

Statistical Methods II

Semester I	Subject Code: BS11506	Lectures : 40
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Objectives:

The syllabus aims in equipping students with -

- Ability to prepare for postgraduate work or study in various fields of Statistics.
- Developing attitudes which aim to make them responsible members of the society.
- The methodology of designing research tools and interpretation and analysis of results and report writing.
- Application orientation of logic and objectivity in solution of problems of development and growth.
- Ability to offer research and consultancy services to advance societal development
- Sustainability in emerging process of digital technology and confront the challenges of modern technology and information system.

Unit 1: Permutations and Combinations	No. of Lects.
<ul style="list-style-type: none"> • Fundamental principles of counting, factorial notation, elementary problems on permutations and combinations. • Numerical Problems 	44

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Unit 2: Theory of Probability	No. of Lects.
<ul style="list-style-type: none"> • Deterministic and non-deterministic models • Random Experiment, Sample Spaces (finite and countably infinite, infinite) • Events : types of events, operations on events • Probability - classical definition, relative frequency approach, probability models, axioms of probability, probability of an event • Theorems of probability (with proof) <ul style="list-style-type: none"> (i) $0 \leq P(A) \leq 1$ (ii) $P(A) + P(A') = 1$ (iii) $P(A) \leq P(B)$ when $A \subset B$ (iv) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. • Concept and definitions of conditional probability, multiplication theorem $P(A \cap B) = P(A)P(B/A)$. • Bayes' theorem (without proof) • Concept and definition of independence of two events • Numerical Problems 	(12)

Unit 3: Discrete Random variables	No. of Lects.
<ul style="list-style-type: none"> • Definition of random variable and discrete random variable • Definition of probability mass function, distribution function and its properties • Mathematical Expectation: Definition of expectation and variance, theorems on expectation and variance • Numerical Problems 	(08)

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Unit 4: Standard Discrete Distributions**No. of Lects.**

- Uniform Distribution : definition, mean, variance
- Bernoulli Distribution : definition, mean, variance, additive property
- Binomial Distribution : definition, mean, variance, additive property
- Geometric Distribution ($p.m.f. p(x) = pq^x, x = 0, 1, 2, \dots$): definition, mean, variance.
- Poisson Distribution : definition, mean, variance, mode, additive property, limiting case of $B(n, p)$
- Illustrations of real life situations
- Numerical Problems

(10)

Unit 5: Continuous Random Variables**No. of Lects.**

- Definition of continuous Random Variable (r.v.), Probability Density Function (p.d.f.)
- Distribution function and its properties
- Mathematical Expectation: Definition of expectation and variance, theorems on expectation
- Numerical Problems

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Note : Theorems are to be studied without proof (wherever applicable)

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Recommended Text Books:

- Gupta S. C. and Kapoor V. K. 1987, Fundamentals of Applied Statistics (3rd Edition) S. Chand and Sons, New Delhi.
- Kulkarni M.B., Ghatpande S.B., Gore S.D. 1999, Common Statistical Tests Satyajeet Prakashan, Pune
- Kulkarni M.B., Ghatpande S.B. 2007, Introduction to Discrete Probability and Probability Distributions SIPF Academy
- Sarma K.V.S. 2001 Statistics Made Simple. Do it Yourself on P.C. Prentice Hall

Recommended References:

- Medhi J. 1992, Statistical Methods (An Introductory Text), New Age International
- Freund J.E. 2005, Modern Elementary Statistics Pearson Publication
- Trivedi K.S. 2001, Probability, Statistics, Design of Experiments and Queuing Theory with Applications of Computer Science Prentice Hall of India, New Delhi 9
- Ross S. M. 2006, A First Course In Probability 6th Edition Pearson publication
- Law A. M. and Kelton W. D. 2007, Simulation Modelling and Analysis Tata-McGraw Hill
- Box G. E. P. and Jenkins G. M. 2008, Time Series Analysis, 4th edition Wiley
- Brockwell P. J. and Davis R. A. 2006, Time Series Methods Springer
- Snedecor G. W. Cochran W. G. 1989, Statistical Methods John Wiley & sons

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