

University of Pennsylvania
The Wharton School

FNCE 257/757:
Foundations of Asset Pricing

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Office hours: Wednesday 4:30–5:30

Spring 2021
Classes: M/W 9–10:30

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

- You may access all course materials through Canvas:
<https://canvas.upenn.edu>.
Please check Canvas for announcements, zoom meeting links, slides, textbook chapters, class videos, and sample exam problems.
- Textbook in draft form:
J Wachter, *An Introduction to the Theory of Asset Pricing*.

Course Work and Grading

There will be two midterms, a final, and a class presentation, which may be done on your own or with another student (in which case a joint grade will be assigned). The midterms are each worth 20% of the grade. The presentation is worth 10%, and the final 50%.

- Midterm 1: available 8am on Thursday February 25, due 8am on Friday February 26
- Midterm 2: available 8am on Thursday March 25, due 8am on Friday March 26
- Final Exam: available 8am on Thursday May 6, due 8am on Friday May 7 (cumulative, with greater weight on topics not yet covered).

All exams are open book/notes. They are to be taken under adherence to the University's honor code. Midterms are designed for a prepared student to complete in 80 minutes. The final is designed for a prepared student to complete in 2 hours.

Student presentations will be based on one of the exercises at the end of each chapter, or on a sample midterm or final problem. The presentation may be done individually or in teams of 2. Total presentation length should be 10 minutes, with 5 minutes for questions. Please confirm your question with me prior to beginning work on it. We will decide on the questions for presentation and the dates after spring break.

Attendance in classes is highly encouraged. Please let me know if you cannot attend a class. Please feel free either to jump in with questions, or to use the chat. Please keep your video on if possible.

Teaching Assistant

The teaching assistant for this course is James Paron. He can be reached by email at jparon@wharton.upenn.edu. His office hours will be Tuesdays 4:30–5:30. Please see canvas for a zoom link.

Course Outline

I Decision Making under Uncertainty

- Expected utility
- Risk aversion
- The portfolio choice problem
- Utility functions
- A definition of risk

Readings: Chapter 1

II Mean-Variance Portfolio Analysis

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

Readings: Chapter 2

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

Readings: Chapter 3

IV No-arbitrage pricing in two periods

- Definition of arbitrage
- Bounds on the prices of call and put options
- Put-call parity

Readings: Chapter 4

V State-Contingent Claims

- Complete market competitive equilibrium
- Securities market equilibrium
- The representative agent
- The fundamental theorem of asset pricing
- The second fundamental theorem: Complete markets

Readings: Chapter 5

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.

Readings: Chapter 7

VII Dynamic risk-neutral valuation

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

Readings: Chapter 8

VIII The pricing of bonds and stocks

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

Readings: Chapter 9

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).

Readings: Chapter 12