Course Description

This course will cover methods and topics that form the foundations of modern asset pricing. These include: investment decisions under uncertainty, mean-variance theory, capital market equilibrium, arbitrage pricing theory, state prices, dynamic programming, and risk-neutral valuation as applied to option prices and fixed-income securities. Upon completion of this course, students should acquire a clear understanding of the major principles concerning individuals’ portfolio decisions under uncertainty and the valuations of financial securities.

Prerequisites

- Required: Corporate finance (FNCE 100/FNCE 611) Multivariate calculus (MATH 114), Linear algebra (MATH 312), Probability (STAT 430).

- Recommended (at least one of the following): Investments (FNCE 205/720), Intermediate microeconomics (BEPP 250/MGEC 612), Real analysis (MATH 360), Stochastic processes (STAT 433).

Course Material

- The website for this course can be accessed through Canvas:
  https://canvas.upenn.edu.
  On this website you can find lecture notes, sample problems, announcements.

- Textbook in draft form:
Course Work and Grading

There will be two quizzes and a final exam. For each quiz, you may bring in one sheet of paper with writing on the front and back. Quizzes will be 80 minutes long. For the final (which is cumulative), you may bring in three sheets of paper with writing on the front and back. Note that the final is held on the date and time determined by the Registrar. Final grades will be determined as follows: Quizzes (25% each, for a total of 50%), Final exam 50%. Also, students are expected to come to class and to actively participate in class discussion. Class participation will count for students on the margin between grades.

For each topic, there will be sample questions and answers posted on Canvas. There will also be exams from previous years. Students are highly encouraged to work through these problems without looking at the answers as preparation for the quizzes and the final exam, and as the best way to learn the material.
Course Outline

I Decision Making under Uncertainty

- Expected utility
- Risk aversion
- The portfolio choice problem
- Utility functions

II Mean-Variance Portfolio Analysis

- Characterization of minimum variance portfolios
- Properties of minimum variance portfolios
- The case with a riskless asset

III Linear valuation models

- Statement of the CAPM
- First derivation of the CAPM
- Fund separation and the second derivation of the CAPM
- Linear factor models and the Arbitrage Pricing Theory

IV No-arbitrage pricing in two periods

- Definition of arbitrage
- Bounds on the prices of call and put options
- Put-call parity
- Futures pricing and other derivatives

V State-Contingent Claims

- The fundamental theorem of asset pricing
- The second fundamental theorem: Complete markets
- Pricing of securities in competitive equilibrium
VI Dynamic models of investment

• The Markov property
• Dynamic programming and the value function
• The Euler equation
• Application: consumption and portfolio choice for the log utility investor
• The infinite-horizon limit.

VII Dynamic risk-neutral valuation

• Notation and definitions
• The fundamental theorems revisited
• Optimal consumption and investment policies
• The binomial model and dynamic option pricing

VIII The pricing of bonds and stocks

• The iid lognormal model
• The consumption CAPM
• The yield curve
• Equity strips
• Rare events

IX Introduction to continuous-time models

• From the binomial model to continuous-time diffusions
• Black/Scholes/Merton option pricing
• The consumption CAPM revisited
• The intertemporal CAPM
• The jump-diffusion model (as time permits).