Tepper School of Business (CMU) – Fall 2015
Derivative Securities 70-497

Syllabus

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Office hours	Tuesday, Thursday 3:30–5pm

Lectures	Tuesday and Thursday, 10:30–11:50am, PH A18B

Description

The goal of the course is to develop tools to price, hedge and understand the risk exposure of any contingent claim on any underlying asset. We will cover forwards and futures, exchange-traded calls and puts, OTC exotic options, interest rate options, and volatility derivatives. By the end of the course, you will have good knowledge of how these products work, how they are used, and how they are priced. As pricing techniques, we will study binomial pricing, Monte Carlo pricing, Black-Scholes and the option pricing meta-theory of risk-neutral valuation. A partial list of topics, which the course will cover, is the following:

- Introduction to derivatives
- Futures and forwards
- Interest rate derivatives
- Option markets and strategies
- Binomial pricing
- Monte Carlo simulations and pricing
- Black-Scholes model
- Greeks
- Volatility risk

Evaluation

- Midterm (20%)
- Final exam (30%)
- Assignments (20%)
- Final project (30%)

All exams are closed book and closed notes. A formula sheet will be provided for each exam. A copy of it will be made available on the course webpage. You will need a calculator that can compute natural logarithms and raise numbers to arbitrary powers. Laptops are not permitted. No makeup midterm exams will be given. If you cannot take the midterm, the weight of your final exam will be increased by the weight of the midterm.

Students are allowed to do the homework assignments in groups of up to 3. Each group should turn in a single hard copy of their work at the beginning of class with the names of all contributing members listed. I will not become involved in any group problems. You may choose to govern yourselves in any manner that you deem appropriate. Solution keys will be available on the course webpage. No late assignments will be accepted.

The final project will consist of you implementing either a binomial pricing or a Monte Carlo pricing approach for an exotic option. You can do so in Excel or Matlab. Each group (max of 3 students) will pitch their pricing strategy in class during the last two weeks. In the last class I expect a write-up of 5 pages presenting results and robustness checks including the code.

Course Material

- Text book: Hull, Options, Futures, and other Derivatives, $\geq 8^{th}$ edition
- Lecture notes
- Supplementary readings
- Excel and Matlab files

Course Schedule

Week of	Topic	Hull (8^{th} ed.)
Sept 1	1. Introduction	1
Sept 8	2. Asset Pricing	
Sept 15	3. Forwards and Futures	2, 3, 5
Sept 22	5. Option Markets	9, 10, 11
Sept 29	6. Binomial Pricing	12
Oct 6	7. Monte Carlo Simulations	13
Oct 13	8. Monte Carlo Pricing	20.6, 25, 26.1
Oct 20	9. Review and midterm	
Oct 27	8. Monte Carlo Pricing	20.6, 25, 26.1
Nov 3	10. Black-Scholes Model	14
Nov 10	11. Greeks	18
Nov 17	12. Volatility Pricing	19, 22, 25.15, 26.2
Nov 24	12. Volatility Pricing	19, 22, 25.15, 26.2
Dec 1	Student presentations	
Dec 8	Student presentations	