IISER Pune - Course Content

Semester	JAN 2025
Open to Semester	6,8,32,34,12
Course Code	MT3284
Course title	Topics: Mathematical Finance
Nature of Course	LE - Lecture
Credit	4
Coordinator and participating faculty (if any)	**Dr. Anindya Goswami**
Pre-requisites	
Objectives	In this subject, students will be trained in the mathematical and computational techniques required to solve problems in quantitative finance. It is suitable for third- or fourth-year BS-MS students, first- or second-year MSc students, and first-year iPhD students.
Course content	Financial markets and instruments, risk-free and risky assets (1)* Interest rates, present and future values of cash flows, term structure of interest rates, spot rate, forward rate (3)* Return and risk of a portfolio, mean-variance portfolio theory, efficient frontier, Sharpe ratio (5)* Discrete- and Continuous-time asset pricing models, Binomial, Trinomial GBM, Stochastic volatility, Regime switching, Merton's jump-diffusion (4)* No-arbitrage principle, Financial derivatives* Forward, futures, and op-tion contracts and their pricing theory (3)* Complete and incomplete market (3)* Type and style of options and path independent/dependent options (2)* Hedging strategies using futures, interest rate, and index futures* Swaps and their valuation (1) Discrete-time pricing of European and American options (4)* Continuous-time pricing of options: BSM model, Heston model (6)* Monte-Carlo simulation for pricing financial derivatives (3) Ito's lemma and its application (3)
Evaluation / Assessment	Quiz 30%, Mid Sem 35%, End sem 35%
Suggested readings	1. Luenberger, David. Investment science, Oxford Univ Pr* 2e, 2013 2. Wilmott, Paul. Paul Wilmott on Quantitative Finance, 3 Volume Set, Wiley* 2e, 2006 3. Shreve, Steven. Stochastic Calculus for Finance I: The Binomial Asset Pricing Model, Springer, 2005

	4. Shreve, Steven. Stochastic Calculus for Finance II: Continuous-Time Models, Springer 1e, 2004 5. Sondermann, Dieter. Introduction to Stochastic Calculus for Finance: A New Didactic Approach, Springer-Verlag Berlin, 2006 6. Delbaen, Freddy and Schachermayer Walter. The Mathematics of Arbitrage, Springer, 2006
When Next	not known
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