

Mathematical Finance – Math 358

Professor Henry Schellhorn

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Office hours: M 2-4, Tu 11-12

Class meets Tu 4-6:50 PM in Academic Computing 211

Grader: Jae Hong Kim JaeHong.Kim@cgu.edu

Text

Required:

- (i) Stochastic Calculus for Finance I and II, by Steven Shreve, Springer 2004.
- (ii) Options, Futures, and Derivatives, by John Hull, any edition.

The two books by Shreve are quite demanding, but we will cover only about half of the material, and skip some of the details. Hull's book is a must-have for a financial engineer.

Coverage

This class will cover the theory of option pricing, emphasizing the Black-Scholes model and interest rate models. Implementation of the theory and model calibration are covered in the companion class, Numerical Methods for Finance, Math 361. We will see:

- The Binomial No-Arbitrage Pricing Model
- State Prices
- Brownian Motion, Stochastic Integration, and Ito's lemma
- Derivation and Solution of the Black-Scholes equation
- Risk-neutral Pricing and Girsanov Theorem
- Change of Numeraire
- Term-Structure Models: Vasicek and Heath-Jarrow-Morton.

This corresponds to the following chapters in Shreve's books: vol I chapters 1 and 2; vol II chapters 3,4,5,9, and 10. Students are encouraged to take Mgmt 339 to see applications of the theory.

Prerequisites

Math 251, Math 256.

Grading

Grading will be composed of:

- Attendance (10%)
- Homework (40%)
- Mid-term (25%)
- Final (25%)

Homework is due one week after reception.

Assignments and solutions will be handed in class. I will try to post them on Sakai. If they do not print/display well off Sakai, I will keep some hard-copies in front of my office door, to be picked up during business hours.

All anticipated excused absences must be cleared with me prior to the absence. The final is on May 12. Only because of exceptional circumstances will I accept requests to reschedule the final.