Statistical Methods II

Semester II	Subject Code: BS21506	Lectures : 40

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.

Nitin Abhyankar

Dr. Bhavana Deshpande

Anita Deshmukh

Suchi Smita Mohapatra

Anjali Kale

Amrita Basu

Unit 1: Standard Continuous Probability Distributions	No. of Lects.
• Uniform Distribution: statement of p.d.f., mean, variance, distribution function nature of probability curve. • Exponential Distribution: statement of p.d.f. with mean θ mean, variance, distribution function nature of probability curve, lack of memory property. • Normal Distribution: statement of p.d.f., identification of parameters, property, nature of probability density curve, standard normal distribution, distribution of $aX-b$, $aX-bY-c$ where X and Y are independent normal variables, computations of probabilities using normal probability table, normal approximation to binomial and Poisson distribution , central limit theorem (statement only), normal probability plot. • Numerical problems related to real life situations.	(13)

Unit 2: Hypothesis Testing	No. of Lects.
• Concepts and definitions related to testing of hypothesis • Definitions: population, statistic, SRSWR, SRSWOR, random sample from a probability distribution, parameter, statistic, standard error of estimator. • Concept of null hypothesis and alternative hypothesis, critical region, level of significance, type I and type II error, one sided and two sided tests, p-value.	(5)

Unit 3: Large Sample Tests	No. of Lects.
• $H_0: \mu = \mu_0$ Vs $H_1: \mu \neq \mu_0$ (two sided test) $H_0: \mu_1 = \mu_2$ Vs $H_1: \mu_1 \neq \mu_2$ (two sided test) $H_0: P = P_0$ Vs $H_1: P \neq P_0$ (two sided test) $H_0: P_1 = P_2$ Vs $H_1: P_1 \neq P_2$ (two sided test) • Numerical problems related to real life situations.	(6)

Nitin Abhyankar 20/3/15

Anjali Kale 20/03/15

Dr. Bhavana Deshpande 20/3/15

Amrita Basu 20/3/15

Anita Deshmukh 20/3/15

Suchi Smita Mohapatra 20/3/15

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Unit 4: Small Sample and non-parametric tests	No. of Lects.
• Tests based on t-distribution: H_0: $\mu = \mu_0$ Vs H_1: $\mu \neq \mu_0$, (two sided test) H_0: $\mu_1 = \mu_2$ Vs H_1: $\mu_1 \neq \mu_2$ (two sided test) • Paired t-test. • Test based on Chi-square distribution, for goodness of fit, Test for independence of attributes (m X n contingency table) • Kolmogrov - Smirnov test • Numerical problems related to real life situations.	(9)

Unit 5: Simulation	No. of Lects.
• Introduction to simulation, merits and demerits • Pseudo-random number generator, model sampling from uniform and exponential distributions as simulation technique. • Model sampling from Normal distribution using Box-Muller transformations • Run test for testing randomness of the sample and sign test for testing symmetry of the sample • Numerical problems	(7)

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

Nitin Abhyankar

Dr. Bhavana Deshpande

Anita Deshmukh

Suchi Smita Mohapatra

Anjali Kale

Amrita Basu

St. Mira's College For Girls ★ Poona-411001 ★

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

Nitin Abhyankar

Dr. Bhavana Deshpande

Anita Deshmukh

Suchi Smita Mohapatra

Anjali Kale

Amrita Basu

St. Mira's College For Girls ★ Poona-411001 ★