Finance 4480 - Derivatives Markets

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- **Office:** BUS 605
- **Course Dates:** January 12 - April 28, 2016
- **Course Room:** ENGR 304
- **Course Time:** TR 7:30 - 8:45 AM
- **Course Website:** http://broughtj.github.io/teaching/FIN4480/
- **Office hours:** TBD

Course Description

This course is an introduction to derivative securities, the markets in which they trade, theoretical models for obtaining rational prices for them, and their applications in hedging and speculation. Derivatives are an advanced finance topic. At one time, a course in derivatives was considered a specialized elective, but is now considered mandatory in any finance major. Our topic is by nature an analytical one that will require a good deal of mathematics and quantitative reasoning. However, we will seek a balance between the theoretical presentation of the material and a practical implementation. The skill set necessary to effectively implement modern financial derivative pricing models is a crucial one to have for those seeking a job in the finance industry.

Course Objectives

- Learn fundamental principles and theories.
  - Learn what derivatives are and their basic vocabulary.
  - Learn how derivatives markets operate and the institutional features of the markets in which they trade.
  - Learn the principles of modern financial economic theory explaining how derivative securities are priced.
- Learn to apply course materials
  - Learn a framework for corporations, individuals, and other organizations to determine how and when to use derivative securities for hedging and speculation.
  - Learn to implement derivative pricing models for applications in hedging and speculation.
- Developing specific skills, competencies and points of view needed by professionals in the finance industry and in academic finance.

– Learn the basics of Python programming for purposes of financial modeling.

Python Programming

One unique objective of this course is to learn the basics of Python programming for financial modeling. I have found that programming financial models is an extremely helpful pedagogical tool for learning financial theory. In addition, I have found that my past students have benefited very much from learning some basic programming skills.

The version of Python that we will be using is the following:

- The Anaconda edition of Python by Continuum Analytics. This will have everything that we will need pre-installed. Please install the version that comes with Python 3. It is completely free.

Python is a very good choice for a programming language for this course. As a programming language, Python is fairly easy to learn and can be put to productive use very quickly. Python is quickly becoming the de facto scripting language for scientific computing, and is widely used in the finance industry. Programming will be used as a tool to reinforce learning about derivatives and how they are priced, it will not be the main focus of the course. The amount of programming that you will be required to learn is quite modest. Nevertheless, I cannot emphasize enough how important these skills are for a student of finance to be competitive in the labor market.

Linux/UNIX

I also **highly** recommend that you learn a little about the UNIX command line as well. I will be covering some basic material about UNIX in the course, and will use if heavily myself. While I encourage this, your grade will not depend on this material at all. But I think you will find it a very helpful addition to your skill set.

Textbook

The *required* textbook for the course is *Options, Futures and Other Derivatives 9th Edition* by John C. Hull.

In addition, I will follow the book *Python Programming for the Absolute Beginner 3rd Edition*, in my presentation of the Python programming language. This book is **not** required, but it is **strongly suggested** for those who have never programmed before.

While the first book doesn't have a very serious subject (simple computer games) the programming taught is *serious* programming and it is taught in a way that takes away some of the intimidation associated with other beginning programming books. I highly recommend it!

Grading

The grade that you will earn will be determined from your ranking in the class based on the weighted total points accumulated on class preparation and participation, a class project, as well as on exams. There is no predetermined percentage of the class that will earn an A or that will fail. If you all do excellent work you will all earn exceptional grades. The weights given to each part of the class are as follows:

Class Preparation & Participation (20%)

This portion of your grade will be determined by your preparation for class lectures, your participation in class discussions and the completion of homework assignments. Homework assignments will be given approximately every Thursday and will be due a week later. I will drop your lowest assignment and replace it with the average of the others if you hand all assignments in with full effort. Participation in class is crucial!

Class Projects (40%)

This portion of your grade will be determined by a class project. The project will consist of a computational modeling exercise. You can work in teams of two. Potential topics will be discussed in class, but here are some suggestions:

- Monte Carlo pricing of an exotic option such as Asian option
- Monte Carlo estimation of hedging strategies
- Monte Carlo pricing of a swaption
- Monte Carlo pricing of an option subject to stochastic volatility
- Monte Carlo pricing of an option subject to price jumps
- Monte Carlo evaluation of the Stutzer pricing methodology

Exams (40%)

This portion of your grade will be determined by your performance on the midterm and final exams. I will calculate your grade two ways:

- The total of your two exam scores

- Drop the midterm exam and place all of the weight on the final

Your grade will be determined by which ever method gives you the highest total points.

Format and Attendance

This course is designed to be as interactive and hands-on during our face-to-face class time as possible. As much as possible I will seek to present the dense textbook material in online video lectures. You will watch these on your own time out of class. We will use class time to dig deeper into the material, solve problems, and go over homework problems. This puts a strong burden on each student to come to course prepared to participate in class.

To make this work in practice class attendance will be mandatory. To enforce this I will collect a list of questions from each of you at the beginning of class. Often I will use those questions to decide upon how we will spend class time.

Topics (Subject to Change)

Please see the course website and the course Google Drive folder for a spreadsheet with and updated schedule.

Important Dates:

- **Feb 16** - Monday Schedule
- **Mar 7 - 11** - Spring Break
- **Apr 28** - Last Day of Classes
- **Apr 3** - Final Exam