

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. **3 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: 7 (2), 8, 14 (2), 15, 21 (2), 22, 28 (2), 29 (12 lectures)

February: 4 (2), 5, 11 (2), 12 (6 lectures)

March: 5, 11 (2), 12, 18 (2), 19, 25 (2), 26 (10 lectures)

April: 1 (2), 2, 8 (2), 9, 15 (2), 16 (9 lectures)

Total : 37 lectures

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

Sections:

Section 1. Prof. Swanand Khare : NR-121: AG(58)+IM(56)+MI(67) +NA (10) + PH(4) + CY (2) + CH (53) = 250

Section 2. Prof. Somesh Kumar (C): NR-122: CE(75)+ MA(55)+MF(41)+QE(8)+QM(6) + ME (74) = 259

Section 3. Prof. Buddhananda Banerjee: NR-221: BT(40)+CS(105)+ HS(50) + AE (14) + EE (11) + GG (11) + EX (11) +IE (3) +AR (10) = 255