Minor Course(Science)
(Effective from Academic Year 2024-2025 onwards)
Subject- Mathematics

Faculty of Science

Pandit Deendayal Upadhyaya Shekhawaya University
Sikar (Rajasthan) 307026
E-mail: reg.shekhauni@gmail.com
Website: www.shekhauni.ac.in

Bachelor of Science
(CBCS) As per the NEP 2020 (Semester I to IV)
w.e.f. the Academic Session 2024-25
Discipline: Mathematics
Minor

Semester	Course title	Credits	Course Code	Credit distribution of the course			Eligibility criteria
				Lecture	Tutorial	Practical/ Practice	
I	ELEMENTARY MATHEMATICS	2	24BMS5106T	2	0	0	10+2 from any recognized Board
II	FOUNDATIONS OF SET THEORY AND MATHEMATICAL FUNCTIONS	2	24BMS5206T	2	0	0	
III	BASIC CALCULUS	4	24BMS5306T	4	0	0	
IV	STATISTICS AND PROBABILITY	4	24BMS5406T	4	0	0	

Elementary Mathematics

Learning Objectives

The learning objectives of this course are:

- understand basic mathematical concepts, including matrices and their applications.
- learn to solve quadratic equations using various methods.
- develop skills to analyze the relationships between straight lines, including parallelism and perpendicularity.
- apply determinants to solve practical problems in areas like systems of equations.

.Learning Outcomes

The learning outcomes of this course are:

- students will be able to perform matrix operations and understand their significance.
- students will confidently solve quadratic equations using factorization and the quadratic formula.
- students will be able to graph straight lines using various forms of equations.
- students will use determinants to analyze and solve systems of linear equations

Dy. Registrar
Pandit Deendayal Upadhyaya
Shekhawati University,
Sikar(Rajasthan)

Course Title:	Elementary Mathematics	Course Code: 24BMS5106T
Total Lecture hour: 26		
Unit I	Matrices: Definition, types of matrices, operations on matrices: addition, substraction and multiplication of matrices transpose of a matrix and its properties, trace of Matrices and its properties.	Hours
		7
Unit II	Determinants: Definition, Minors and Cofactors, Properties of determinants, Area of a Triangle, Adjoint and the inverse of a Matrix, Solution of system of equation.	7
Unit III	Quadratic equation, Solution of quadratic equation: factorization method and Shridharacharya''s formula, Nature of roots, formation of quadratic equation from given roots	6
Unit IV	Coordinate geometry: Cartesian coordinate system, locus, Equation of straight line: Intercept form, Slope intercept form, point-slope form, two-points form, condition for parallel and perpendicular lines.	6
Reference Books:		
1	"Mathematics for Class XI and XII" by R. D. Sharma	
2	"Higher Algebra" by Hall and Knight (Indian Edition)	
3	"Advanced Engineering Mathematics" by Erwin Kreyszig	

FOUNDATIONS OF SET THEORY AND MATHEMATICAL FUNCTIONS

Learning Objectives

The learning objectives of this course are:

1. Understand the basic concepts of sets and functions.
2. Learn to identify and categorize different types of sets and relations.
3. Apply operations on sets and functions to solve practical problems.
4. Explore the importance of set theory and functions in different areas

Learning Outcomes

The learning outcomes of this course are:

- Students will be able to define and use basic set terminology and notation.
- Students will confidently perform operations on sets and understand their practical applications.
- Students will analyze relationships between variables using functions
- Students will appreciate the applications of set theory and functions in real-world situations.

Course Title:	FOUNDATIONS OF SET THEORY AND MATHEMATICAL FUNCTIONS	Course Code: 24BMS5206T
Total Lecture hour: 26		
Unit I		Hours
	Sets: Definition, Types of sets, subsets, cardinality of sets, operations on sets: Union, intersection, complement of sets, set difference; venn diagram and demorgan law, Inclusion-Exclusion principle	7

Unit II	Relations: Cartesian product of sets, Definition of relation, properties of relations: Reflexive Relation Symmetric Relation Transitive Relation , antisymmetric Relation, Equivalence Relation	6
Unit III	Functions: Definition, domain range, Types Of Functions: constant, identity, polynomial, exponential, logarithmic, trigonometric, modulus, greatest integer functions with their graphs.	6
Unit IV	One-One and Onto Function, bijection, composition of functions, inverse function. binary operations, types of binary operations	7

Reference Books:	
1	"Mathematics for Class XI and XII" by R. D. Sharma
2	"Fundamentals of Mathematics" by S. K. Singh
3	"Elements of Set Theory" by Herbert B. Enderton

BASIC CALCULUS

Learning Objectives

The learning objectives of this course are:

- Understand basic concepts of limits and continuity in real-life contexts.
- Learn to differentiate simple functions and interpret their meanings.
- Apply calculus to find maximum and minimum values in practical situations.
- Explore real-world applications of derivatives in fields like economics and engineering etc.

Learning Outcomes

By the end of this course, the students will be able to:

- Students will be able to evaluate limits and understand their significance.
- Students will confidently calculate derivatives of basic functions.
- Students will identify and apply maximum and minimum principles in practical examples.
- Students will relate calculus concepts to real-life scenarios in various disciplines.

Course Title:	BASIC CALCULUS	Course Code: 24BMS5306T
Total Lecture hour: 52		
Unit I	Limits: Definition, properties of limits, Some important limits, evaluation of limits. L'Hospital's Rule. Continuity: Continuity at a point, Continuity in open interval (a, b), Continuity in closed interval [a, b]	**Hours** 14
Unit II	Differentiability: Definition of derivative, derivatives of some standard functions, differentiation of product and quotient of two functions, chain rule.	14
Unit III	Application of derivatives: Tangent, normal, rate of change, increasing and decreasing functions, Maxima and Minima of	12

	Functions of one Variable	
Unit IV	Partial differentiation: Definition and concept of partial derivatives, Chain Rules for One or Two Independent Variables, Euler theorem on homogeneous functions	12

Reference Books:

1	. "Higher Engineering Mathematics" by B. S. Grewal
2	"Calculus" by S. C. Gupta and S. Kumar
3	"Calculus: Early Transcendentals" by James Stewart

BASIC STATISTICS AND PROBABILITY

Learning Objectives

The learning objectives of this course are:

- Understand basic concepts of statistics and probability in everyday situations.
- Learn to collect, organize, and interpret data effectively.
- Apply measures of central tendency, dispersion, correlation, regression, and permutations and combinations to analyze data sets.
- Explore the fundamentals of probability to make informed decisions and solve practical problems.

Learning Outcomes

By the end of this course, the students will be able to:

- Students will confidently interpret data distributions and identify trends.
- Students will apply statistical concepts to solve practical problems in various fields.
- Students will apply permutations and combinations to solve counting problems and make predictions in various scenarios.
- Students will calculate and explain basic probabilities, and analyze correlations and regression in real-life contexts.

Course Title:	BASIC STATISTICS AND PROBABILITY	Course Code: 24BMS5406T
Total Lecture hour: 52		
		Hours
Unit I	Frequency distribution, Measures of central tendency: Arithmetic Mean, Mode, Median, Geometric Mean, Harmonic Mean Measures of dispersion: Mean deviation, Standard Deviation, Variance ,Coefficient of variation	14
Unit II	Correlation Analysis: Definition, Types of correlation, Karl pearson Method, Regression analysis: Regression Coefficients and Equation of Regression lines	14
Unit III	Factorial, Permutation and Combination, Inclusion-Exclusion principle	12
Unit IV	Basic probability, Conditional Probability, Bayes Theorem	12

Reference Books:

1	"Fundamentals of Statistics" by S. C. Gupta and V. K. Kapoor
2	Statistics: Theory, Methods & Application D. C. Sancheti, V. K. Kapoor
3	"A Textbook of Probability and Statistics" by A. G. K. Bhat
4	"Introduction to Probability and Statistics" by William Mendenhall, Robert J. Beaver, and Barbara Beaver