

**Winter B 2006**

**FIN 618 Derivative Instruments**

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**Course Overview and Objectives**

This course covers advanced topics on derivative securities. We will develop the Black-Scholes option pricing model and more general option pricing relations. We will also explore how these pricing concepts can be applied to other assets, including exotic derivatives, interest rate options, corporate bonds, and credit derivatives. This course is highly mathematical and requires strong background in calculus, probability, and statistics. Therefore, it is suitable only for students who are interested in understanding the mathematical and financial theories behind derivative securities.

**Course Materials**

The required text book for this course is *Options, Futures, and Other Derivatives*, 6<sup>th</sup> Edition, Prentice Hall Publishing, by John Hull.

The following books are highly recommended for the history of the development of option pricing theories. *When Genius Failed: The Rise and Fall of Long-Term Capital Management*, by Roger Lowenstein, Random House, 2000. *Inventing Money: The Story of Long-Term Capital Management and the Legends Behind It*, by Nicholas Dunbar, John Wiley & Sons, 2000.

**Course Website**

A course website will be available at Ctools. I will post lecture notes, homework assignments, and related reading materials. You will be responsible for printing out the lecture notes and bringing them to class. Most lectures in this class will follow the lecture notes closely.

**Prerequisites**

To take this course, you must have taken FIN 580 or some other equivalent courses. In addition, the study of derivatives is inherently quantitative. There are many equations in almost every lecture. You must be comfortable with basic probability theory, statistics and some calculus. You should also feel comfortable with a computer program that can do statistical analysis and numerical simulations. Excel will do.

## **Class Preparation**

Please finish the assigned readings *before* each class. You will be cold-called to discuss the assigned topics in class. Lack of preparation will negatively affect your grades.

## **Homeworks and Case Competition**

There will be 3 homework assignments throughout the course. They are due on March 16, March 30, and April 13, respectively. You should work in a group of four to six students (at least four) when preparing these assignments and turn in one write up for the entire group.

There will be a case competition at the end of the class. Every group (the same one for homework assignments) will analyze and present a Harvard Business Case on applications of derivatives in a real business setting. I will give you a list of cases from which you can choose from once I know how many students will be in the class. I reserve the right to assign cases to you if necessary. **You have to work on the case on your own, which means that neither I nor the TA will give you any help on the case. Treat it as an oral exam.**

## **Exams and Grading**

There will be a final exam, which is closed-book and closed-notes. You are allowed to bring one double-sided 8.5\*11 cheat sheet. Your grade of the course will be determined according to the following formula:

10% Class participation + 20% Case Competition + 20% Homework + 50% Final Exam.

**Tentative Course Schedule** (As the course progresses and as I get to know you better, I may make certain changes to better suit the class. I will also post additional readings as the course progresses).

### **3/9 1. The Black-Scholes Option Pricing Model**

Hull, Chapter 13-14

Peter Passell, "2 Get Nobel for a Formula at the Heart of Options Trading," *New York Times*, October 15, 1997.

Fischer Black, "How We Come Up with the Option Formula," *Journal of Portfolio Management*, January 1, 1989.

### **3/16 2. The Greek Letters and Volatility Smiles (Assignment 1 due in class)**

Hull, Chapter 15-16

Leland and Rubinstein, "Replicating Options with Positions in Stock and Cash,"  
*Financial Analysts Journal*, July 1, 1981.

**3/23 3. Corporate Securities**

Contingent Claim Analysis, HBS Case 286-114.  
CFA Interviews with Merton

**3/30 4. Exotic Derivatives (Assignment 2 due in class)**

Hull, Chapter 22

**4/6 5. Interest Rate Derivatives**

Hull, Chapters 26 and 28

**4/13 6. Case Competition (Assignment 3 due in class)**

Case 1. HBS Case 9-293-123, Liability Management at General Motors

Case 2. HBS Case 9-294-061, Leland, O'Brien, and Rubinstein Associates: Portfolio Insurance

Case 3. HBS Case 9-293-128, American Barrick Resources Corporation: Managing Gold Price Risk