Course Description

This course introduces a set of modern analytical tools to solve practical problems in finance. The goal is to bridge the gap between finance theories and practice by building operational models, taking them to the data, and using them to aid financial decision making. The topics include: (1) statistical inference and forecasting with linear and nonlinear models; (2) event studies; (3) structural approach to extract information from financial data; (4) simulation methods; (5) machine learning methods; and (6) static and dynamic optimization in finance.

Example applications will include the development of quantitative trading strategies, credit scoring models, portfolio optimization under financial constraints, and private equity valuation. We will also examine the analytical frameworks behind some Fintech innovations, such as Kensho’s “financial answer machine,” robo-advisors, and micro-lending with big data.

Pre-requisites

15.401 Finance Theory I (or 15.415) is a pre-requisite for this course. 15.460 is recommended but not required. Basic programming skills (in R, Python, MATLAB, or other comparable languages) are expected. Homework assignments involve intensive data analysis and computer implementation of quantitative methods. In addition to formal prerequisites, the course assumes undergraduate-level background in calculus, probability, and statistics.

Course Materials

Lecture notes will be posted on Stellar (http://stellar.mit.edu) before each class. I will also post additional reading materials on Stellar, including research papers and newspaper articles, which can provide useful background information or add depth to the materials covered in class.

Recommended Material:


Course Requirements

- Lectures

- Assignments: There will be 6 problem sets. These problem sets should be done in groups of 3-4 students.

- Exam: There is one written exam. It is closed book; two 8.5” × 11” sheets of notes (two-sided) are allowed.

- Final Project: The final take-home project will be a “mini-case.” The project will require the use of a computer and the concepts developed in the course. You are allowed to work in groups on this project, but each student is required to submit an individual report.

Office Hours and Recitations

- Office Hours: TBA

- The TAs for this class are Peter Hansen (pghansen@mit.edu) and Mazi Kazemi (kazemi@mit.edu). They will hold weekly office hours and recitations. Time and location will be announced on the course website.

Course Website

Course information (syllabus, lecture notes, problem sets and solutions, recitation schedule, announcements, additional course material, etc.) will be posted on http://stellar.mit.edu. Please check it regularly.

Contact Information

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Professional Standards

See the MIT Sloan Professional Standards posted on Stellar.