

# Math 3225 Mathematics of Finance 1

Fall 2015 University of Pittsburgh

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**Lectures:** Thursday 6:00-8:30 pm in 704 Thackeray Hall.

**Office Hours:** Tuesday, Friday 1:30-3:00 pm in 404 Thackeray Hall or by appointment.

## Description

This course and its sequel MATH3226 present fundamental principles and standard approaches used in mathematical finance. We will study discrete and continuous-time stochastic models with applications in various fields of mathematical finance including pricing and hedging financial instruments, risk management and financial decision making etc. We will first cover the volume 1 of Shreve's book on discrete-time stochastic models which includes Binomial pricing model; discrete-time martingale theory, arbitrage and risk-neutral pricing; capital asset pricing model, American options and fixed-income derivatives. Then we will discuss the first few chapters of volume 2 of Shreve's book: general probability theory and sigma algebra of information, random walk, Brownian motion and stochastic integrals if time permits.

## Prerequisite

Calculus and Calculus-based Probability.

## Text

1. "Stochastic Calculus for Finance I: The Binomial Asset Pricing Model" by Steven Shreve (Springer, ISBN-13: 978-0387401003 ISBN-10: 0387401008 Edition)
2. "Stochastic Calculus for Finance II: Continuous-Time Models" by Steven Shreve (Springer, ISBN-13: 978-1441923110 ISBN-10: 144192311X)

## Supplementary Text

- "Arbitrage Theory in Continuous Time (3rd edition)" by Tomas Björk (Oxford University Press, ISBN-13: 978-0199574742 ISBN-10: 019957474X)
- "Options, Futures, and Other Derivatives (9th Edition)" by John C Hull (Pearson Education, ISBN-13: 978-0133456318 ISBN-10: 0133456315)
- "An Elementary Introduction to Mathematical Finance (3rd edition)" by Sheldon M. Ross (Cambridge University Press, ISBN-13: 978-0521787222 ISBN-10: 052178722X)
- "Financial Calculus: an introduction to derivative" by Martin Baxter and Andrew Rennie (Cambridge University Press, ISBN-13: 978-0521552899 ISBN-10: 0521552893)
- "The Concepts and Practice of Mathematical Finance (2nd edition)" by Mark S. Joshi (Cambridge University Press, ISBN-13: 978-0521514088 ISBN-10: 0521514088)

## Grades

Homework assignments 30%  
Take-home midterm exam 30%  
Take-home final exam 40%