

St. Xavier's College (Autonomous), Ahmedabad
Syllabus of Semester – IV of the following departments under Faculty of Science
based on Under Graduate Curriculum Framework – 2023 (NEP)
to be implemented from the Academic Year 2024-25.

FACULTY OF ARTS

DEPARTMENT OF STATISTICS

Course	Title	Content	Hours/Week	Credit
STMN441C	Mathematical Methods for Statistics – II	U-1: Permutations and Combinations, Probability U-2: Random Variable, Mathematical Expectation and Moments U-3: Probability Distributions-I U-4: Normal Distribution	4 hrs	4

STMN441C Mathematical Methods for Statistics – I

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course (Total - 04 Credit)			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Lecture	Practical	Experiential Learning		
Mathematical Methods for Statistics – II & STMN441C	4	0	0	10 + 2 from a recognized board in any stream	Basic Mathematics, Observation & Analytical Skills

Course Outcomes:

- CO-1 Demonstrate the skills of finding permutations and combinations in real life situations. Apply these ideas in probability theory.
- CO-2 Demonstrate the skill of identifying/designing the random experiments and their sample spaces. Apply ideas of probability theory, conditions probability, Bayes' theorem in real life situations. Apply probability ideas in various fields.
- CO-3 Apply the idea of random variables and their expected values to study the behaviour of random phenomenon occurring in business, industry and daily life activities.
- CO-4 Understand the basic properties of normal distribution, Importance of normal curve, application of normal distribution in business, industry and daily life activities.

Learning Outcomes: After completion of this course, the students will be able to

- (1) Apply the fundamental principles of permutations, combinations, and basic probability theory to solve counting and uncertainty problems.
- (2) Evaluate random variables and calculate mathematical expectations to describe data distributions.
- (3) Analyze and apply standard discrete and continuous probability distributions (Probability Distributions-I) to model real-world random phenomena.
- (4) Demonstrate a comprehensive understanding of the Normal Distribution and its properties to perform statistical modeling and data analysis.

Unit: 1 Permutations and Combinations, Probability

(15Hrs)

- Basic idea of permutations with simple illustrations.
- Basic idea of combinations with simple illustrations.
- Formulae for nPr and nCr (Without proof)
- Examples based applications of permutations and combinations.
- Definition of Random Experiment, Sample Space, Events, Mutually exclusive events, Exhaustive events, Favorable cases, Mathematical and Statistical definition of probability
- Theorems of addition and multiplication laws of probability (Without proof).
- Dependent events and Independent events, conditional probability with Simple examples
- Bay's theorem (without proof) and its simple examples.

(15Hrs)

Unit: 2 Random variable and Mathematical Expectation

- Concept of a discrete random variable, probability mass function of a discrete random variable and its properties.
- Definition of mathematical expectation of a discrete random variable.
- Mathematical expectations of sum and product of two independent and dependent random variable (without Proof) and its properties.
- Simple examples

Unit: 3 Probability Distributions-I

(15Hrs)

- Concept of probability mass function and probability density function
- Bernoulli distribution, Binomial distribution and Poisson distribution.
- Properties of these distributions (Without proof) and Simple examples based on these distributions.

Unit: 4 Normal distribution

(15Hrs)

- Definition, basic properties of Normal distribution (without proof)
- Idea of area under the normal curve
- Importance of normal distribution
- Examples of Normal distribution.

Teaching Methodology: Apart from the conventional blackboard teaching, other modes of teaching that will be adopted are power points, group discussions, quizzes, class tests, problem-solving, and assignments.

References:

1. S. C. Gupta & V. K. Kapoor: “Fundamental of applied statistics”, Sultan Chand & Sons New Delhi (2007).
2. Sancheti & Kapoor: “Business Mathematics”, Sultan Chand & Sons, New Delhi.
3. Kapoor V.K.: “Business Mathematics”, Sultan Chand & Sons, New Delhi.
4. Parimal Mukhopadhyay: “Mathematical Statistics” Books & allied(p) Ltd (2000).