

APPLIED STOCHASTIC PROCESSES FOR FINANCE 2024 SPRING
STAT-GB 2308 30, STAT-GB 6008
Peter Lakner

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Office: Room 8-61 KMEC
Class meetings: Tuesday 6:00-9:00 pm.
Classroom: TBA
First class: Feb. 6th
Last class: April 30th
No class on March 19th
Office hours: TBA

Textbook: Pliska, S.R., Introduction to Mathematical Finance. This book is available in the NYU Bookstore. Purchase of the book is NOT mandatory, lecture notes will be distributed.

Teaching assistant: TBA

Assignments, exams, and grading: Homework exercises will be assigned after every class and posted on the class website. The grade will be based on the two exams and the homework assignments. The weights are 40% for each exam and 20% for the homework assignments. Each homework assignment will be due by the beginning of the class following the one when it has been assigned. Both handwritten or typed homework assignments will be accepted. Homework assignments should be based on individual work.

Attendance of classes is mandatory. However, absences for medical or work related reasons or for family emergencies will be accepted.

Prerequisite: An introductory course in Statistics, knowledge of binomial and normal distributions, use of the normal probability table, expected value and standard deviation of a distribution, conditional probabilities. Solving a system of linear equations.

Dates of the exams:

Midterm exam: March 12th, 6:00 - 8:00 pm
Final exam: April 30th, 6:00-8:00 pm

MBA Stern Honor Code: http://w4.stern.nyu.edu/scorp/committee.cfm?doc_id=4797

If you have a qualified disability and will require academic accommodation during this course, please contact the Moses Center for Students with Disabilities (CSD, 998-4980) and provide me with a letter from them verifying your registration and outlining the accommodations they recommend. If you will need to take an exam at the CSD, you must submit a completed Exam Accommodations Form to them at least one week prior to the scheduled exam time to be guaranteed accommodation.

List of topics:

Stock prices, trading strategies, value process, gains, discounting, arbitrage, risk-neutral probability measures, the fundamental theorem of asset pricing.

Pricing attainable contingent claims, Call and put options, complete and incomplete markets.

Pricing non-attainable contingent claims, the put-call parity, multiperiod markets, event algebras.

Trading strategy, gains and wealth processes in a multiperiod setting, discounting, conditional expectation with respect to an event algebra, martingales, arbitrage, martingale measure. The fundamental theorem of asset pricing in a multiperiod setting.

Martingale measure for a market with dividend paying stocks, contingent claims, arbitrage pricing in a multiperiod setting, put-call parity and the chooser option.

The binomial model, the European call option under the binomial model.

Lookback, knockout and Asian options. American options.

The Bermudan option, forward contracts on stocks without and with dividends. Futures contracts.

The Black-Scholes model, the BS formula, hedging the European call in the BS model.

Sensitivity analysis of the Black-Scholes formula, Approximation of the Black-Scholes formula with the binomial option-pricing formula. Zero-coupon bonds, the yield curve.

Optimal portfolio selection.

Computations:

A calculator will be necessary for this class. It should be able to calculate the logarithm and the exponential of a number. It should also contain a memory. In class a few times we shall use MINITAB for computing binomial and normal probabilities. Such calculations will be also necessary for a few homework assignments. The use of Minitab for completing these assignments is not mandatory, any other computer program that can compute such probabilities is acceptable.