

MA 20104 Probability and Statistics (3-0-0 3 credits)

- 1. Probability:** Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' Theorem and independence, problems. **6 Lectures**
- 2. Random Variables:** Discrete, continuous and mixed random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, moment generating function, median and quantiles, Chebyshev's inequality, problems. **4 Lectures**
- 3. Special Distributions:** Discrete uniform, binomial, geometric, negative binomial, hypergeometric, Poisson, continuous uniform, exponential, gamma, Weibull, Pareto, beta, normal, Cauchy distributions, reliability of series and parallel systems, problems. **6 Lectures**
- 4. Function of a Random Variable:** Distribution of function of a random variable, problems. **2 Lecture**
- 5. Joint Distributions:** Joint, marginal and conditional distributions, product moments, correlation, independence of random variables, bivariate normal distribution, problems. **4 Lectures**
- 6. Transformations:** functions of random vectors, distributions of sums of random variables, problems. **2 Lectures**
- 7. Sampling Distributions:** The Central Limit Theorem, distributions of the sample mean and the sample variance for a normal population, Chi-Square, t and F distributions, problems. **2 Lectures**
- 8. Estimation:** Unbiasedness, consistency, the method of moments and the method of maximum likelihood estimation, confidence intervals for parameters in one sample and two sample problems of normal populations, confidence intervals for proportions, problems. **4 Lectures**
- 9. Testing of Hypotheses:** Null and alternative hypotheses, the critical and acceptance regions, two types of error, power of the test, the most powerful test and Neyman-Pearson Fundamental Lemma, tests for one sample and two sample problems for normal populations, tests for proportions, Chi-square goodness of fit test and its applications, problems. **6 Lectures**

Text/References

- 1. An Introduction to Probability and Statistics by V.K. Rohatgi & A.K. Md. E. Saleh**
- 2. Probability and Statistical Inference by Hogg, R. V., Tanis, E. A. & Zimmerman D. L.**
- 3. Probability and Statistics in Engineering by W.W. Hines, D.C. Montgomery, D.M. Goldsman, C.M. Borror**
- 4. Introduction to Probability and Statistics for Engineers and Scientists by S.M. Ross**
- 5. Introduction to Probability and Statistics by J.S. Milton & J.C. Arnold.**
- 6. Introduction to Probability Theory and Statistical Inference by H.J. Larson**
- 7. Probability and Statistics for Engineers and Scientists by R.E. Walpole, R.H. Myers, S.L. Myers, Keying Ye**
- 8. Modern Mathematical Statistics by E.J. Dudewicz & S.N. Mishra**
- 9. Introduction to the Theory of Statistics by A.M. Mood, F.A. Graybill and D.C. Boes**

Lecture Schedule

January: 6 (2), 7, 13 (2), 14, 20 (2), 21, 27 (2), 28 (12 lectures)

February: 3 (2), 4, 10 (2), 11 (6 lectures)

March: 2 (2), 3, 10, 16 (2), 17, 23 (2), 24, 30 (2), 31 (13 lectures)

April: 6 (2), 7, 13 (2), (5 lectures)

Total : 36 lectures

Slot : A3 Monday 8:00 – 10:00, Tuesday 12:00 – 13:00

Sections:

Section 1.: Prof. Bibhas Adhikari: NR-221: AG(66)+ HS(50)+ MF(50)+ other departments not listed in any section

Section 2. Prof. Buddhananda Banerjee (C): NR-321: CE(89)+ IM(66) +CH

Section 3. Prof. Somesh Kumar: NR-322: BT(40)+CS(123)+ME

Section 4: Prof. Swanand Khare: NR-421: MA (61) + MI (75) + QE (09) +QM (10)+Backlog

