

Indian Institute of Technology Kharagpur  
Department of Mathematics  
**MA20104: Probability and Statistics (3-0-0) CRD-3**  
January - May 2017

Instructor: Bibhas Adhikari

Section: AG+MI+IM

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Course web page: <http://www.facweb.iitkgp.ernet.in/~bibhas/Teaching.html>

Syllabus:

**Probability:** Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' Theorem and independence, problems. **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. **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. **Function of a Random Variable:** Distribution of function of a random variable, problems. **Joint Distributions:** Joint, marginal and conditional distributions, product moments, correlation, independence of random variables, bivariate normal distribution, problems. **Transformations:** functions of random vectors, distributions of sums of random variables, problems. **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. **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. **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.

Texts/References:

**Probability and Statistics in Engineering** by W.W. Hines, D.C. Montgomery, D.M. Goldsman, C.M. Borror

**Introduction to Probability and Statistics for Engineers and Scientists** by S.M. Ross

**Introduction to Probability and Statistics** by J.S. Milton & J.C. Arnold

**Introduction to Probability Theory and Statistical Inference** by H.J. Larson

**Probability and Statistics for Engineers and Scientists** by R.E. Walpole, R.H. Myers, S.L. Myers, Keying Ye

**An Introduction to Probability and Statistics** by V.K. Rohatgi & A.K. Md. E. Saleh

**Modern Mathematical Statistics** by E.J. Dudewicz & S.N. Mishra

**Introduction to the Theory of Statistics** by A.M. Mood, F.A. Graybill and D.C. Boes

Class Timings:

SLOT: B3, **MON(11:00-11:55)** , **TUE(08:00-08:55)** , **TUE(09:00-09:55)** Room: **NR121**.