

DEPARTMENT OF STATISTICS
(KOLHAN UNIVERSITY, CHAIBASA)
Proposed Syllabus for FYUGP, NEP-2020

Semester-II-(MJ-2)

Course Title: Probability Theory

Max. Marks: 75 (Mid-Term:15, End-term: 60)

Credit-3

UNIT I

(12 Hours)

Random experiment, Trial, Sample point and Sample space, Events, Operations of events, Concept of equally likely, mutually exclusive and Exhaustive events. Definition of Probability: Classical, Relative frequency and Axiomatic approaches. Discrete Probability Space, Properties of Probability under Set Theory Approach, Independence of Events, Conditional Probability, Total and Compound Probability theorems, Bayes theorem and its applications.

UNIT II

(12 Hours)

Random Variables - Discrete and Continuous, Probability Mass Function (pmf) and Probability density function (pdf), Cumulative distribution function (cdf) with properties, Joint distribution of two random variables, Jacobian Transformation for one and two variables with illustrations, Marginal and Conditional distributions, Independence of random variables.

UNIT III

(12 Hours)

Expectation of a random variable and its properties, Expectation of sum of random variables and product of independent random variables, Conditional expectation and related problems. Moment generating function (m.g.f.) & their properties. Cumulative generating function and characteristic function- Uniqueness and inversion theorems (without proof) along with applications. Conditional expectations.

UNIT IV

(09 Hours)

Attributes: Notion and Terminology, Contingency table, Class frequencies and Ultimate class frequencies, Consistency, Association of Attributes, Independence, and Measures of association for 2X2 table, Coefficients of Association.

Suggested Readings:

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (1968). Fundamental of Statistics, Vol I-II, World Press, Kolkata.
2. Gupta, S.C. and Kapoor, V.K. (2020). Fundamentals of Mathematical Statistics, Sultan Chand and Sons.
3. Hogg, R.V. and Tanis, E.A. (2008). A Brief Course in Mathematical Statistics. Pearson Education.

Semester-II-(MJ-3)

Course Title: Probability Distribution

Max. Marks: 75 (Mid-Term:15, End-term: 60)

Credit-3

UNIT I

(12 Hours)

Markov, Jensen & Chebyshev's inequalities, Limit laws: convergence in probability, almost sure convergence, convergence in mean square and convergence in distribution and their inter-relations, W.L.L.N., S.L.L.N. and their applications, De-Moivre Laplace theorem, Central Limit Theorem (C.L.T.) for i.i.d. variates, applications of C.L.T. and Liapunov Theorem (without proof).

UNIT-II

(12 Hours)

Discrete Probability distributions: Bernoulli distribution, binomial distribution, its mean, variance, mode and mgf, recurrence relation for binomial distribution. Definition, moments and mgf. Negative binomial distribution, Poisson distribution and its moments. Poisson distribution as a limiting case of binomial distribution, its mean, variance and mgf, Recurrence relation of Poisson distribution, Poisson distribution as a limiting case of negative binomial distribution recurrence formula for negative binomial distribution. Geometric and Hyper geometric distribution; its definition, mean, variance and relation with Binomial distribution

UNIT-III

(12 Hours)

Rectangular distribution; Moments of rectangular distribution, mgf and mean deviation of rectangular distribution. Normal distribution: its definition, mean, variance and mgf. Properties of Normal curve, simple problems on Normal distribution including area problems, Normal distribution as a limiting case of binomial distribution.

UNIT-IV

(09 Hours)

Gamma and Beta distribution: Definition and properties of Gamma distribution, beta distribution of first kind as well as of second kind, Cauchy and Exponential distribution along with simple illustrations.

Suggested Readings:

1. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): Probability and Statistical Inference, Seventh Ed, Pearson Education, New Delhi.
2. Myer, P.L. (1970): Introductory Probability and Statistical Applications, Oxford & IBH Publishing, New Delhi
3. Gupta, S.C. and Kapoor, V.K. (2020). Fundamentals of Mathematical Statistics, Sultan Chand and Sons.

Semester-II-MJ (Practical-2)

Max. Marks: 50

Credit-2

60Hours

List of Practicals

1. Problem based on Probability.
2. Problems based on pmf, pdf&cdf.
3. Computation of conditional probabilities based on Bayes Theorem.
4. Computation of Joint, Marginal & Conditional probabilities.
5. Checking consistency of data and finding association among attributes.
6. Problem based on binomial distributions for n and $p=q=1/2$ given, computing mean and variance.
7. Application problems based on binomial distribution.
8. Application problems based on Poisson distribution.
9. Problems based on area property of normal distribution.
10. Problems based exponential distribution etc.