

## Statistical Methods II

Semester I	Subject Code: BS11506	Lectures : 40
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## Objectives:

The syllabus aims in equipping students with -

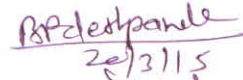
- Ability to prepare for postgraduate work or study in various fields of Statistics.
- Developing attitudes which aim to make them responsible members of the society.
- The methodology of designing research tools and interpretation and analysis of results and report writing.
- Application orientation 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"> <li>• Fundamental principles of counting, factorial notation, elementary problems on permutations and combinations.</li> <li>• Numerical Problems</li> </ul>	(4)

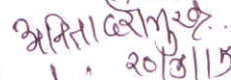
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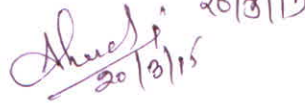
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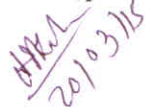
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Suchi Smita Mohapatra



Anjali Kale



Amrita Basu




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

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

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Unit 4: Standard Discrete Distributions	No. of Lects.
<ul style="list-style-type: none"> <li>Uniform Distribution : definition, mean, variance</li> <li>Bernoulli Distribution : definition, mean, variance, additive property</li> <li>Binomial Distribution : definition, mean, variance, additive property</li> <li>Geometric Distribution (p.m.f. <math>p(x) = pq^x</math>, <math>x = 0, 1, 2, \dots</math>): definition, mean, variance.</li> <li>Poisson Distribution : definition, mean, variance, mode, additive property, limiting case of <math>B(n, p)</math></li> <li>Illustrations of real life situations</li> <li>Numerical Problems</li> </ul>	(10)

Unit 5: Continuous Random Variables	No. of Lects.
<ul style="list-style-type: none"> <li>Definition of continuous Random Variable (r.v.), Probability Density Function (p.d.f.)</li> <li>Distribution function and its properties</li> <li>Mathematical Expectation: Definition of expectation and variance, theorems on expectation</li> <li>Numerical Problems</li> </ul>	(6)

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 6<sup>th</sup> 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, 4<sup>th</sup> 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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