

MA 20205 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. **4 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. **5 Lectures**

Text Books:

1. An Introduction to Probability and Statistics by V. K. Rohatgi. & A.K. Md. E. Saleh
2. Mathematical Statistics and Data Analysis by John A. Rice
3. Probability and Statistical Inference by R.V. Hogg, E.A. Tanis, & D. L. Zimmerman
4. Introduction to Probability Theory by Paul G. Hoel, Sidney C. Port and Charles J. Stone

Reference Books:

1. Introduction to Probability and Statistics for Engineers and Scientists by S.M. Ross
2. Introduction to Probability and Statistics by J.S. Milton & J.C. Arnold.
3. Introduction to Probability Theory and Statistical Inference by H.J. Larson
4. Probability and Statistics for Engineers and Scientists by R.E. Walpole, R.H. Myers, S.L. Myers, Keying Ye
5. Modern Mathematical Statistics by E.J. Dudewicz & S.N. Mishra
6. Introduction to the Theory of Statistics by A.M. Mood, F.A. Graybill and D.C. Boes
7. Probability and Statistics in Engineering by W.W. Hines, D.C. Montgomery, D.M. Goldsman, C.M. Borror
8. Probability & Statistics with Reliability, Queuing and Computer Science Applications by K. S. Trivedi
9. Fundamentals of Probability with Stochastic Processes by S. Ghahramani

Video Lectures: Probability and Statistics by Prof. Somesh Kumar are available on the following link:

<https://www.youtube.com/playlist?list=PL6C92B335BD4238AB>

Lecture Schedule: Sections 1, 3, 5, 7

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

August: 2, 8 (2), 16, 22 (2), 23, 29 (2), 30 (10 lectures)

September: 5 (2), 6, 12 (2), 13, 19 (2) (8 lectures)

October: 10 (2), 11, 17 (2), 18, 25, 31 (2) (9 lectures)

November: 1, 7 (2), 14 (2) (5 lectures)

Total: 32 Lectures

Lecture Schedule: Sections 2, 4, 6

Slot B3 - Monday - 11:00-11:55, Tuesday - 8:00-10:00

August: 2 (2), 8, 16 (2), 22, 23 (2), 29, 30 (2) (11 lectures)

September: 5, 6 (2), 12, 13 (2), 19 (7 lectures)

October: 10, 11 (2), 17, 18 (2), 25 (2), 31 (9 lectures)

November: 1 (2), 7, 8 (2), 14 (6 lectures)

Total : 33 lectures

Class Test Schedule

Test 1	4 th September
Test 2	6 th November

Details of Sections:

Section 1: Prof. Bibhas Adhikari: Slot A3

IE (48) + HS (68) + MA (79) + EX (23) – Total - 218

Section 2: Prof. Swanand Khare: Slot B3

EC (165) + PH (45) – Total - 210

Section 3: Prof. Prateep Chakraborty: Slot A3

MI (82) + MT (79) – Total – 161

Section 4: Prof. Somesh Kumar: Slot B3

CS (155) + MF (71) – Total – 226

Section 5: Prof. Arindam Banerjee: Slot A3

CE (106) + AG (76) – Total – 182

Section 6: Prof. Buddhanda Banerjee: Slot B3

EE (124) + BT (60) – Total – 184

Section 7: Prof. H.P. Sarwar: Slot A3

CY (33) + IM (79) + NA (60) + QE (1) – Total – 173

Total no. of students in seven sections – 1354