

## **Semester 1 (1<sup>st</sup> year 1<sup>st</sup> Semester)**

**Course Title:** Structured Programming  
**Code:** CSE 101  
**Credit:** 1 Credit Theory and 2 Credit Lab

**Course Outline:** Fundamentals of C programming; Introducing C's Program Control Statements; Data types, Variables and Expressions; Exploring Arrays and Strings; Understanding Pointers and Functions; Console and File I/O; Structures and Unions.

**References:**

1. Teach Yourself C, Herbert Schildt, McGraw Hill
2. C: The Complete Reference, Herbert Schildt, McGraw Hill
3. Schaum's Outline of programming with C, McGraw Hill

**Course Title:** Discrete Mathematics  
**Code:** CSE 102  
**Credit:** 3 Credit Theory

**Course Outline:** **The Foundations: Logic and Proofs:** propositional logic, applications of propositional logic, propositional equivalences, predicates and quantifiers, nested quantifiers, rules of inference, introduction to proofs; **Basic Structures:** Sets, Functions, Sequences, Sums, and Matrices; **Number Theory:** The division algorithm, divisibility and the euclidean algorithm, prime numbers, congruence, applications of congruence; **Induction and Recursion:** Mathematical Induction, Recursive Definitions and Structural Induction, Program Correctness; **Counting:** The addition and multiplication rules, The principle of Inclusion-Exclusion, The pigeon-hole principle, permutations, combinations, Generalized Permutations and Combinations, Generating Permutations and Combinations; **Relations and Functions:** Symmetry, transitivity, reflexivity, equivalence classes, congruence, closure of relations, partial orderings; **Graphs:** Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths; **Trees:** Introduction to Trees, Tree Traversal, Spanning Trees.

**References:**

1. Discrete Mathematics and its Applications, Seventh Edition by Kenneth H. Rosen.

**Course Name:** Probability and Statistics for Engineers – I  
**Code:** STAT 103  
**Credit:** 3 Credit Theory

**Course Outline:** **Introduction to Statistics:** Concept of Data and Variables, Data Collection and Descriptive Statistics, Inferential Statistics, Populations and Samples; **Descriptive Statistics:** Frequency Tables and Graphs, Relative Frequency Tables and Graphs, Grouped Data, Histograms,

Ogives, Stem and Leaf Plots, Sample Mean, Sample Median, Sample Mode, Sample Variance and Standard Deviation, Sample Percentiles and Box Plots, Chebyshev's Inequality, Normal Data Sets, Paired Data Set and Sample Correlation Coefficient; **Elements of Probability:** Basic Terminology in Probability, Sample Space and Events, Venn Diagrams and Algebra of Events, Axioms of Probability, Conditional Probability, Bayes' Theorem and Independent Events; **Random Variables and Expectation:** Random Variables, Types of Random Variables, Jointly Distributed Random Variables, Expectation, Property of Expected Values, Use of Expected Values in Decision Making, Variance, Covariance and Variance of Sums of Random Variables and Moment Generating Functions; **Special Random Variables:** Binomial Random Variables, Poisson Random Variables, Uniform Random Variables, Normal Random Variables, Exponential Variables, Gamma Distribution, Chi-Square Distribution, t-Distribution and F-Distribution; **Distributions of Sampling Statistics:** Central Limit Theorem, Sampling Distribution for Normal Population, and Sampling from a Finite Population; **Parameter Estimation:** Maximum Likelihood Estimators, Interval Estimates, Estimating the difference in Means of Two Normal Population, Approximate Confidence Interval for the Mean, Confidence Interval of the Mean of the Exponential Distribution and Bayes' Estimator.

#### References:

1. Sheldon M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, Elsevier/Academic Press, 3rd Ed.
2. M. Nurul Islam, An Introduction to Statistics and Probability, Book World, 3rd Edition.
3. Lipschutz, Lipschutz Seymour, 2000 Solved Problems in Discrete Mathematics, McGraw-Hill, 1st Ed

**Course Title:** Calculus and Analytical Geometry

**Code:** Math 104

**Credit:** 3 Credit Theory

**Course Outline: Basic Concepts:** Real Numbers and Real Lines, Polar Coordinates, Parametric Equations, Functions, Algebra of Functions, Inverse Functions, Quadratic Functions, Shifting Graphs, Trigonometric Functions, Complex Numbers, Inequalities, Infinite Series and Sequences, Taylor Series, Rate of Change and Limit, Rules of Finding Limits, Formal Definition of Limit, Extension of the Limit Concepts, L'Hospital's Rule, Continuity, Tangent Lines; **Differential Calculus:** The Derivatives of a Function, Differentiation Rules, Rates of Change, Derivatives of Trigonometric Functions, Chain Rule Differentiation, Implicit Differentiation and Rational Exponents, Related Rates of Change, Extreme Values of Functions, Mean Value Theorem, First Derivative and Second Derivative Tests for Extreme Values, Optimization, Linearization and Differentials and Newton's Method; **Integral Calculus:** Indefinite Integrals, Integration by Substitution, Riemann Sums, Definite Integral, Fundamental Theorem of Calculus, Mean Value Theorem, Substitution in Definite Integrals, Areas between Curves, Finding Volumes by Slicing, Volumes of Solids of Revolution, Cylindrical Shells, Lengths of Plane Curves, Areas of Surfaces of Revolution, Moments and Center of Mass, Fluid Pressures and Forces, Integration by Parts, Improper Integrals, Multiple Integrals and Line Integrals; **Linear Algebra and Vector Calculus:** Matrices, Operation on Matrices, Inverse of a Matrix, Rank of Matrix, Determinant, Vectors, and Solutions of System of Linear Equations, and Eigen value Problems.

#### References:

1. G.B. Thomas and R.L. Finney, *Calculus and Analytical Geometry*, Addison Wesley, 9th Ed.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons, 9th Ed.

**Course Title:** Technology and Society  
**Code:** GE 105  
**Credit:** 2 Credit Theory and 1 Credit Lab

**Course Outline:** Technology and Society: Nature of technology, social forces that affect its adoption; impact on society, innovation, within historical and contemporary contexts, the societal implications of technology, Effects of technological factors on social life and Influence of Technology on Social Institution, public policy implications of innovation, changing nature of technology and its impact on society.

**References:**

1. Society and Technological Change. 6th edition. Worth Publishers Inc.

**Course title:** Soft Skill Communication  
**Code:** GE 106  
**Credit:** 3 Credit Theory.

**Course Outline: The elements of Communication:** The importance of communication through English at the present time, The process of communication and factors that influence communication sender, receiver, channel, code, topic, message, context, feedback, noise, filters & barriers, The importance of audience and purpose, The information gap principle: given and new information, information overload, Verbal and non-verbal communication: body language, Comparing general communication and business communication, the sounds of English, Review of English grammar.

**References:**

1. An introduction to Professional English and Soft Skills by B. K. Das et al., Cambridge University Press .
2. Technical Communication: Principles and Practice, Second Edition by Meenakshi Raman and Sangeeta Sharma, Oxford Publications.
3. Effective Technical Communication by M Ashraf Rizvi, The McGraw-Hill companies.
4. Understanding Body Language by Alan Pease.
5. Communicative Grammar of English by Geoffrey Leech and Ian Svartik.
6. Better English Pronunciation by J.D.O'Connor.
7. English Grammar by S.PitCorder
8. English Grammar by Wren and Martin. This is not the end of the list other books may also be referred.

**Course Title:** Introduction to Software Engineering  
**Code:** SE 107  
**Credit:** 3 Credit Theory

**Course Outline:** Introduction to Computers, Basic Computer Organization, Processor and Memory, Secondary Storage Devices, Input-Output Devices, Computer Software, Software and Software Engineering and Software Process Models.

**References:**

1. Computer Fundamentals, Pradip K Sinha, BPB Publications.
2. Software Engineering: A Practitioner's Approach, 7<sup>th</sup> Edition, McGraw Hill Higher Education.

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