

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 2023-24.

FACULTY OF SCIENCE

DEPARTMENT OF STATISTICS

Course	Title	Content	Hours/Week	Credit
STMN442C	Basic Probability Theory	U-1: Probability U-2: Random variable and mathematical expectation U-3: Practical using manual calculation and Excel	6 hrs	4

STMN442C Basic Probability Theory

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course (Total - 02 Credit)			Prerequisite(s) of the Course (if any)
	Lecture	Practical	Experiential Lab	
Basic Probability Theory & STMN442C	2	2	0	Basic Mathematics, Observation & Analytical Skills

Course Objectives:

- CO-1 Demonstrate the skill of identifying/designing the random experiments and their sample spaces. Apply ideas of probability theory, conditional probability, and Bayes' theorem in real-life situations.
- CO-2 Apply the idea of random variables and their expected values to study the behavior of random phenomena occurring in business, industry, and daily life activities.
- CO-3 Demonstrate the skill of identifying/designing the random experiments and their sample spaces. Apply ideas of probability theory, conditional probability, Bayes' theorem in real life situations.

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

- (1) Distinguish between random and non-random experiments
- (2) Identify Random variable and their mathematical expectation
- (3) Calculate the probabilities of events
- (4) Enumerate Generating function and Function of Random variable

Unit: 1 Probability**(15Hrs)**

- Random experiments, trials, discrete and continuous sample space
- Events and their types.
- Axiomatic approach to probability and its properties.
- Theorems on probability. (only statement)
- Definitions of equally likely cases, exhaustive cases, favorable cases.
- Classical and Empirical approach to probability.
- Conditional probability and its properties, Independence of two events, Pair wise and mutual independence for three events.
- Theorem on total probability.(only statement)
- Bayes' theorem and its applications.

Unit: 2 Random variable and mathematical expectation**(15Hrs)**

- Random variable and its types (Discrete and Continuous).
- Probability mass function, probability density function and distribution function.
- Properties of distribution function and theorems.
- Mathematical Expectation and its basic properties.
- Theorems on Mathematical Expectation.
- Raw and Central Moments and their recurrence relation

Unit: 3 Computing all the practical manually and using Excel

- Practical Based on Probability
- Practical Based on Random variable
- Practical Based on mathematical expectations
- Practical Based on conditional and marginal distributions

References:

1. Agresti, A. (2010): Analysis of Ordinal Categorical Data, 2nd Edition, Wiley.
2. Anderson T.W. and Jeremy D. Finn (1996). "The New Statistical Analysis of Data", Springer.
3. Freedman, D., Pisani. R and Purves. R. (2014), "Statistics", 4th Edition, W. W. Norton & Company.
4. Gupta, S.C. (2018), "Fundamental of Statistics", Himalaya Publishing House, 7th Edition.
5. Gupta S.C. and V.K. Kapoor (2020), "Fundamental of Mathematical Statistics", Sultan Chand and Co. 12th Edition.
6. Goon A.M., Gupta M.K. and Dasgupta B. (2002): "Fundamentals of Statistics", Vol. I & II, 8th Edn. The World Press, Kolkata.
7. John E. Freund's "Mathematical Statistics with Applications", (7th Edn.), Pearson Education, Asia.
8. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): "Introduction to the Theory of Statistics", 3rd Edn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd.