**COMMON POOL OF GENERIC ELECTIVES (GE) COURSES**
**OFFERED BY DEPARTMENT OF STATISTICS**
**CATEGORY-IV**

## GENERIC ELECTIVES : INTRODUCTORY PROBABILITY

### CREDIT DISTRIBUTION, ELIGIBILITY, AND PRE-REQUISITES OF THE COURSE

| Course title & Code | Credits | Credit distribution of the Course | | | Eligibility Criteria | Pre-requisite of the Course (if any) |
|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical/ Practice | | |
| Introductory Probability | 4 | 3 | 0 | 1 | Class XII pass with Mathematics | Nil |

**Learning Objectives** :

- Acquaint students with the mathematical foundation of probability.
- familiarize students with important tools for statistical analyses at introductory level.
- Introduction to some common discrete and continuous distributions and their properties.

**Learning Outcomes:**

After taking this paper, the student should be able to:

- Understand the meaning of probability and probabilistic experiment. Various approaches to probability theory and in particular the axiomatic approach. Laws of probability, conditional probability, conditioning, and reduced sample space, compute joint and conditional probabilities. Bayes' rule and applications.
- Understand the concept of a random variable, expectation and its properties, Compute variance and covariance in terms of expectation. Moment generating function and its properties.
- Get familiar with some standard discrete and continuous distribution and the usefulness of Central limit Theorem in daily life.

**SYLLABUS OF GE**

**Theory**

**UNIT-I** **(12 Hours)**

**Probability**

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional

Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.

**UNIT II** **(18 Hours)**

**Random Variables**

Random Variables: Discrete and continuous random variables, pmf, pdf, cdf. Illustrations of random variables and its properties. Expectation, variance, moments and moment generating function.

**UNIT III** **(15 Hours)**

**Probability Distributions**

Standard probability distributions: Binomial, Poisson, Geometric, Negative Binomial, Hypergeometric, Uniform, Normal, Exponential, Beta, Gamma. De-Moivre Laplace and Lindeberg-Levy Central Limit Theorem (C.L.T.) (Only Statements)

**PRACTICAL - 30 Hours**

**List of Practical:**

1. Application problems based on addition law of probability.
2. Application problems based on conditional probability.
3. Application problems based on Bayes law.
4. Application problems based on Expectation of random variable.
5. Computing MGF and how it helps in finding moments.
6. Computing cdf for discrete and continuous random variables drawing its graph.
7. Fitting of binomial distributions for n and p = q = ½
8. Fitting of binomial distributions for n and p given.
9. Fitting of binomial distributions computing mean and variance.
10. Fitting of Poisson distributions for given value of lambda.
11. Fitting of Poisson distributions after computing mean.
12. Application problems based on binomial distribution.
13. Application problems based on Poisson distribution.
14. Problems based on area property of normal distribution.
15. To find the ordinate for a given area for normal distribution.
16. Application based problems using normal distribution.
17. Fitting of normal distribution when parameters are given.
18. Fitting of normal distribution when parameters are not given.
19. Computing probabilities using Microsoft Excel functions binomdist(), poisson(), normsdist(), normsinv(), normdist(), and norminv().
20. Computing Binomial probabilities for large n and small p using Microsoft Excel functions binomdist() and poisson().
21. Computing Binomial probabilities for large n and p $\in$ (0.4, 0.6) using Microsoft Excel functions binomdist() and normdist().

**Practical work to be conducted using electronic spreadsheet / EXCEL/ Statistical Software Package/ SPSS.**

**SUGGESTED READINGS:**

1. Hogg, R.V., Tanis, E.A. and Rao, J.M. (2009). Probability and Statistical Inference, 7th Ed, Pearson Education, New Delhi.
2. Miller, I. and Miller, M. John E. Freund (2006). Mathematical Statistics with Applications, 7th Ed., Pearson Education, Asia.
3. Myer, P.L. (1970). Introductory Probability and Statistical Applications, Oxford & IBH Publishing, New Delhi.

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch University of Delhi, from time to time.**

## GENERIC ELECTIVES : APPLICATIONS IN STATISTICS

### CREDIT DISTRIBUTION, ELIGIBILITY, AND PRE-REQUISITES OF THE COURSE

| Course title & Code | Credits | Credit distribution of the Course | | | Eligibility Criteria | Pre-requisite of the Course (if any) |
|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical/ Practice | | |
| Applications in Statistics-II | 4 | 3 | 0 | 1 | Class XII pass with Mathematics | Nil |

**Learning Objectives**:

- Acquaint students with the current official statistical system in India
- Familiarize students with important concepts of Demand Analysis
- Introduction to Utility and Production functions.

**Learning Outcomes:**

After taking this paper, the student should be able to:

- Understand the current and prevailing official statistical system in India, role of MoSPI, CSO, NSSO, and their important publication
- Understand the laws of demand and supply, Price and Income elasticity of demand.
- Differentiate between Partial and Cross Elasticities of Demand, Engel's law, Pareto's law, and different curves of concentration.
- Understand theory of utility function, Utility Curve, Marginal rate of substitution, Budget line, and Construction of Utility Curve.

**SYLLABUS OF GE**