Course Overview

This course focuses on the financial theories and empirical evidences that are useful for investment decisions. Its main content can be summarized as follows.

- **Financial Risk Factors:** The development of Finance builds on the uncertain nature of the world we live in. Without uncertainty or risk, there would be no financial markets or financial intermediaries as we see them today. So the first and foremost task of this class is to bring risk and uncertainty to our Investments approach. We will focus on the key risk factors in the equity, index options, fixed-income, and credit markets. In the process, we will rely on the two essential ingredients: the financial models and the financial data.

- **Financial Models:** In 15.401 (or equivalent), students study the development of key financial models. In this class, they investigate the extent to which such models actually work. All models are approximations of the much richer reality, and no models are perfect. At the same time, however, financial models are playing an increasingly important role in the financial industry. It is therefore all the more important for us to understand their advantage as well as limitation. In particular, when and where do our financial models work, and when and where do they fail? What can we do to improve them? Questions like this are extremely important for anyone who prepares him/herself for a career in the financial industry, regardless of the subfields. The recent financial crisis reminds us once again of this urgency.

- **Financial Markets:** The innovations in financial markets are such that many “plain-vanilla” financial instruments such as index options, interest-rate swaps, and credit default swaps were not in existence several decades ago. The key risk factors in the financial markets remain very much the same, but the vehicles for such risk exposures have been expanded in variety and improved in efficiency. It would be difficult to function in the current financial environment without the knowledge of such new development. In our process of empirical investigation, for each of the capital markets, we will use the most relevant financial products to test the most relevant financial models. So you will not only get a deeper understanding of the models, but also a deeper understanding of the key financial securities in modern finance.
Course Materials and Webpage

- Required: Lecture notes in pdf format will be posted on Stellar.
- Required: Assignments and datasets are to be posted on Stellar.
- Optional: Bodie, Kane and Marcus, Investments, 8th edition or older, McGraw Hill.
- Optional: Additional reading materials are to be posted on Stellar.
- There is no course reader.

Office Hours and TA

- Office hours are on Tuesdays 2:30-4:00pm or by appointment at E62-624.
- The TAs for this class are Indrajit Mitra (imitra@mit.edu) and Yu Xu (yu_xu@mit.edu).

There will be weekly office hours held by one of the TAs and optional recitations for each problem set and the midterm and final exams. Time and location will be announced on the course website.

Course Requirements

- Lectures:
  - Lectures are on Tuesdays and Thursdays.
  - Section A: 10-11:30am E62-250.
  - Section B: 1:00-2:30pm E51-335.
  - Students are welcome to attend either section.

- Readings:
  - I will post the lecture notes for each class, at the latest, on the day before the class. Reading the first few slides will be helpful.
  - I will post additional reading materials on Stellar. These research papers and newspaper articles could be useful in providing background information or adding some depth to the materials covered in class.

- Assignments:
  - There are four problem sets. Each of the first three assignments counts 5 points toward your final grade, and the last assignment counts 10 points toward your final grade. Here is a list of problem sets with tentative due dates in parentheses:
    2. Time-Series Analysis of Stock Returns (10/8).
3. Options (11/5).
   – Problem sets are to be done in groups with no more than four students.
   – Each problem set must be handed in to the TA before 5pm of the due day.
   – Late assignments will not be accepted.
   – There is an optional recitation for each problem set.

• Exams:
   – The midterm will be given on Thursday October 17,
   – The final will be given on Tuesday December 10.
   – Both exams are closed-book. Students will be allowed to bring one 8.5” ×11”
     two-sided sheet of notes into the midterm and two sheets of such notes into the
     final.

• Grades:
   – The final grade will be determined according to the following weighting scheme:
     * 15% Class participation
     * 25% Problem sets
     * 30% Midterm examination
     * 30% Final examination

Course Calendar

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*Materials covered in this class will not be included in the final exam.
Course Schedule

1. Introduction
2. Alpha, Beta, and the CAPM
3. Equity in the Cross Section, Part 1, Forming Portfolios by Stock Characteristics
4. Equity in the Cross Section, Part 2, Multi-Factor Models
5. Equity in the Cross Section, Part 3, Momentum, Reversal, and Other Anomalies
7. Equity in the Time Series, Part 2, Time-Varying Volatility
10. Options, Part 2, Index Options, Model and Data
11. Options, Part 3, Risk and Return in Index Options
12. Midterm Exam
13. Options, Part 4, Beyond the Black-Scholes Model
14. Fixed-Income, Part 1, Factors Influencing the Yield Curves, Economic and Institutional
15. Fixed-Income, Part 2, Statistical Analysis of the Yield Curves
16. Fixed-Income, Part 3, Term-Structure Models
17. Fixed-Income, Part 4, Interest-Rate Swaps
18. Fixed-Income, Part 5, Decomposing PIMCO Returns
19. Credit, Part 1, Corporate Bonds and Credit Default Swaps
20. Credit, Part 2, Modeling Default
22. Portfolio Management, Part 2, Mean-Variance Analysis
24. Final Exam