

University of Pennsylvania
The Wharton School

FNCE 911:
Foundations for Financial Economics

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Fall 2015
Classes: Friday 1:00-4:00
Office hours: By appointment

Course Description

The objective of this course is to undertake a rigorous study of the theoretical foundations of modern financial economics. The course will cover the central themes of modern finance including individual investment decisions under uncertainty, stochastic dominance, mean-variance theory, capital market equilibrium and asset valuation, arbitrage pricing theory, option pricing and the potential application of these themes. Upon completion of this course, students should acquire a clear understanding of the major theoretical results concerning individuals' consumption and portfolio decisions under uncertainty and their implications for the valuations of securities.

Prerequisites

The prerequisites for this course are graduate level microeconomics (Economics 681 or Economics 701), matrix algebra, and calculus. The microeconomics courses may be taken concurrently.

Course Material

- The website for this course can be accessed through Canvas:
<https://canvas.upenn.edu>.
Lecture notes, problem sets, announcements, and readings will be posted here.
- The textbook for the course is:
C.F. Huang and R. Litzenberger, 1988, *Foundations for Financial Economics*, Prentice Hall.
On the syllabus, readings from the textbook are prefaced by HL. This textbook is out of print. Copies of the relevant chapters can be accessed through the course website.
- Following each topic, there is a list of recommended articles. These can also be accessed through the website.

Other reading

Some excellent texts that cover material related to this course are:

- K. Back, 2010, *Asset Pricing and Portfolio Choice Theory*, Oxford University Press.
- J. Campbell, A. Lo, A. MacKinlay, 1996, *The Econometrics of Financial Markets*, Princeton University Press. (See especially chapters 5-11)
- J. Cochrane, 2005, *Asset Pricing* Revised Edition, Princeton University Press. (See especially chapters 1-9, 17-21)
- D. Duffie, 2001, *Dynamic Asset Pricing Theory* 3rd edition, Princeton University Press. (See especially chapters 1-4)
- J. Ingersoll, 1987, *Theory of Financial Decision Making*, Rowman and Littlefield.

For background reading, the following textbooks may be useful:

- A. Mas-Colell, M. Whinston, and J. Green, 1995, *Microeconomics Theory*, Oxford University Press, New York.
- W. Rudin, 1976, *Principles of Mathematical Analysis*, McGraw Hill, New York.

Course Work and Grading

Homework assignments will be available on Canvas and will be due on Friday in class starting September 11. While you may work on the homework in groups, you must hand in your own answers. Homework assignments will be graded on a three point scale. There is a midterm and a final exam. The midterm will be held in class on October 23. The final will be held on the date determined by the Registrar, which is Thursday, December 17, from 12 to 2. Final grades will be determined as follows: Homework (20%), midterm (35%) and final (45%). In addition, 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.

Teaching Assistant

The teaching assistant for this course is Mete Kilic. He can be reached by email at mkilic@wharton.upenn.edu. His office hours are Thursdays from 4:30 to 5:30 in SH-DH 2406.

Course Outline and Readings

Note: Dates are approximate.

I Decision Making under Uncertainty Aug.. 28, Sept. 4

- Outline
 - Expected utility representations
 - Risk aversion
 - Insurance premium; certainty equivalent wealth
 - Portfolio choice
 - Important utility functions
 - Global risk aversion
- Readings:
 - (a) HL Chapter 1
 - (b) Cass, D., and J. Stiglitz, 1970, The structure of investor preferences and asset returns, and separability in portfolio allocation: a contribution to the pure theory of mutual funds, *Journal of Economic Theory* 2, 122-160.
 - (c) Pratt, J., 1964, Risk aversion in the small and in the large, *Econometrica* 32, 122-136.
 - (d) Ross, S., 1981, Some stronger measures of risk aversion in the small and large with applications, *Econometrica* 49, 621-638.

II Stochastic Dominance Sept. 4

- Outline
 - Motivation
 - First order stochastic dominance
 - Second order stochastic dominance
 - A definition of risk; mean-preserving spreads
- Readings
 - (a) HL Chapters 2.1–2.10
 - (b) Rothschild, M., and J. Stiglitz, 1970, Increasing risk I: a definition, *Journal of Economic Theory* 2, 225-243.

III Mean-Variance Portfolio Analysis Sept. 4, Sept. 11

- Outline
 - Notation and definitions
 - Characterization of minimum variance portfolios
 - Properties of minimum variance portfolios
 - The case with a riskless asset
- Readings
 - (a) Chapter 3
 - (b) Roll, R., 1977, A critique of the asset pricing theory's tests, *Journal of Financial Economics* 4, 129-176. (Pay special attention to the Appendix)

IV Portfolio Separation and the Capital Asset Pricing Model (CAPM) Sept. 18

- Outline
 - Statement of the CAPM
 - First derivation of the CAPM
 - One and two-fund separation
 - Second derivation of the CAPM
- Readings
 - (a) HL Chapters 4.1–4.17
 - (b) Black, F., 1972, Capital market equilibrium with restricted borrowing, *Journal of Business* 45, 444-454.
 - (c) Brennan, M., 1971, Capital market equilibrium with diverged borrowing and lending rates, *Journal of Financial and Quantitative Analysis* 1971, 1197-1205.
 - (d) Fama, F. and K. French, 2004, The capital asset pricing model: Theory and evidence, *Journal of Economic Perspectives* 18, 25-46.
 - (e) Ross, S., 1978, Mutual fund separation in financial theory: the separation distributions, *Journal of Economic Theory* 17, 254-286.
 - (f) Sharpe, W., 1964, Capital asset prices: a theory of capital market equilibrium under conditions of risk, *The Journal of Finance* 19, 425-442.

V Arbitrage Pricing Theory Oct. 2

- Outline
 - Linear factor model
 - An economy with one factor and no residual risk
 - An economy with multiple factors and no residual risk
 - An economy with multiple factors and residual risk
- Readings
 - (a) HL Chapters 4.18–4.22
 - (b) Huberman, G., 1983, A simplified approach to arbitrage pricing theory, *Journal of Economic Theory* 28, 1983-1991.
 - (c) Ross, S., 1976, Arbitrage Theory of Capital Asset Pricing, *Journal of Economic Theory* 13, 341-360.

VI State-Contingent Claims Oct. 2, Oct. 16

- Outline
 - Pareto-optimal allocations
 - Complete markets economy and competitive equilibrium
 - Securities market equilibrium
 - Using options to complete markets
 - Representative agent
 - Aggregation
- Readings
 - (a) HL Chapter 5
 - (b) Arrow, K., 1964, The role of securities in the optimal allocation of risk-bearing, *Review of Economic Studies* 31, 91-96.
 - (c) Hansen, L., and S. Richard, 1987, The role of conditioning information in deducing testable restrictions implied by asset pricing models, *Econometrica* 55, 587-614.
 - (d) Rubinstein, M., 1974, An aggregation theorem for securities markets, *Journal of Financial Economics* 1, 225-244.

VII State Prices and Arbitrage Oct. 30.

- Outline
 - Definitions
 - Fundamental theorem of asset pricing
 - Complete markets
 - Application to options
- Readings
 - (a) HL Chapters 6.1–6.9
 - (b) Dybvig, P., S. Ross, 2003, Arbitrage, state prices, and portfolio theory, in *Handbook of the Economics of Finance*, G. Constantinides, M. Harris, and R. Stulz (eds.), North-Holland, Amsterdam, The Netherlands.

VIII Multi-Period Securities Markets Nov. 6

- Outline
 - Description of the economy
 - Pareto optimal allocations
 - Complete markets and competitive equilibrium
 - Dynamic completeness
 - Securities market equilibrium
- Readings
 - (a) HL Chapters 7.1–7.8, 7.11-7.15
 - (b) Kreps, D., 1982, Multiperiod securities and the efficient allocation of risk: A comment on the Black-Scholes option pricing model, in *The Economics of Uncertainty and Information*, J. McCall (ed.), University of Chicago Press, Chicago, Illinois.

IX Characterizing Optimal Consumption and Investment Policies: Dynamic Programming Nov. 13, Nov. 20

- Outline
 - Dynamic programming
 - Characterization of optimal consumption and investment policies
 - Representative agent revisited
 - Consumption CAPM
- Readings
 - (a) HL Chapters 7.9, 7.10, 7.16, 7.19, 7.20, 7.22
 - (b) Campbell, J., 2003, Consumption-based asset pricing, in *Handbook of the Economics of Finance*, G. Constantinides, M. Harris, and R. Stulz (eds.), North-Holland, Amsterdam, The Netherlands.
 - (c) Epstein, L., S. Zin, 1991, Substitution, risk aversion, and the temporal behavior of consumption and asset returns: An empirical analysis, *Journal of Political Economy* 99, 263-286.
 - (d) Grossman, S. and R. Shiller, 1982, Consumption correlatedness and risk measurement in economies with non-traded assets and heterogeneous information, *Journal of Financial Economics* 10, 195-210.
 - (e) Levhari, D., Srinivasan, T. N., 1969, Optimal savings under uncertainty, *The Review of Economic Studies* 36, 153-163.
 - (f) Lucas, R., 1978, Asset prices in an exchange economy, *Econometrica* 46, 1426-1446.
 - (g) Mehra, R., and E. Prescott, 1985, The equity premium puzzle, *Journal of Monetary Economics* 15, 145-161.
 - (h) Samuelson, P., 1969, Lifetime portfolio selection by dynamic stochastic programming, *Review of Economics and Statistics* 51, 239-246.

X Optimal Consumption/Investment Policies and Asset Pricing: The Martingale Representation Approach Nov. 25¹, Dec. 4

- Outline
 - Notation and definitions
 - Martingale property of prices and no-arbitrage
 - Market completeness
 - Individual optimization
 - Asset pricing: Binomial model
- Readings
 - (a) HL Chapter 8
 - (b) Cox, J., and S. Ross, 1976, The valuation of options for alternative stochastic processes, *Journal of Financial Economics* 3, 145-166.
 - (c) Cox, J., S. Ross, and M. Rubinstein, 1979, Option pricing: a simplified approach, *Journal of Financial Economics* 7, 229-263.
 - (d) Duffie, D., 2003, Intertemporal asset pricing theory, in *Handbook of the Economics of Finance*, G. Constantinides, M. Harris, and R. Stulz (eds.), North-Holland, Amsterdam, The Netherlands.
 - (e) Harrison, M. and D. Kreps, 1979, Martingales and arbitrage in multi-period securities markets, *Journal of Economic Theory*, 20, 381-408.

¹This class is on the Wednesday before Thanksgiving. It will take place at the same time and place as the regular class.