

NATIONAL UNIVERSITY



First Year Syllabus Department of Computer Science and Engineering

Four Year B.Sc. Honours Course
Effective from the Session: 2017–2018

National University
Subject: Computer Science and Engineering
Syllabus for Four Year B.Sc. Honours Course
Effective from the Session: 2017-2018

Year wise courses and marks distribution

FIRST YEAR

Semester I

Course Code	Course Title	Credit Hours
510201	Structured Programming Language	3.0
510202	Structured Programming Language Lab	1.5
510203	Electrical and Electronic Circuit	3.0
510204	Electrical and Electronic Circuit Lab	1.5
510205	Calculus	3.0
510207	Physics	3.0
510209	English	3.0
	Total Credits in 1st Semester	18.0

Semester II

Course Code	Course Title	Credit Hours
510221	Digital Systems Design	3.0
510222	Digital Systems Lab	1.5
510223	Discrete Mathematics	3.0
510225	Linear Algebra	3.0
510227	Statistics and Probability	3.0
510229	History of the Emergence of Independent Bangladesh	3.0
	Total Credits in 2nd Semester	16.5

Detailed Syllabus

First Semester

Course Code : 510201	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Structured Programming Language		

Computer Programming Techniques:

Overview of Structured Programming Language concept; algorithm , flowchart and pseudo code; Constants, variables and data types; Operator & Expression; Managing Input & Output Operations; Decision making and branching; Looping; Arrays; Handling of character strings; User-defined functions; parameter passing conventions, scope rules and storage classes, recursion; Structure and union; Pointers; File management; header files; preprocessor; library functions; error handling;

Reference language: C

Reference Books:

- 1) *Shaum's Outline of Theory and Problems of Programming with C*, B. S. Gottfried, McGraw Hill, 3rd Edition.
- 2) *Teach Yourself C*, Herbert Schildt, Published by Osborne, 3rd Edition.

Course Code : 510202	Marks : 40	Credits : 1.5	Class Hours : ---
Course Title :	Structured Programming Language Lab		

Objectives: Laboratory classes are based on course CSE 510201. The goal of this lab is to provide students with the skills needed to effectively design, develop, implement, debug, test, and maintain programs and more generally to solve problems in C programming language using a computer. Students will be asked to solve various problems in a regular basis to increase their programming ability. At the end of the course, students will have to develop a simple real-life programming project.

Course Code : 510203	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Electrical and Electronic Circuit		

AC Fundamentals : Basic Principles of AC Generators, Alternating Voltages and Currents, Frequency, Amplitude and Phase, RMS and Average Value, Form Factor, Resistance, Inductance, Capacitance, RLC Series Connection and Resonance, Parallel Resonance.

Network theorem: KVL, KCL, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem.

Introduction to Semiconductors: Semiconductors and their properties, Intrinsic and extrinsic semiconductors.

Semiconductor Diodes and Special Purpose Diodes: The p-n junction formation, properties and V-I characteristics, Basic constructions, characteristics, operations and uses of special diodes, Light emitting diode (LED), Zener diode.

Regulated Power Supply: Voltage regulation, rectifiers, half-wave and full-wave rectifiers, Voltage regulator circuits- Zener diode and transistor voltage regulator.

Bipolar Junction Transistors: npn and pnp transistors, Amplifying and switching actions of transistor, Transistor characteristics in CB, CE and CC configurations, Operating point, Transistor load line analysis, BJT Biasing.

Field Effect Transistors: Classification of FET, Construction, operation and characteristics of JFET, Operation and characteristics curves of MOSFET, DC biasing of JFET.

Feedback Techniques and Op-amps: Negative and positive feedback, characteristics and gain with negative voltage and current feedback, Emitter Follower, Basic Op-amps- characteristics, inverting, non-inverting, integrators, differentiators, summing amplifiers.

Reference Books:

- 1) *A Textbook of Electrical Technology*, Volume I, B.L. Theraja and A.K. Theraja
- 2) *Electronic Devices and Circuit Theory*, Robert L. Boylestead and Louis Nashelsky

Course Code : 510204	Marks : 40	Credits : 1.5	Class Hours : --
Course Title : Electrical and Electronic Circuit Lab			

Objectives: Laboratory classes are based on CSE 510203. Verification of ohm's law and measurement of Resistivity of a Metallic wire, To verify Kirchhoff's Current law and kirchhoff's Voltage law, To verify Thevenen's theorem, To verify Norton's theorem, To verify Superposition theorem, To study R-C circuit and to find out the time constant, To study the R-L-C series Resonance circuit. I-V Characteristics of diode, Input and Output Characteristics of BJT: Common-Base Configuration(CB), Common-Emitter Configuration (CE), I-V characteristic of Zener diode.

Course Code : 510205	Marks : 80	Credits : 3	Class Hours : 45
Course Title : Calculus			

Differential Calculus

Function and their graphs (polynomial and rational functions, logarithmic and exponential functions, trigonometric functions and their inverses, hyperbolic functions and their inverses, combination of such functions).

Limits of Functions: Definition. Basic limit theorems with proofs: limit at infinity and infinite limits, Continuous functions. Algebra of continuous functions. Properties Continuous functions on closed and boundary intervals (no proof required).

Differentiation : Tangent lines and rates of change. Definition of derivative. One-sided derivatives. Rules of differentiation (proofs and applications). Successive differentiation. Leibnitz theorem. Related rates. linear approximations and differentials.

Rolle's theorem: Lagrange's and Cauchy's mean value theorems. Extrema of functions. problems involving maxima and minima. Concavity and points of inflection.

Taylor's theorem with general form of the remainder ; Lagrange's and Cauchy's forms the remainder. Taylor's series. Differentiation and integration of series. Validity of Taylor expansions and computations and computations with series. indeterminate forms. L-Hospital's rules.

Integral Calculus

Integrals: Antiderivatives and indefinite-integrals. Techniques of Integration. Definite Integration using antiderivatives. Definite Integration using Riemann sums.

Fundamental theorems of Calculus, Basic properties of Integration. Integration by reduction.

Application of Integration: Plane areas. Solids of revolutions. Volumes by cylindrical shells volumes by cross-sections. Arc length and Surface of revolution.

Improper integrals. Gamma and Beta functions.

Graphing in polar co-ordinates. Tangents to polar curves. Area and length in polar coordinates.

Reference Books:

- 1) *Differential Calculus*, B. C. Das, B. N. Mukherjee
- 2) *Integral Calculus*, Dr. Abdul Matin
- 3) *A Text Book on Differential Calculus*, Mohammad, Bhattacharjee and Latif

Course Code : 510207	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Physics		

Charge, Electric field & Gauss's Law: Simple phenomena in electrostatics; Electrostatic induction and charge density; Coulomb's law; Electric field & field strength; Point charge in an electric field; dipole in an electric field; Electric flux; Gauss's law and some applications; Electric potential; Potential due to a point charge; Equipotential surfaces; Potential energy; Potential gradient; Capacitance and its calculation; Parallel plate capacitor with dielectric; Dielectric & Gauss's law; Electric vectors; Energy stored in an electric field.

Electric current, Simple circuits and Electrical Measurements: Current and Ohm's law; E.M.F. and potential difference; Whetstone bridge; Simple RC and RL circuits, The potentiometer; Moving coil galvanometer; Ammeter; Voltmeter; Multimeter; Wattmeter.

Magnetic Field & force on Current: Coulomb's law; Magnetic field and field strength; Magnetic force on current; Directions of current and field; Maxwell's screw rule; Fleming's left hand rule; Magnetic field near long wire; Magnetic field for solenoid; Fleming's right hand rule;

Magnetic properties of matter: Poles and dipoles; Coulomb's law for magnets & Gauss's theorem of magnetism; Dia-magnetism, Para-magnetism and Ferro-magnetism. Magnetomotive force and field intensity; concept of self and mutual inductance; The coefficient of magnetic coupling; Rise of current and decay of current in inductive circuit; Energy in magnetic field; Inductance in series and parallel; Hysteresis and eddy current losses.

Reference Books:

1. David Halliday and Robert Resin, Physics Part-II
2. Boylested, Introductory Circuit Analysis
3. B. L. Theraja, A Text book of Electrical Technology

Course Code : 510209	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	English		

This course adopts an integrative approach to teaching the four basic skills: speaking, listening, reading and writing. Special emphasis will be given to the development of reading and writing skills. To ensure maximum benefit from this course, 30% of the total marks will be allotted to class work in reading and writing. **Speaking:** Students will focus on developing speaking which will include strategies for communication and an acquaintance with phonetics. Effective oral presentation. Tasks will include making statements, requests, inquiries, disagreeing, complaining and apologizing, discussing, and other oral presentations. **Listening:** Students will practice listening to spoken English and taking useful notes. **Reading:** Extracts from literary and general essays will be used to develop comprehension as well as an understanding of the nature of literary communication. Students will develop the following reading strategies: **Grammar in Use:** While grammar will generally be taught in context, some attention to grammar may be necessary at this stage. The following aspects may be taught: articles, verb patterns, sentence combining-subordination and coordination, conditional sentences, the infinitive, gerund, and participle, subject-verb agreement. **Writing:** Paragraph, précis and analytical writings, writing on current affairs, Scientific writing. **Commercial Correspondences:** Defining context, feedback and semantic gap. Different types of commercial and business letter writing, tender-notice and pre-qualification notice writing. Writing of different types of reports on specific topics.

Reference Books:

- 1) *College Writing Skills with Readings*, John Langan.
- 2) *The Craft of Business Letter Writing*, Matthew M Monippally, Tata McGraw-Hill Publishing Company Limited.
- 3) *Advanced Learners' Degree General English*, Chowdhury and Hossain.

Second Semester

Course Code : 510221	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Digital Systems Design		

Introduction: Introductory concepts, Number System and code, Logic gates and Boolean algebra.

Combinatorial Logic: Combinational Circuits design using logic gates, universal gates. Minimization of switching functions, algebraic simplification, the Karnaugh map, Prime Implement.

Sequential Logic: NAND and NOR latches. Clocked SR. JK D and T flip-flops. FF timing consideration. Master-slave FF.

Complex Sequential logic: Frequency division and counting troubleshooting. Asynchronous ripple up and down counters, counters with any MOD numbers asynchronous IC counters, propagation delay. Parallel up down and up/down counters. Presentable counters. The 74193 counter. Decoding a counter. Cascading counters. Shift registers, IC shift, digital clock, troubleshooting case studies. MSI logic circuits: BCD-to-Decimal decoders, BCD-to-7 segment decoder/drivers. Encoders.

Multiplexer and Demultiplexer: Multiplexer and their applications, Demultiplexers, Troubleshooting case studies, Analog-to-Digital conversion, digital-ramp, successive approximation, flash ADC, Digital-to-Analog conversion: circuits, specifications, Sample and hold circuits, Analog multiplexers, Data acquisition, digital voltmeter.

Memory Devices: Semiconductor memory technologies ROM architecture timing and type of ROM, EPROM, EEPROM, ROM applications. RAM architecture static and dynamic RAM, DRAM structure operation and refreshing. Expanding word size and capacity. Magnetic bubble and CCD memories trouble shooting case studies. Introduction to sequential circuits, formal representation of sequential circuits.

Arithmetic circuits: The half-adder, full adder, parallel adders, 2's complement addition and troubleshooting case studies.

Reference Books:

- 1) *Digital Systems: Principles and Applications*, Ronald J. Tocci, Neal S. Wildmer.
- 2) *Hand Book of Modern Digital Electronics*, G. Moazzam and M. Shorif Uddin.
- 3) *Modern Digital Electronics*, R P Jain.
- 4) *An Engineering Approach to Digital Design*, William I. Fletcher.

Course Code : 510222	Marks : 40	Credits : 1.5	Class Hours : --
Course Title :	Digital Systems Lab		

Objectives: Minimize and Implementation of Boolean Functions Using Logic Gates, Design Half Adder and Full Adder, Design Half Subtractor and Full Subtractor, Verify the Truth Table of S-R, T, D Flip-Flop, Verify the Truth Table of J-K, Prepare Different Type Shift Register and Check Its Operation, Design Synchronous Counter, Design Asynchronous Counter, Design Ripple Counter, Design Johnson and Ring counter, Verify the Operation of Encoder and Decoder, Verify the Operation of Multiplexer, De-Multiplexer, Verify the Operation of D/A and A/D Converter.

Course Code : 510223	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Discrete Mathematics		

Set Theory, Relations, Functions, Graph Theory, Planer Graph and Trees, Direct graphs and Binary Trees, Algebraic Systems, Ordered sets and lattices, Propositional Calculus, Boolean Algebra, Lattices, group theory, cyclic groups, permutation groups, symmetry groups, quotient, homomorphism, Basic structure theory, Prepositional and Predicate logic, Mathematical reasoning and program techniques. Theories with induction. Counting and countability. Graph and trees. Morphisms, Algebraic structures.

Reference Books:

- 1) *Discrete Mathematics And Its Applications*, Kenneth H. Rosen
- 2) *Theory and Problems of Discrete Mathematics, Schaum's Outlines*, Lipschutz S., Lipson M., TATA McGraw-Hill.
- 3) *O. Nicodemi*, Discrete Mathematics CBS, 1989
- 4) *J. C. Molluzzo and F. Buckley*(Waveland Press, reprinted 1997) ISBN 0-8833-9407

Course Code : 510225	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Linear Algebra		

Vectors in R^n and C^n . Review of Geometric vectors on R^2 and R^3 space. Vectors in R^n and C^n . Inner product. Norm and distance in R^n and C^n .

Matrices and Determinants: Notion of matrix, Types of matrices, Matrix operation of matrix Algebra, Determinant function, Properties of determinants, Minors, Cofactors, Expansion and evaluation of determinants, Elementary row and column operation and row-reduces echelon matrices, Invertible matrices, Block matrices.

System of Linear Equations: Linear equations, System of linear equations (homogeneous and non-homogeneous) and determinants for solving system of linear equations.

Linear Transformations: Linear transformation, Kernel and image of a linear transformation and their properties, Matrix representation of linear transformation, Change of basis.

Eigenvalues and Eigenvectors : Eigenvalues and eigenvectors, Diagonalization and application.

Reference Books:

- 1) *Elementary Linear Algebra*, Howard Anton, Chris Rorres
- 2) *Linear Algebra*, Abdur Rahman

Course Code : 510227	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	Statistics and Probability		

Statistics – Definition and scope: past and present, its nature and characteristics, population and sample, descriptive and inferential statistics, scope and applications of statistics, abuse of statistics, sources of statistical data, primary and secondary sources. Data collection tools, types, etc. Construction of questionnaire and other field problems of data collection. Types of data, cross sectional, longitudinal, follow-up and panel data.

Processing of data: measurement scales, variables, attributes, classification, characteristic and basis of classification, array formation, tabulation, different types of tables, frequency distribution.

Presentation of data: graphical presentation of data, details of different types of graphs and charts with their relative merits and demerits, concept of explorative data analysis, stem-and-leaf plot, schematic plots, extremes and median, hinges, outliers and 5 number summaries.

Characteristics of statistical data: measures of location, dispersion, skewness, kurtosis and their properties, moments, box -and- whiskers plots, trimean, trimmed mean, interpretation of data with these measures.

Correlation analysis: bivariate data, scatter diagram, simple correlation, rank correlation, correlation ratio, multiple and partial correlations, intraclass and biserial correlation.

Regression analysis: basic concept of regression, regression model, estimation of parameters (OLS method) in regression model, properties of estimators, interpreting the constants, some ideas of polynomial regression, 3-variable regression, estimation of parameters, standard error and other properties.

Association of attributes: concepts of independence, association and disassociation, contingency table, measure of association for nominal and data in contingency tables, partial association: different forms of correlation table.

Reference Books:

- 1) *Statistics for Business and Economics*, Paul Newbold, William Carlson, Betty Thorne.
- 2) *Business Statistics*, Md. Abdul Aziz.
- 3) *An Introduction to Statistics*, M. Nurul Islam.

Course Code : 510229	Marks : 80	Credits : 3	Class Hours : 45
Course Title :	History of the Emergence of Independent Bangladesh		

Introduction: Scope and description of the emergence of Independent Bangladesh.

1. Description of the country and its people.

- a. Geographical features and their influence.
- b. Ethnic composition.
- c. Language.
- d. Cultural syncretism and religious tolerance.
- e. Distinctive identity of Bangladesh in the context of undivided Bangladesh.

2. Proposal for undivided sovereign Bengal and the partition of the Sub Continent, 1947.

- a. Rise of communalism under the colonial rule,
- b. Lahore Resolution 1940.
- c. The proposal of Suhrawardi and Sarat Bose for undivided Bengal : consequences
- d. The creation of Pakistan 1947.

3. Pakistan: Structure of the state and disparity.

- a. Central and provincial structure.
- b. Influence of military and civil bureaucracy.
- C. Economic, social and cultural disparity

4. Language Movement and quest for Bengali identity

- a. Misrule by Muslim League and struggle for democratic politics.
- b. Foundation of Awami League, 1949
- c. The Language Movement: context and phases.
- d. United front of Haque – Vasani – Suhrawardi: election of 1954, consequences.

5. Military rule: the regimes of Ayub Khan and Yahia Khan (1958-1971)

- a. Definition of military rules and its characteristics.
- b. Ayub Khan's rise to power and characteristics of his rule (Political repression, Basic democracy, Islamisation)
- c. Fall of Ayub Khan and Yahia Khan's rule (Abolition of one unit, universal suffrage, the Legal Framework Order)

6. Rise of nationalism and the Movement for self-determination.

- a. Resistance against cultural aggression and resurgence of Bengali culture.
- b. The Six Point Movement of Sheikh Mujibur Rahman
- c. Reactions, importance and significance of the Six Point Movement.
- d. The Agortola Case 1968.

7. The mass-upsurge of 1969 and 11 Point Movement:

- a. Background
- b. Program significance and consequences.

8. Election of 1970 Non-cooperation movement of March 1971 and the Declaration of Independence by Bangabondhu

- a. Election result and centres refusal to comply
- b. The Non Co-operation Movement, the 7th March Address of Bangabondhu, Operation Searchlight
- c. Declaration of Independence by Bangobondhu and his arrest

9. The War of Liberation 1971

- a. Genocide, repression of women, refugees
- b. Formation of Bangladesh government and proclamation of Independence
- c. The spontaneous early resistance and subsequent organized resistance (MuktiFouz, Mukti Bahini, guerillas and the frontal warfare)
- d. Publicity Campaign in the war of Liberation (Shadhin Bangla Betar Kendra, the Campaigns abroad and formation of public opinion)
- e. Contribution of students, women and the masses (Peoples war)
- f. The role of super powers and the Muslim states in the Liberation war.
- g. The Anti-liberation activities of the occupation army, the Peace Committee, Al- Badar, Al-Shams, Rajakars, pro Pakistan political parties and Pakistani Collaborators, killing of the intellectuals.
- h. Trial of Bangabondhu and reaction of the World Community.
- i. The contribution of India in the Liberation War

- j. Formation of joint command and the Victory
- k. The overall contribution of Bangabondhu and his leadership in the Independence struggle.

10. The Bangabondhu Regime 1972-1975

- a. Homecoming
- b. Making of the constitution
- c. Reconstruction of the war ravaged country
- d. The murder of Bangabondhu and his family and the ideological turn-around.

Reference Books:

- 1) *History of the Emergence of Independent Bangladesh*, Professor Dr. Muntasir Mamun
- 2) *History of the Emergence of Independent Bangladesh*, Professor Md. Mozammel Haque
- 3) *History of the Emergence of Independent Bangladesh*, Md. A Salam, S M Nasir, Md. Nazrul Islam.