

UNIVERSITY OF LADAKH



SYLLABUS

OF

THE INTERDISCIPLINARY COURSE

OF

MATHEMATICS

(UNDER NEP – 2020)

(Implemented w.e.f Academic Session 2023-24)

UNIVERSITY OF LADAKH

SYLLABUS OF THE INTER-DISCIPLINARY COURSE IN MATHEMATICS

UNDER NATIONAL EDUCATION POLICY - 2020

(Session 2023-2024)

Semester I

Course Title: A First Course on Probability

Credit: 3

Course Code: MTS-MA-102-G

Objective: This course aims to provide students an understanding of the basic concepts in probability, conditional probability, distributions and events.

Unit I (15 Hrs)

Sample space. Events, elementary events, algebra of events. Axioms of probability. Inclusion-Exclusion formula. Conditional probability. Bayes' Theorem. Independence

Unit II (15 Hrs)

Discrete random variables. Expected value and variance. Basic discrete distributions (binomial, hypergeometric, Poisson, negative binomial). Continuous random variables. Probability density function. Basic continuous distributions (uniform, normal, exponential, gamma).

Unit III (15 Hrs)

Random vectors. Joint, marginal, and conditional distributions. The bivariate normal distribution. Expectation and variance of sums of random variables. Moment generating functions. Conditional expectation and prediction

Suggested Books:

Essential

1. Sheldon Ross, "A First Course in Probability", Pearson.

Further Reading

1. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi -2, 2011.
2. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, Narosa.
3. K. L. Chung, *Elementary Probability Theory with Stochastic Process*, Springer Narosa.
4. W. Feller, *An Introduction to Probability Theory & its Applications*, John Wiley
5. A. M. Goon, M. K. Gupta, & B. Dasgupta, *An Outline of Statistical Theory*, World Press.
6. E. Parzen, *Modern Probability Theory and its Applications*, John Wiley .
7. N. A. Rahman, *Practical Exercises in Probability and Statistics*, Griffen.
8. T. Cacoullous, *Exercises in Probability*, Narosa.

Semester II

Course Title: DISCRETE MATHEMATICS

Credit: 3

Course Code: MTS-MA-202-G

Objective: The main objective of this course is to introduce basic concepts of mathematical logic, relations and functions and Boolean algebra for analysing and proving theorems.

Unit I (15 Hrs)

Mathematical Logic: Statement and notations, proposition and logic operations, connectives (conjunction, disjunction, negation), statement formulas and truth tables, propositions generated by set, equivalence of formulas and implication laws of logic, propositions, principal of mathematical induction, quantifiers.

Unit II (15 Hrs)

Relation and Function: Binary relations, Properties of binary relation in a set, Equivalence relations, Composition of binary relations, Partial ordering and Partial Order set, Hasse diagram, Function and Pigeon hole Principle. Recursion definition, many faces of recursion, Recurrence relations, common recurrence relations, generating functions and their solutions.

Unit III (15 Hrs)

Posets, lattice and basic properties of Boolean algebraic, Principle of duality, distributive and complemented lattices, uniqueness of finite Boolean algebra, Boolean functions and Boolean expressions, Normal forms of Boolean expression and simplifications of Boolean expressions, Basic circuits and theorems, Logical gates and relations of Boolean function.

Suggested Books:

Essential Readings

1. S. K. Chakraborty, B. K. Sarkar, *Discrete Mathematics*, Oxford Education, 2011.

Suggested Readings

1. B. Ram, *Discrete Mathematics*, Pearson Education, 2012.
2. K. D. Rosen, *Discrete Mathematics and its Applications*. 7th edition, Tata McGraw Hill, 2011.
3. J. P. Trembley and R. Manohar, *A First Course in Discrete Structure with applications to Computer Science*, Tata McGraw Hill, 1999.
4. V. K. Khanna, *Lattices and Boolean Algebras*. PHI Publication, 2004.
5. C. L. Liu, *Elements of Discrete Mathematics*. Tata McGraw Hill, 2000.
6. S. Lipschutz, M. L. Lipson and V. H. Patil, *Discrete Mathematics*. Schaum's Outline Series, Tata McGraw-Hill Education, 2006.