

## BACHELOR OF SCIENCE - MATHEMATICS AND STATISTICS

1. *Name of Department:* **Department of Mathematics and Statistics**
2. *Title of Programme:* **B.Sc.**
3. *Programme Specific Outcomes:*

### FYBSC:

- Calculus (Sem I & II): This course gives introduction to basic concepts of Analysis with rigor and prepares students to study further courses in Analysis. Formal proofs are given a lot of emphasis in this course which also enhances understanding of the subject of Mathematics as a whole. The portion on first order, first degree differentials prepare learners to get solutions of so many kinds of problems in all subjects of science and also prepares learners for further studies of differential equations and related fields.
- Algebra I (Sem I) & Discrete Mathematics (Sem II): This course gives expositions to number systems (Natural Numbers & Integers), like divisibility and prime numbers and their properties. These topics later find use in advanced subjects like cryptography and its uses in cyber security and such related fields.

### SYBSC:

- Calculus (Sem III & IV): This course introduces students' infinite series, Riemann integration and multivariable calculus in a rigorous way. Students learn the Riemann theory of integration and understand proofs of various integration formulae applied in science. The fundamental theorem of calculus gives them relation between integration and derivatives. In multivariate calculus students understand how to extend limits, continuity and derivatives from single variable calculus. Students learn applications of derivatives to understand theory of differential equations and optimization techniques.
- Linear Algebra I & II (Sem III & IV): This course gives systematic study of linear system and Matrices. Introduces vector spaces, and prepares students to study more abstract Mathematics. Determinants and factorization methods for matrices are learned. The approach is more abstract and rigorous for studying system of linear equations and methods to solve them. Further students study linear transformation, their representations using Matrices in finite dimensional cases. The student learns inner product spaces. Also eigenvalues, eigenvectors and diagonalization for matrices are learned. This is the most applied part of Mathematics in other branches of science.
- Ordinary Differential Equations & Numerical Methods (Sem III & IV). This course introduces students to applicable Mathematics. Analytical methods to solve differential equations are learned for particular types. Further numerical methods to solve differential equations are introduced. Also students are introduced to numerical approaches to solve algebraic and transcendental equations, interpolation problems, curve fitting, integration, solving linear systems and finding eigenvalues.

**4. Course Outcomes:**

<b>Title of the course</b>	<b>Course credit</b>	<b>Course outcome</b>
Calculus I	02	1. Students can do basic theorems and proofs about real number system, real sequences and are able to solve first order differential equations with some techniques.
Algebra I	02	1. Students can do basic theorems and proofs about integers, divisibility, functions, relations, binary operations and polynomials.
Practicals USMTP01	02	1. Students can do simple problems in Calculus I and Algebra I.
Calculus II	02	1. Students can do basic theorems and proofs about limits, continuity and derivatives of single variable functions.
Discrete Mathematics	02	1. Students can do basic theorems and proofs about simple and advanced counting, permutations and recurrence relations.
Practicals USMTP02	02	1. Students can do simple problems in Calculus II and Discrete Mathematics.
Calculus III	02	1. Students can do basic theorems and proofs about infinite series, Reimann integration and improper i integrals with applications.
Linear Algebra I	02	1. Students can do basic theorems and proofs about system of equations and matrices, vector spaces over field of real numbers, determinants and linear equations.
Ordinary Differential Equations	02	1. Students can do basic theorems, proofs and solving Higher Order linear Differential Equations, Systems of First Order 2, 3 Linear differential equations, Numerical Solutions of Ordinary Differential Equations
Practicals USMTP03	02	1. Students can do simple problems in calculus III, Linear Algebra I and ORDINARY DIFFERENTIAL EQUATIONS.
Multivariable Calculus I	02	1. Students can do basic theorems and proofs about multivariate sequences, limits, continuity, derivative and applications.