3102 Database System Projects / Field Work
3 Hrs. per week, 1.5 Credits

Project / Field Work on current Database Management Systems based on **CSE 3101**

CSE 3104 Assembly Language Laboratory
3 Hrs. per week, 1.5 Credits

Microcomputer Systems, Representation of Numbers and Characters, Introduction to IBM PC Assembly Language, The Processor Status and Flag Registers, Flow Control Instructions, Logic, Shift and Rotate Operations, The Stack and Introduction to Procedures, Multiplication and Division Instructions, Array and Addressing Modes, String Instruction, Text Display and Keyboard Programming. Macros, BIOS and DOS Interrupts, Recursions, Disk and File Operations.

Recommended Books:

1. Ytha Yu, Charles Marut, “Assembly Language Programming and Organization of IBM PC”, Mc-Graw Hill International Edition.

CSE 3111 Microprocessors and Microcontrollers
3 Hrs. per week, 3 Credits

Section A:

Introduction to Microprocessors, Evolution of Microprocessors, Organization of Microprocessors, Instruction Formats and Types, Instruction Set, Addressing Modes, Memory, I/O Interfacing, DMA, Interrupt, Common Programmable Interface.

Section B:

Hardware and Software Interfacing In Microcomputer System Design, I/O Design and Testing. EEPROM Programming, Coprocessor Configuration, Numeric Coprocessor, I/O Processors, Multiprocessor Configuration, Parallelism in Microprocessors.

Recommended Books:

1. Mohamed Rafiquzzaman, “Microprocessors and Microcomputer-Based System Design”, Universal Book Stall, New Delhi.
2. Ramesh S. Gaonkar, “Microprocessor Architecture, Programming and Applications with 8085”, 4th Edition, Penram International Publishing (India).
3. Yu-Cheng Liu & Glenn A. Gibson, “Microprocessor Systems: The 8086/8088 family Architecture, Programming and Design”, 2nd Edition.
4. Douglas V. Hall, “Microprocessors and Interfacing: Programming and Hardware”, 2nd Edition, McGraw-Hill publishing Company.

CSE 3112 Microprocessors and Interfacing Laboratory/Project
3 Hrs. per week, 1.5 Credits

Laboratory / Projects based on **CSE 3111**

ECE 3151 Digital Electronics
3 Hrs. per week, 3 Credits

Section A:

Diode Logic Gates, Transistor Switches, Transistor Gates, OS Gates, Logic Families: TTL, ECL, IIL and CMOS Logic with operation details. Propagation Delay, Product and Noise Immunity. Open Collector and High Impedance Gates. Electronic Circuits for Flip-Flop, Counter and Register. Memory System, PLAs and PLDs, D/A Converters with applications. S/H Circuits, LED, LCD and optically coupled oscillators. Non-linear application of OP-AMP, Analog Switches.

Section B:

Linear wave shaping: diode wave shaping techniques, clipping and clamping circuits. Comparator Circuits, switching circuits, Pulse transformers, pulse transmission, Pulse generator; monostable, bistable and astable multivibrators; Schmitt trigger, Blocking oscillators and time-base circuits. Timing Circuits. Simple Voltage sweeps, Linear Current Sweeps.

Recommended Books

1. Millman & Taub, "Pulse, Digital and Switching Waveform".
2. Taub & Schilling, "Digital Electronics".
3. R.P. Jain , "Digital Electronics".
4. Millman & Halkias, "Microelectronics".

MATH 3153 Mathematical Methods
3 Hrs. per week, 3 Credits

Section A:

Differential Equations:

Solution of different equation by the methods based on the factorization of the operators. Cauchy Euler Equations. Frobenius Method. Bassel's and Legendre's differential Equations. Partial Differential Equations: Partial Differential Equations, Homogeneous, Non homogeneous, Linear equations, Mongis Method, Wave Equations. Particular solutions with boundary and initial conditions.

Section B:

Laplace Transform & Fourier Series:

Definition of Laplace Transform, Laplace Transform of different functions, Inverse Laplace Transform, Convolution, Evaluation of improper integrals by Laplace Transform. Solution of different equation by Laplace Transform. Fourier Series: Convergence of Fourier Series, Fourier Analysis, Fourier Integral. Z- Transformation and its application. Laplace Transforms and Fourier Series in Circuits.

Recommended Books:

1. M. D. Raisinghania, "Laplace and Fourier Transform".
2. F. Ayres, "Differential Equations".
3. R.T.H. Piaggio, "Differential Equations".
4. M.R. Spiegel, "Laplace Transform".

BA 3151 Accounting
3 Hrs. per week, 3 Credits

Section A:

Basic accounting principles, Cash book, Trial Balance, Balance Sheet, Bank Reconciliation Statement, Cost Accounts and objectives; Elements of a cost; Direct Cost, Overhead allocation.

Section B:

Preparation of a cost sheet, Computation of break even point, Standard Costing, Job Order Costing, Process Costing and Cost Variance.

Recommended Books:

1. Pyle & White, “Principle of Accounting”.
2. Pyle & Larson, “Principle of Accounting”.

THIRD YEAR

SECOND TERM

CSE 3200 Web Programming Project / Field work 3 Hrs. per week, 1.5 Credits

Internet and World Wide Web Applications, HTML, SGML, CGI Programming, Active Server Page Programming, Electronic Commerce, Internet Database, Javascript, VB Script, PHP, ASP.NET, JQuery, XML Programming, Flex, WCF, WPF, AJAX, MVC, Silverlight, CMS, Cold Fusion, Python, Mobile web applications.

CSE 3201 Operating Systems and Systems Programming 3 Hrs. per week, 3 Credits

Section A:

Assembler: General Design procedures, Table Processing. Macro Language and Microprocessors; Loaders: Design of absolute loader and direct link loader. Linkers, Translators, Evolution of Operating Systems: Early Operating Systems, Improvements in System Utilization, Spooling, Interrupts and Interrupt Handling, Multiprogramming and Time Sharing: Sharing of Space and Time, Protection and Integrity.

Section B:

Microcomputer and Microcomputer Systems, Distributed Computing and Network Based Systems. Virtual Systems: Virtual Memory, Paging and Segmentation, Virtual Devices and Generalization to Virtual Systems. Concurrency Management: Erroneous Results from concurrent Accesses, Concurrency on the basis of an Operating System, Cost Evaluation of Spooling, Long and Short Term Scheduling, Round Robin and Other Scheduling Policies. State Space Description of Operating System: Process Creation and Removal, Samples of Process Life Cycle and Bootstrapping, Layered Concepts in Operating Systems, Kernel, Memory Manager, I/O systems, File Manager, Resource Manager, Command Interpreter and Application Programs.

Recommended Books:

1. Abraham Silberschatz & Peter Baer Galvin, "Operating Systems Concepts", John Wiley and Sons (Asia) Private Limited.
2. Andrew S. Tanenbaum, "Operating System: Design and Implementation", Prentice-Hall of India Private Limited.
3. William Stallings, "Operating Systems", Prentice-Hall of India Private Limited.

CSE 3202 Operating System and Systems Programming Laboratory / Project 3 Hrs. per week, 1.5 Credits

Laboratory/Project works based on CSE 3201

CSE 3203 Software Engineering and Information System Design 4 Hrs. per week, 4 Credits

Section A:

Software: Its Nature and Qualities. Software Engineering Principles: Rigor and Formality, Separation of Concerns, Modularity, Abstraction and Incrementally. The Software Process: Process Models, Planning, Cost Estimation and Project Control, Software Design, Modularization: Structure, Representation, Interface and Information Hiding, Design Notations, Object Oriented Design: Object Paradigm, Introduction to a Specific Object-Oriented Design Techniques, Component Based Development. Software Specification, Operational Specification.

Section B:

Information System Development Environment: Information System Analysis, Role of System Analyst, SDLC, Modern Approaches to System Development, Different Types of IS. System Planning and Selection: Project Feasibility Analysis, BPP, SOW, SOPS, Determining System Requirements: Interview, Questionnaires, Directly Observing Users, Structuring System Requirements: Process Modeling, Context DFD, 0-Level DFD, n-Level DFD, Primitive DFD, DFD Decomposition, DFD Balancing, Logic Modeling, Structured English, Decision Tables, Use Cases, Data Modeling: Entity, Relationships, ERD, Degrees of Relationships, Cardinalities, Selecting Best Alternative Design Strategy, Designing Human Interface: Forms and Repots, Dialogs, Designing Databases: Schema, Table, Meta Data, Relational Database, Normalization, System Implementation and Operation: Coding, Testing: unit testing, Integration Testing, System Testing, Acceptance Testing, Installation, maintenance.

Recommended Books:

1. Joseph S. Valacich, Joey F. George, Jeffrey A. Hoffer, “Essentials of System Analysis and Design”, 2nd Edition, Prentice-Hall of India Private Limited, New Delhi.
2. Elias M. Awad, “System Analysis and Design”, 2nd Edition, Prentice-Hall of India Private Limited, New Delhi.

CSE 3203 Software Engineering and Information System Design Project
3 Hrs. per week, 1.5 Credits

Project works based on **CSE 3203**

ECE 3251 Data Communication
3 Hrs. per week, 3 Credits

Section A:

Introduction to modulation techniques: Pulse Modulation, Pulse Amplitude modulation, Pulse Width Modulation and Pulse Position Modulation. Pulse code modulation: Quantization, Delta Modulation, TDM, FDM, OOK, FSK, PSK, QPSK, Constellation Diagrams

Section B:

Probability of error for pulse systems, Concept of Channel Coding and Capacity, Error Detection and Correcting Codes, Asynchronous Communications, Hardware Interfaces, Multiplexer, Concentrators and buffers, Communication Medium, Fiber Optics, WDN.

Recommended Books:

1. William Stallings, “Data and Computer Communications”, 6th Edition, Prentice-Hall of India Private Limited, New Delhi.
2. Prakash S. Gupta, “Data Communications”, Prentice-Hall of India Private Limited, New Delhi.

BA 3251 Industrial Management and Law
3 Hrs. per week, 3 Credits

Section A:

Industrial Management:

Administration, Management and Organization, Authority and Responsibility. Scientific Management, Organization Structure, Organization chart, Span of Control: Selection and Recruitment of employees, Training and its types, Promotion, Wage System and Incentives, Job Evaluation and Merit Rating, Plant Layout, Layout of Physical Facilities, Transportation and Storage, Material Handling, Maintenance, Maintenance Policy, Production Control in intermittent and Continuous Manufacturing Industry, Functions of Production Control, Purchasing Procedures: Inventory need and Methods of Control, Factors affecting Inventory building up, Economic Lot Size and Recorder Point.

Section B:

Law:

Law of Contract, Elements of a valid Contract, Consideration, Parties component to contract, Sale of Goods, Hire and Purchase, Negotiable Instrument Act, Patent Right and Validity, Industrial Laws in Bangladesh: Factories Act, Industrial Relations Ordinance, Workmen's Compensation Act.

Recommended Books:

1. Herold Koontz, "Management".
2. W. H. Newman, "Administrative Action".
3. Terry & Frankin, "Principle of Management".

Option I with Lab. should be selected from the following Courses:

CSE 3221 Simulation and Modeling
3 Hrs. per week, 3 Credits

Section A:

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 Engineering, Introduction to Simulation Languages and Development of Simulation Packages.

Section B:

Modeling Methods: Different Methods for curves and surface Modeling, Solid Modeling, Polyhedral Modeling with Euler's Formula, Non-polyhedral Modeling, Advanced Modeling, Procedural Models, Fractal Models, and Physically Based Modeling.

Recommended Books:

1. Averill M. Law & David Kelton, "Simulation Modeling and Analysis", 3rd Edition, McGraw-Hill Publishing Company.
2. Geoffrey Gordon, "System Simulation", 2nd Edition, Prentice-Hall of India Private Limited.
3. Jerry Banks, John S. Carson & Barry L. Nelson, "Discrete Event System Simulation", 2nd Edition, Prentice-Hall of India Private Limited.
4. Narsingh Deo, "System Simulation with Digital Computer", Prentice-Hall of India Private Limited.

CSE 3222 Simulation and Modeling Laboratory / Project
3 Hrs. per week, 1.5 Credits

Laboratory/Fieldwork based on CSE 3221

CSE 3223 Neural Networks and Fuzzy Systems
3 Hrs. per week, 3 Credits

Section A:

Introduction to Neural Networks, Neural and Fuzzy Machine Intelligence, Neuronal Dynamics: Activation and Signals, Activation Models, Synaptic Dynamics: Unsupervised and Supervised Learning, Architectures and Equilibrium, Kohonen self-organizing Networks, Hopfield Networks, Pattern Recognition by Neural Network, Application of Neural Network.

Section B:

Fuzziness vs. Probability, Fuzzy Associative Memory, Comparison of Fuzzy and Neural trick backer upper Control Systems, Fuzzy Image Transform Coding, Comparison of Fuzzy and Kalman-filter, Target Tracking Control Systems.

Recommended Books:

1. Bart Kosko, “Neural Network and Fuzzy Systems: A Dynamic System Approach to Machine Intelligence,” 2nd Edition, Prentice-Hall of India Private Limited.
2. James A. Anderson, “An Introduction to Neural Networks”, Prentice-Hall of India Private Limited.
3. George J. Klir & Bo Yuan, “Fuzzy Sets and Fuzzy Logic: Theory and Applications”, Prentice-Hall of India Private Limited.
4. B. Yegnanarayana, “Artificial Neural Networks”, Prentice-Hall of India Private Limited.

CSE 3224 Neural Networks and Fuzzy Systems Laboratory 3 Hrs. per week, 1.5 Credits

Laboratory works based on CSE 3223

CSE 3225 Computational Geometry 3 Hrs. per week, 3 Credits

Section A:

Introduction: Historical Perspective, Algorithmic Background, Geometric Preliminaries, Models of Computation, Geometric Searching, Point Location Problem and Range Searching Problem, Divide and Conquer, Amortization, multi-dimensional Search, Space Sweep, Duality and Randomization, Convex Hulls.

Section B:

Proximity, Closest Pair Problems, Intersections, Voronoi and Delaunay Diagrams, Arrangements of lines and Points, Geometry of Rectangles, Hidden Surface Removal, Polygon Triangulation Art Gallery Theorems, Shortest Paths and Lower Bounds.

Recommended Books

1. Michael J. Laszo, “Computational Geometry and Computer Graphics in C++”, Prentice-Hall of India Private Limited.

CSE 3226 Computational Geometry Laboratory 3 Hrs. per week, 3 Credits

Laboratory / Fieldwork based on CSE 3225

CSE 3227 Geographical Information System 3 Hrs. per week, 3 Credits

Section A:

Introduction: Definition, Purpose (Organization, Visualization, Analysis: Spatial Query, Prediction), Components of Geography Based Information Systems, Application of GIS in private and The Evolution of Approaches to their Development. Data Input to Spatial Information: Basic Hardware, Software (Available in the market), types of Data Entry System, Criteria of Choosing Types of Input, Digitizer, Problems with Digitizing Maps, Error Shooting, Geographical Data Types and Methods of Representation, Spatial Database: Database Concepts, Point, Line and Polygon Features, Continuous Surfaces. The Organizational Role of GIS and Emerging Trends in GIS Development, Script Language in GIS (For example, Arc Avenue Development by ESRI).

Section B:

Vector and Raster Data Model, Format Conversion, Data Structures Conversion, Data Medium Conversion, Data Organization, Coordinate Systems and Geo-referencing (Concepts of Map Projection including suitability and Classification). GIS Data Modeling and Statistical Analysis, 3D GIS: Point to Line Interpolation, Line to TIN and TIN to Lattice to GRID Conversion, Simulation with 3D.

Recommended Books:

1. Bonham-Carter & Graeme F, “Geographical Information System for Geoscientists : Modeling with GIS”, Prentice-Hall of India Private Limited.

CSE 3228 Geographical Information System Laboratory / Fieldwork
3 Hrs. per week, 1.5 Credits

Laboratory / Fieldwork based on **CSE 3227**

Khulna University, Khulna
Science, Engineering and Technology School
Computer Science and Technology Discipline
Summary of Courses for the Degree of B.Sc. Engg. (CSE)
(Effective from Academic Session 2010-2011)

FOURTH YEAR

FIRST TERM

CSE 4100 Project and Thesis I
3 Hrs. per week 3 Credits.

Study of problems in the field of Computer Science and Engineering.

N. B. The Project and thesis topic selected in this course is to be continued in the CSE 4200 Course.

CSE 4103 Computer Graphics
3 Hrs. per week 3 Credits.

Section A:

Introduction to Computer Graphics: History, Applications of Computer Graphics (Computer Aided Design, Animation), A Survey of Graphics I/O Devices and Types. Graphics Software Design: Survey of Desired Functions, Toward a Universal Graphic Language, Display Files, Data Bases 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, Scan Conversion, Two Dimensional Graphics, 2D transformation, 2D viewing and Clipping.

Section B:

Three dimensional Graphics, 3-D Transformation, 3D viewing and Clipping, Curves and Surfaces, Hidden Surface Problem: Back Face Removal, Hidden line Removal, Texture Mapping.

Recommended Books:

1. 1. R.A. Plastock & G. Kalley ,“Theory and Problems of Computer Graphics”, Schaum's Outline.
2. Steven Harrington, “Computer Graphics: A Programming Approach”,2nd Edition, McGraw-Hill.
3. Newmann Sprocell, “Principles of Interactive Computer Graphics”, McGraw-Hill Education.

CSE 4104 Computer Graphics Laboratory/ Project
3 Hrs. in every alternate week 0.75 Credits.

Laboratory works based on **CSE 4101**.

CSE 4105 Compiler Design
3 Hrs. per week 3 Credits.

Section A:

Introduction to Compilers, lexical analyzer, regular expression, non-deterministic finite automata (NFA) and deterministic finite automata (DFA), contexts free grammar, ambiguous grammar, basic parsing techniques.

Section B:

Intermediate code, symbol table, data structure for symbol table, Run time storage administration, Error detection and recovery, code optimization, code generation.

Recommended Books:

1. Aho, Ullman & Raavishethi, “Principles of Compiler Design”, 2nd Edition, Pearson Education, Inc.
2. Philip M. Lewis, “Compiler Design Theory”, Addison-Wesley Pub.
3. Willam A. Barrette, “Compiler Construction: Theory and Practice”.

CSE 4106 Compiler Design Laboratory/Project
3 Hrs. in every alternate week 0.75 Credits.

Laboratory works based on CSE 4105.

Students will complete three Projects with proper documentation as assigned by teacher.

CSE 4111 Computer Networks
3 Hrs. per week 3 Credits.

Section A:

Network Architecture - layered architecture and ISO- OSI reference model: data link protocols, error control, HDLC, X 25. flow and congestion control, virtual terminal protocol, data security.

Section B:

Local area networks, satellite networks, packet radio networks. Introduction to ARPANET, SNA and DECNET. Topological design and queuing models for network and distributing computing systems.

Recommended Books:

1. Gerd Keiser, “Local Area Network”, McGraw-Hill Education.
2. Andrew S. Tanenbaum, “Computer Network”, 5th Edition.
3. D.W. Davies, “Computer Networks and their Protocols”, John Wiley & Sons Ltd.

CSE 4112 Computer Networks Laboratory/Fieldwork
3 Hrs. in every week 1.50 Credits.

Laboratory works based on CSE 4111.

Fieldwork within and around Khulna City.

Option I and Option II should be selected from the following courses.

CSE 4121 Applied Probability and Queuing Theory
2 Hrs. per week 2 Credits.

Section A:

Probability distribution and expectations, discontinuous probability distribution, e.g. binomial, Poisson and negative binomial, Continuous probability distribution, e.g. normal and exponential. Stochastic processes, Discrete time Markov chain and continuous time Markov Chain. Birth-death process in queuing.

Section B:

Queuing models: M/M/1, M/M/C, M/G/I, M/D/I, G/M/I solution of network of queue-closed queuing models and approximate models. Application of queuing models in Computer Science.

Recommended Books:

1. K. L. Chung, "Markov Chains with Stationary Transition Probabilities", Springer.
2. E. Cinlar, "Introduction to Stochastic Processes", Prentice Hall College Div.
3. White, Schmitt, Pennette, "Analysis of Queuing theory".
4. Klienrock, "Queuing Theory Vol. I & II", Wiley-Interscience.

CSE 4123 Parallel and Distributed Processing
2 Hrs. per week 2 Credits

Section A :

Parallel Processing: Importance, Architecture, Hardware and software issues; Architectures for parallel processing - Classifications, Comparative study of different architectures; Hardware issues in parallel processing, Parallel programming; Distributed Processing: Definition, Impact of distributed processing on organizations, pitfalls in distributed processing.

Section B:

Forms of distributed processing: Function distribution, Hierarchical distributed systems, Horizontal distributed systems; Strategy: Strategies for distributed data processing control of complexity, problems of incompatibility, centralization vs. decentralization, cost and benefit analysis; Design of distributed data: Distributed data, location of data, multiple copies data, conflict analysis database management, distributed databases and applications; Software and Network Strategy: Software strategy, the ISO seven layers, architectural interfaces, physical link control, network management etc.

Recommended Books:

1. J.M. Crichlow, "Distributed and Parallel Computing".

CSE 4125 Computational Geometry
2 Hrs. per week 2 Credits.

Section A :

Introduction: Historical perspective, algorithmic background, geometric preliminaries, models of Computation. Geometric searching, point location problem and range searching problems, Divide & conquer, amortization, multi-dimensional search, space sweep, duality and randomization. Convex hulls.

Section B:

Proximity, Closest pair problems, Intersections, Voronoi and Delaunay diagrams, arrangements of lines and points, Geometry of rectangles, polygon triangulation art gallery theorems, shortest paths, and lower bounds, Connectivity, Matching, Random Numbers, Parallel Algorithms.

Recommended Books:

1. Shamos, "Computational Geometry", Springer.
2. Robert Sedgewick, "Algorithms".
3. Knuth, "The Art of Computer Programming Vol. 2. Seminumerical Algorithms".

CSE 4127 Multimedia
2 Hrs. per week 2 Credits.

Section A:

Definition for Multimedia System, Text, Images and graphics: Basic concepts, Computer image processing, Audio: Basic concepts, Music, MIDI, Speech; Video and animation: Basic concepts, Computer base animation, Data Compression Techniques: JPEG; H.261 (px64); MPEG; Intel's DVI; Microsoft AVI; Audio compression; Fractal compression, Video compression, Multimedia file standards: RTF; TIFF; RIFF; MIDI: JPEG.

Section B:

Multimedia Storage and Retrieval Technology: Magnetic media technology; optical media technology; Basic technology, CD Digital audio, CD-ROM, its architecture and further development, CD write only (CD-WO), CD-magnetic optical (CD-MO). Electronic Publishing: Concepts and future of Electronic Publishing.

Recommended Books:

1. John F. Koegel Buford, "Multimedia Systems", Addison-Wesley.
2. John McCoy, "Mastering Web Design", 2nd Edition, BPB Publications.

CSE 4129 Human Computer Interaction
2 Hrs. per weeks 2 Credits.

Section A:

Introduction to Human-Computer Interaction (HCI). Human Information Processing Systems, Models of interaction. Approaches to HCI. User Interface.

Section B:

User system interaction: analysis and design. user Interface Design. Interface Technique and Technology. Case Studies.

Recommended Books:

1. Dix, "Human Computer Interaction 3/e", 3rd Edition, Prentice Hall Engineering/Science/Mathematics.
2. M. Helander, "Handbook of Human-Computer Interaction. 2/Reved".

CSE 4131 E-Commerce
2 Hrs. per weeks 2 Credits.

Section A :

Foundations of Electronic Commerce, Retailing in Electronic Commerce, Internet Consumers and Market Research, Advertisement in Electronic Commerce, Electronic Commerce for Service Industries.

Section B :

Business-to-Business Electronic Commerce, Internet and Extranet, Electronic Payment systems, EC strategy and Implementation, Public policy: From legal issues to Privacy, Infrastructure for Electronic Commerce, Economics, Global and other issues in Electronic Commerce.

Recommended Books:

1. Turban, Lee, King chung, "Electronic Commerce: A Managerial Perspective".
2. Brenda Kienan, "Managing your E-Commerce Business", 2nd Edition, Microsoft Press.

**CSE 4133 Distributed Database System
2 Hrs. per weeks 2 Credits.****Section A :**

Introduction to Distributed database systems, Database system architecture: Centralized system, Client-server systems, Parallel systems, Distributed systems, Network types, Distributed Data storage, Network Transparency, Data Query Processing.

Section B :

Data Transaction model, Commit protocols, coordinator selection, concurrency control, Deadlock handle, Multi Database system, Design of Distributed Database, Location of Database, Multiple copies of Data, Distributed Database and Applications.

Recommended Books:

1. T.J. Theory & J.P. Fry, "Design of Database structures", Prentice Hall.
2. G. Weiderhold, "Database Design".

**CSE 4135 Graph Theory
2 Hrs. per weeks 2 Credits.****Section A :**

Structure and Basic Definition of Graph theory, methodology, proofs, basic properties of graphs, graph operations and their symbolic designation, Orientation of graphs, associated matrices and their relationships, Groups, automorphism graphs, symmetric graphs, graph enumeration, graph coloring, five color problem, four color conjecture, Heawood map coloring theorem, critical graphs, homomorphism.

Section B :

Graph algorithms, Ordered tree, Hoffman tree, Catalan numbers, maxflow problem and solutions, maximum matching in bipartite graph, zero-one net flow, NP-complete problems, Euler and Hamilton path and circuit.,

Recommended Books:

1. Narshing Deo, " Graph theory with applications to Engineering and Computer Science", Prentice-Hall.

**CSE 4137 Theory of Computation
2 Hrs. per weeks 2 Credits.****Section A :**

Language theory; pushdown automata; Context free languages

Section B :

Turing Machines: basic machines, configuration, computing with Turing machines, combining Turing machines; Undecidability.

Recommended Books:

1. Harry R. Lewis, Christos H. Papadimitriou, “Elements of the Theory of Computation”, 2nd Edition, Prentice-Hall.

ECE 4151 Digital Signal Processing 2 Hrs. per week 2 Credits.

Section A :

Discrete time description of signals and systems, Fourier transform of discrete time signals, Discrete Fourier Transform.

Section B:

Z-transform, Digital filter structure, Infinite Impulse Response Filter design techniques. Finite Impulse Response Filter design techniques, Finite precision effects, Inverse filtering.

Recommended Books:

1. A. V. Oppenheim & R. W. Schafe, “Digital Signal Processing”, 3rd Edition, Prentice Hall.
2. A. V. Oppenheim & R. W. Schafe, “Digital Time Signal Processing”, 4th Edition, McGraw-Hill.

ECE 4153 VLSI Design and Testability 2 Hrs. per week 2 Credits.

Section A :

Introduction to microelectronics and MOS technology, Basic electrical properties and circuit design processes of MOS and BiCMOS circuits, Scaling of MOS circuits, Subsystem design processes and layout.

Section B:

Computational elements: Design of an ALU subsystem, Adder, Multipliers, Memory, Registers, and aspects of system timing. Practical aspects of design tools and testability, CMOS design: behavioral description, structural description, physical description and design verification, Introduction to GaAs technology: Ultra-fast VLSI circuits and systems.

Recommended Books:

1. Douglas A. Pucknell, K. Eshraghian, “Basic VLSI Design”.

ECE 4155 Wireless and Optical Networks 2 Hrs. per week 2 Credits.

Section A:

Overview of the wireless environment and wireless communication systems, Antennas and Propagation, Spread Spectrum, Coding and Error Control, IEEE 802.11, Mobile IP, Multi-hop ad hoc networks, Bluetooth, TCP for wireless, Cellular Wireless Networks, satellite communications.

Section B:

Introduction to optical networks and network components, Routing and wavelength, Logical topology design, Traffic grooming, Dynamic lightpath establishment, Protection and restoration, Optical Burst switching, Optical packet switching.

Recommended Books:

1. William Stallings, “*Wireless Communications and Networks*” Prentice Hall, 2001.
2. Rajiv Ramaswami & Kumar Sivarajan, “*Optical Networks: A Practical Perspective*”, 2nd Edition, Morgan-Kaufmann Publishers ISBN: 1558606556, 2002.

CSE 4160 Industrial Training 3 Weeks Non Credit

Students will take 3 weeks industrial training in an "Computer Science and Engineering related industry or establishment. Student will be evaluated on the basis of a report submitted by them after the completion of the training, oral examination and the report from the concerned industry or establishment. This training is to be organized during the inter - session break.

CSE 4170 Advanced Business Venture 3 Weeks Non Credit

Discipline will arrange workshops/seminars on IT Business Venture. IT Executives from different IT related companies will conduct lectures on their business ways, rules, ongoing projects etc. Students will be evaluated on the basis of a report submitted by them after the completion of these workshops/seminars.

FOURTH YEAR

SECOND TERM

CSE 4200 Project and Thesis II 3 Hrs. per week 3 Credits.

Continuation of project and thesis topic undertaken in **CSE 4100**.

CSE 4205 Artificial Intelligence 3 Hrs. per week 3 Credits.

Section A:

Introduction: Definition of AI, Historical Development of AI, Applications of AI, AI Techniques. Logic: Propositional Logic, First-Order Logic, Resolution Principle. Problems Representation: State-Space Representation, Problem- Reduction Representation. Production Systems: PS Structure, Recognition-Action Cycle, Inference Directions, Blackboard Systems, PS Implementation. Relational Data Model: Relational Database Model, Entity and Relationship, Generalization and Aggregation. Search: Blind and Non-Blind Searches, Depth-First Search, Breadth-First Search, Heuristic Search, Best-First Search, Optional Search, A search, Implementation Complexity, Constraint Satisfaction Problems.

Section B:

Predicate Logic, Game Playing, Natural Language Processing, Syntactic Semantics and Pragmatics, 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).

Recommended Books:

1. Elaine Ritch, Kevin Knight, “Artificial Intelligence”, 2nd Edition, McGraw – Hill.
2. Nils J. Nilsson, “Artificial Intelligence”, Morgan Kaufmann.
3. Herbert Schildt, Stuart Russel, “Artificial Intelligence”.
4. Guy L. Steele Jr., “Common LISP Language”, 2nd Edition.
5. Carl Townsend, “An introduction to Turbo Prolog”, Sybex.

**CSE 4206 Artificial Intelligence Laboratory/Project
3 Hrs. in every week 1.50 Credits.**

Laboratory works based on **CSE 4205**.

Students will complete three Projects with proper documentation as assigned by teacher.

Option I with Sessional and Option II with Sessional should be selected from the following courses.**CSE 4221 Pattern Recognition
3 Hrs. per week 3 Credits.****Section A:**

Introduction and General Pattern Recognition Concepts, Introduction to Statistical Pattern Recognition, Supervised Learning using Parametric and Non Parametric Approaches, Linear Discriminant Functions and The Discrete and Binary Feature Cases, Unsupervised Learning and Clustering, Syntactic Pattern Recognition: Syntactic Recognition Via Parsing and Other Grammars.

Section B:

Graphical Approach to Syntactic Pattern Recognition, Learning Via Grammatical Inference, Neural Pattern Recognition: Introduction to Neural Pattern Associates and Matrix Approaches and Unsupervised Learning in Neural Pattern Recognition.

Recommended Books:

1. Gonzaleg, “Pattern Recognition Principles”, Addison-Wesley.

**CSE 4222 Pattern Recognition Laboratory/ Project
3 Hrs. in every alternate week 0.75 Credits.**

Laboratory works based on **CSE 4221**.

Students will complete three Projects with proper documentation as assigned by teacher.

**CSE 4223 Data Warehousing and Mining
3 Hrs. in every week 3 Credits.****Section A:**

Introduction, Data preprocessing, Data mining primitives, languages and systems, Descriptive data mining, characterization and comparison, Association analysis, classification and prediction, cluster analysis, mining complex type of data, applications and trends in data mining.

Section B:

The knowledge discovery process, data selection, cleaning, enrichment, coding, data mining, reporting, data warehousing and OLAP technology for data mining, setting up a KDD environment, some real-life applications.

Recommended Books:

1. Pieter Adriaans & Dolf Zantinge, "Data Mining", Addison-Wesley.

CSE 4224 Data Warehousing and Mining Laboratory/ Fieldwork
3 Hrs. in every alternate week 0.75 Credits.

Laboratory works based on **CSE 4223**.

Students will complete three Projects with proper documentation as assigned by teacher.

CSE 4231 Digital System Design
3 Hrs. in every week 3 Credits.

Section A :

Combinational logic with MSI and LSI circuits, Sequential Circuits, registers, counters and memory unit, register transfer logic, micro-operations, Processor logic design.

Section B:

Control logic design Micro-programmed control, Pipeline and vector processing, Computer arithmetic, microcomputer system design: Case study.

Recommended Books:

1. M. M. Mano, "Computer Engineering", 3rd Edition, Prentice Hall.
2. M. M. Mano, "Digital Logic and Computer Design", Prentice-Hall.
3. A. P. Malvino, "Digital Computer Electronics", 3rd Edition, Mc Graw. Hill.
4. A. P. Malvino & J. A. Brawn, "Digital Computer Electronics".

CSE 4232 Digital System Design Laboratory/ Project
3 Hrs. in every alternate week 0.75 Credits.

Laboratory works based on **CSE 4231**.

Students will complete three Projects with proper documentation as assigned by teacher.

CSE 4233 Client Server Technology
3 Hrs. in every week 3 Credits.

Section A:

Fundamentals of Client/Server systems, Client/server components, software and hardware requirements, software (e.g. database management systems, communication servers, remote access services, application services); network and data communication: network models and topologies, data communication strategies. Client-server implementation along with the analysis and design issues inherent to the client-server paradigm.

Section B:

Server and Network Operating systems, network operating systems to support the client-server paradigm (e.g. UNIX/NT); client operating system, data management, middleware, DCE, RPC and COBRA, role of remote procedure call, inter-process communication and named pipes to provide remote execution and message passing capabilities client/server system design, distributed system application architecture and process design, the theory behind each component, development tools, User interface design, security, future trends.

Recommended Books:

1. Robert Orfali & Dan Harkey, “Client-Server programming with Java and Cobra”, 2nd Edition.
2. Jenkins et. al, “Client/Server Unleashed”, Tata McGrawHill.

CSE 4234 Client Server Technology Laboratory/ Fieldwork
3 Hrs. in every alternate week 0.75 Credits.

Laboratory works based on **CSE 4233**.

Students will complete three Projects with proper documentation as assigned by teacher.

CSE 4235 Computer Peripherals and Interfacing
3 Hrs. in every week 3 Credits.

Section A:

Interrupts, address space partitioning, A-to-D and D-to-A converters, some related chips, interfacing ICs of I/O devices-I/O ports, programmable peripheral interface, DMA controller, interrupt controller, communication interface, interval time, etc. interfacing with microcomputer, interfacing I/O devices, floppy disk, hard disk, tape, CD—ROM and other optical memory, keyboard, mouse, monitor, plotter. Scanner, etc.

Section B:

Microprocessor in scientific instruments, display, Protective relays, measurements of electrical quantities, temperature monitoring system, water level indicator, motor speed controller, traffic light controller, etc. microprocessor based interface design.

Recommended Books:

1. Ramesh S. Gaonker, “Microprocessor architecture, programming and applications with 8085”, 5th Edition, Prentice Hall.
2. Douglas V. Hall, ”Microprocessors and interfacing: programming and Hardware”, Gregg Division, McGraw-Hill.

CSE 4236 Computer Peripherals and Interfacing Laboratory/ Project
3 Hrs. in every alternate week 0.75 Credits.

Laboratory works based on **CSE 4235**.

Students will complete three Projects with proper documentation as assigned by teacher.

CSE 4237 Computer Animation and Virtual Reality
3 Hrs. in every week 3 Credits.

Section A:

Introduction: Computer graphics, two and three dimensional geometry, vectors in graphics, representation and modeling of three dimensional objects, polygonal representation, parametric representation, constructive solid geometry, transformation and viewing: frames of reference, viewing systems, 3D transforms, projections and clipping. Reflection and illumination models, theoretical considerations in reflection, geometric considerations, color, phong reflection model, surface rendering, incremental shading algorithms, rasterization, hidden surface elimination algorithms, hidden line removal methods, splines: spline specification, cubic splines, Bezier curves, B-spline curves and surface, rendering parametric surfaces. Shadows and textures: function of shadows, shadow algorithms, textures, texture domain techniques, graphics Animation: Real time graphics, graphics display and updates, key framing systems, motion specification.

Section B:

Virtual reality, virtual reality systems, real-time computer graphics, overview of application areas, the virtual environment, the computer environment, VR technology, Models of interaction, virtual reality hardware: sensor hardware, display systems, acoustic hardware, integrated VR systems, virtual reality software, modeling of virtual worlds, simulation, VR toolkits, 3D computer graphics: the virtual world space, perspective projection, stereo vision, 3D clipping, color theory, 3D modeling, illumination models, 3D transforms, instances, picking, flying, scaling the VE, collision detection, animating the virtual environment, introduction to animation, the dynamics of numbers, updating real-time graphics, shape and object inbetweening free-form deformation.

Recommended Books:

1. Allen Watt & Mark Watt, "Advanced animation and rendering techniques.", Addison-Wesley Professional.
2. Lee Adams, "Visualization and virtual reality: 3D programming with visual basic", McGraw-Hill Companies.

CSE 4238 Computer Animation and Virtual Reality Laboratory/ Project
3 Hrs. in every alternate week 0.75 Credits.

Laboratory works based on **CSE 4237**.

Students will complete three Projects with proper documentation as assigned by teacher.

Option III should be selected from the following courses.

CSE 4241 Knowledge Engineering
3 Hrs. in every week 3 Credits.

Section A :

Knowledge Engineering Basic Knowledge Representation and Utilization: Production Systems (PS), Semantic Networks, Frames, Logic, Object-Oriented Paradigm, Logic Programming, Neural nets. Incomplete Knowledge and Non-Monotonic Logic. Uncertain Knowledge: Bayesian Probability Theory, Dempster-Shafer Theory, Fuzzy Set Theory.

Section B:

Application Diagnosis. Knowledge Acquisition and Machine Learning: Problems of and Approaches to Knowledge Acquisition, Knowledge Acquisition Support Systems, Machine Learning. Meta - reasoning and Meta-knowledge. Knowledge System Development Environment: AI languages, Shells.

Recommended Books:

1. Aleksander, H. Morton, "An Introduction to Neural Computing", International Thomson Computer Press.
1. 2. P. Hayes Roth, A. Waterman & B. Lenat, "Building Expert Systems", Addison-Wesley.
2. A. Barr & E. A. Feigenbaum, "The Handbook of Artificial Intelligence, Vols. I-IV", Addison-Wesley.
3. P. Harmon & D. King, (1985), "Expert Systems: Artificial Intelligence in Business", J. Wiley.
4. Kowalski (1979), "Logic for Problem Solving", Ediciones Díaz de Santos, 1979.
5. J. W. Lloyd (1984), "Foundation of Logic Programming", Springer- Verlag.
6. C.V. Negoita (1985), "Expert Systems and Fuzzy Systems", Benjamin/Cummings Pub. Co.
7. M . R. Genesereth, N. T. Nilsson, "Logical Foundation of AL", Morgan Kaufmann Publishers, Inc.
8. Indea Pearl (1988), "Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference", Morgan Kaufmann Publishers.

**CSE 4243 Machine Learning
3 Hrs. in every week 3 Credits.****Section A:**

Introduction, supervised and unsupervised learning in propositional logic, induction of decision trees, noise and over-fitting issues, minimum description length principle, conceptual clustering, version space, nearest neighbor classifier, genetic algorithm, computational learning theory, neural network and fuzzy logic.

Section B:

Learning in first order logic, top-down approaches for inducing first order theory, handling noise, first order theory revision, predicate invention, application of inductive logic programming, multiple predicate learning, different types of learning bias, Pac learnability, knowledge discovery in database and data mining, text and image retrieval.

Recommended Books:

1. P.D. Wasserman, "Neural Computing: Theory and Practice.", Van Nostrand Reinhold.
2. Gray Braiscoe, Tray Caelli, "A compendium of machine learning.", Ablex Pub.

**CSE 4245 Robotics and Computer Vision
3 Hrs. in every week 3 Credits.****Section A:**

Robotics manipulation, direct kinematics: The Arm Equation, Inverse Kinematics: Solving the arm equation, work space analysis and trajectory planning, differential motion and static, manipulator dynamics, robot control, task planning.

Section B:

Relationship between image and world structure, image representation, segmentation pattern, perspective transformation, camera calibration, shape analysis, object recognition and picture languages.

Recommended Books:

1. Robert J Schilllin, "Fundamentals of Robotics: Analysis and Control", Prentice Hall.

CSE 4247 Information Security and Control
3 Hrs. in every week 3 Credits.

Section A:

Introduction to Information Systems Security. Information system security management, risk analysis and management, physical and logical security, database and telecommunications security, Systems Security and Controls.

Section B:

Computer abuse, Internet and Electronic commerce, Special Security Considerations and Aspects. Legal and Ethical Issues. Managerial Issues. Case Studies.

Recommended Books:

1. Pfleeger, "Security in Computing 2/e", Arca Systems, Inc.
2. Dhillon, "Managing Information System Security". MacMillan.
3. Ince, "Planning and Architectural Design of Modern Command Control Communication System", Springer.

CSE 4249 Decision Support System
3 Hrs. in every week 3 Credits.

Section A:

Introduction to Decision Support System (DSS). Decision making models, Underlying Framework for DSS. hardware and Software for DSS. Use of decision tools.

Section B:

Development of DSS. issues of model management and interface design. DSS Applications: Executive Information System (EIS), Computer Mediated Communication within an Organization and special aspects.

Recommended Books:

1. R.H. Bonczek, C.W. Holsapple & A.B. Whinston, "Foundations of Decision Support System", New York: Academic Press.
2. J.H. Moore & M.G.Change, "Design of Decision Support Systems", O'Brien, James A.
3. E.D. Cadson, "An Approach for Designing Decision Support Systems".