B.Sc. Statistics Syllabus

Duration: 3 Years (6 Semesters)

Total Credits (typical): 120–140 credits

Structure: Core Statistics + Allied Mathematics + Computer/Programming + Skill Enhancement + Generic Electives + Value-Added Courses (as per NEP)

Semester 1 (First Year – Foundation)

- **Descriptive Statistics** (Measures of central tendency, dispersion, skewness, kurtosis, moments, graphical representation)
- **Algebra** (Matrices, Determinants, Systems of Linear Equations, Eigenvalues & Eigenvectors)
- **Calculus** (Limits, Continuity, Differentiation, Integration, Applications)
- **English / Communication Skills** (AECC – Ability Enhancement Compulsory Course)
- **Environmental Studies** (AECC)
- **Practical**: Data Representation & Analysis using Excel / Manual Calculations

Semester 2

- **Probability & Probability Distributions – I** (Probability axioms, conditional probability, Bayes' theorem, discrete distributions: Binomial, Poisson, Geometric)
- **Mathematical Analysis** (Sequences, Series, Real numbers, Continuity, Differentiability)
- **Computer Programming** (Introduction to C / Python – Basics, Loops, Functions, Arrays)
- **English / Modern Indian Language** (AECC)
- **Generic Elective 1** (e.g., Economics – Microeconomics, Mathematics – Differential Equations)
- **Practical**: Probability simulations & Programming exercises

Semester 3 (Second Year – Intermediate)

- **Probability & Probability Distributions – II** (Continuous distributions: Uniform, Normal, Exponential, Gamma, Beta)
- **Statistical Inference – I** (Sampling distributions, Point estimation, Properties of estimators, Confidence intervals)

- **Sampling Techniques & Survey Sampling** (Simple random, Stratified, Systematic, Cluster sampling)
- **Linear Algebra** (Vector spaces, Linear transformations, Inner product spaces)
- **Skill Enhancement Course** (e.g., Statistical Software – R / SPSS Basics)
- **Generic Elective 2** (e.g., Computer Science – Data Structures, Economics – Macroeconomics)
- **Practical**: Sampling & Inference lab using R/Python

Semester 4

- **Statistical Inference – II** (Hypothesis testing, Parametric & non-parametric tests, Power of test, p-value)
- **Design of Experiments** (CRD, RBD, LSD, Factorial designs, ANOVA)
- **Time Series Analysis** (Components, Trend, Seasonal variation, Forecasting methods)
- **Numerical Analysis** (Error analysis, Interpolation, Numerical integration & differentiation)
- **Skill Enhancement Course** (e.g., Data Visualization using Tableau / Power BI)
- **Generic Elective 3** (e.g., Operations Research – Linear Programming)
- **Practical**: ANOVA, Time series & DOE lab

Semester 5 (Third Year – Advanced Core)

Core Subjects

- **Multivariate Analysis** (Multiple regression, Correlation, Partial & multiple correlation, Principal component analysis)
- **Statistical Quality Control** (Control charts, Acceptance sampling, Six Sigma basics)
- **Stochastic Processes & Queuing Theory** (Markov chains, Poisson process, Queuing models: M/M/1, M/M/c)

Discipline Specific Electives (DSE) – Choose 2

- Econometrics
- Actuarial Statistics
- Biostatistics
- Demography & Vital Statistics
- Operations Research – Advanced

Practical / Project

- Lab: Multivariate & Quality Control using R/Python
- Mini Project / Seminar

Semester 6

Core Subjects

- **Non-Parametric & Distribution-Free Methods** (Sign test, Wilcoxon, Kruskal-Wallis, Runs test)
- **Bayesian Statistics** (Prior & posterior, Bayes estimators, Decision theory)
- **Big Data & Statistical Computing** (Introduction to Big Data tools, R Shiny, Python libraries – pandas, numpy, scipy)

Discipline Specific Electives (DSE) – Choose 2

- Advanced Multivariate Analysis
- Survival Analysis & Reliability
- Financial Statistics
- Statistical Machine Learning Basics
- Official Statistics & National Income Accounting

Capstone Components

- Major Project / Dissertation (Data analysis project using real datasets)
- Comprehensive Viva-Voce

Common Structure Notes (2025–2026)

- **Core Courses** (CC): Probability, Inference, Multivariate, Design of Experiments, Quality Control
- **Discipline Specific Electives** (DSE): Usually 4 total in Sem 5 & 6
- **Generic Electives** (GE): From Mathematics, Economics, Computer Science
- **Skill Enhancement Courses** (SEC): R, Python, SPSS, Data Visualization, Statistical Software
- **Ability Enhancement Compulsory Courses** (AECC): English + EVS
- **Value Added Courses** (VAC – NEP): Ethics, Cyber Security, Constitution, Yoga, etc.