Semester	AUG 2022
Open to semester	7,13,21
Course code	**MT4134/MT6124**
Course title	**Probability**
Credits	4 /4
Course Coordinator & participating faculty (if any)	Anindya Goswami
Nature of Course	Lectures
Pre-requisites	Measure Theory and Integration
Objectives (goals, type of students for whom useful, outcome etc)	This course gives the mathematical foundation of probability theory. This course starts with Kolmogorov's model of probability and then gives in depth understanding of conditional expectation. These facilitate in studying random processes like Martingales, Markov chain, etc. The topics included in this course are essential for those who are interested in advanced probability theory, mathematical finance, mathematical biology, time series analysis, etc.
Course contents (details of topics /sections with no. of lectures for each)	Kolmogorov's model of probability: The Probability Space, Events, properties of probability measures, independence of events. Random variable, distribution functions, decomposition of the distribution function, joint distributions, characteristic function. Bayes' formula, Conditional expectation, conditional probability, independence of ? algebras, and random variables. Regular conditional probability.
	Borel-Cantelli lemmas, Kolmogorov 0-1 law, Central limit theorem, various different notions of convergence of a sequence of random variables. The convergence of the sum of independent random variables. Limit theorems: Weak/Strong law of large numbers, Martingales, Stopping time, Doob's inequality.
Evaluation /assessment	End-Sem Examination-35% Mid-Sem Examination-35% Others-30%
Suggested readings (with full list of authors, publisher, year, edn etc.)	1. Introduction to Probability Models: S. M. Ross (2014) Academic Press 2. Introduction to the Theory of Probability and its

	Applications, Vol. 1: W. Feller (2008) Wiley
	3. Introduction to Stochastic Processes: P. G. Hoel, S. C. Port and C.J. Stone (1986) Waveland Press Inc.
	4. Probability: A Graduate Course (Springer Texts in Statistics): A. Gut (2010) Springer
	5. Probability Theory: R. G. Laha and V. K. Rohatgi (1979), Wiley