

Options and Futures

Course Syllabus

I. Course Objectives:

To understand and value the basic derivatives and their applications in the financial risk management and investment. Students will learn about the theoretical underpinnings and the practical applications in real world of derivative securities.

II. Prerequisite:

Microeconomics	Business Finance
Macroeconomics	Investment
Probability & Statistical Method	
Business Calculus or equivalent	

This is an advanced finance course (and may be the most exciting & difficult course in finance) and relies heavily on quantitative and economic arguments. Students who do not sufficient in the above areas will encounter great difficulties in learning the course material and is strongly advised to consult with the instructor.

III. Textbook:

Don M. Chance & Robert Brooks: An Introduction to Derivatives and Risk Management, Eighth Edition, Thomson South-western, 2010.

IV. Supplemental Reading:

Wall Street Journal, Investor's Business Daily, Chicago Mercantile Exchange Publications on Options/Futures.

Business news in the Internet, and internet quotation(e.g., [http://www.cme.com/market/ vendor.html](http://www.cme.com/market/vendor.html))

V. Course Format:

Class format is lecture and discussion of the assigned homework problems. Students are encouraged to interact with the instructor and fellow students in the class discussions. My lecture notes and solution manual are available and downloaded from my website.

VI. Grade: Grades will be determined using the plus/minus system.

	%	Approximate dates
Exam 1	20%	TBD
Exam 2	20%	TBD
Final	35%	TBD
Project (Simulation)	15%	
Class Participation & Homework	10%	

Grades will be assigned by the point cutoffs listed below.

Grading Scale

<u>Grade</u>	<u>Point Cutoff</u>
A+	98–100
A	94–97
A–	90–93
B+	88–89
B	84–87
B–	80–83
C+	73–79
C	66–72
C–	60–65
D+	58–59
D	54–57
D–	50–53
F	0–49

Or a curve depending on which is most advantageous to the majority of students at the end of the semester. I reserve the right of how to curve (**only if** there is a curve).

Note that (i) exams are **noncumulative**, (ii) ***no make-up*** exams will be given **under any circumstances**, all students must take the exams as scheduled; any missed exam garners a grade of zero, (iii) if the exam is missed under the non-controllable condition (e.g., hospitalization), the final exam's score will be double counted, (iv) exams will be similar to the assigned homework problems or examples used in class, and (v) I reserve the right to make any changes appropriate for the administration and evaluation of the class.

Project:

The purpose of the project is to familiarize both the pricing and the actual trading of the option and future contracts. This project consists of the following:

- I. Select a period of 2/7 to 4/16 for your analysis. Then do the following:
 - a. Graph #1. Prepare a computer graph of traced (1) **daily** 3-month T-bill rate (see p. 57, or <http://www.investinginbonds.com>), (2) **daily** S&P 500 index (SPX), (3) **daily** index option (use call option with exercise price at **1,300** and **expire on April 16**, get quote from <http://cboe.com/DelayedQuote/QuoteTable.aspx> or www.cme.com) and at least one **stock option** during the period (assume 2% dividend for S&P index (SPX) and then use B/S option model to obtain the missing call premium (**only if no trade data**), and
 - b. Table. Table the traced **daily** implied volatility and the **daily** hedge ratio (the delta) of the S&P 500 stock index and stock options [i.e., use the same option on (3) in a] over the period. The hedge ratio and implied volatility can be obtained from the Student Software Disk accompanied by the textbook (or can be downloaded from my website).
 - c. Estimate the historical standard deviation (see, Table 5.6, p.159, software in page 157) of S&P 500 index and the chosen stock in (3) in a.
 - d. Construct a bull money (two calls with two different exercise prices), a butterfly (three calls with three difference exercise prices), and a straddle (buy a call and buy a put with the same exercise price) on 2/7 using a stock option. Close the position on 4/16. Track the **daily** profits and graph the results. Identify the breakeven point(s) **if** you hold until the maturity and maximum and minimum

profits **during this period** (i.e., 2/7-4/16).

e. Construct a table to record (1) **daily** stock (or index fund with its options traded in the market) price start on 2/7, (2) its **daily sell Put** price with exercise price lower or equal to the stock price on 2/7 **expire on April 16**, (3) its **daily Call** price with exercise price higher than (or equal to) the stock price on 2/7 **expire on April 16**, (4) **buying a call** price and **selling a put** price with the **same** exercise price equal (or close to) to the stock price on 2/7 and **expire on April 16**.

Check the WSJ to get the option premiums and the appropriate interest rates.

- II. Under the same time period, please do the following:
- Prepare a computer graph of (1) **daily** S&P 500 index futures price mature in **June**, **get quote from** www.futuresource.com (see p. 278) or <http://data.tradingcharts.com/futures/quotes/SP.html>, (2) **daily** Eurodollar futures price mature in **expire in June**. www.cme.com use the formula of **100-(100-IMM Quotation) (90/360)**, see table 10.2, p. 332) to calculate the Eurodollar futures price].
 - Examine the effect of the hedge based on a long S&P 500 index and a short its futures (use **250** as the multiplier for S&P500's spot and futures) the futures hedge portfolio close on 4/16. (see example in p. 380).
- III. Assume that on 2/7 you sell **one** S&P 500 index futures contracts and buy **one** Eurodollar futures and **one** commodity futures contracts. Close out your all positions on 4/16. Check futures' size from WSJ. Initial margin is \$3,000/contract, and the maintenance margin is \$2,500/contract. Table your daily settlement (ignore the transaction costs) (see Table 8.2, p. 272 and margin call (in dollars)) **for each** futures contract, if it occurs.

Written Report must contain the following:

- Title page: Your name(s) and group # (underline the group leader's name), course #, term and date, and instructor's name.
- Introduction (1-2 pages): Briefly describe your project and what you learn from the project.
- Option strategies (3-5 pages): Display all calculated results in a table. Graph all calculated results. Detailed discuss and analyze the calculated results (what and why). For example, specify any significant information occurred triggers the change of profit (or loss) changes, why the implied volatility differs from the historical standard deviation, etc. Compare and explain the results of trading strategies tabled in section I. (e). What is your recommendation of the investment strategy and why?
- Analysis (2-4 pages):
Discuss, compare and analyze **the speculation** and **hedge results** on trading options, futures (included margin), and underlying asset. Analyze, discuss, and comment the hedge effectiveness for various hedging strategies.
- Conclusion (1 page): Summarize what you found and learn in this project.
- Appendices (included confirmed weekly E-mail records (the group leader responsibility))
- References

The results of your project will be summarized in a type-written term paper. Your term paper should not exceed 12 typed pages, double spaced. It is due on **TBD before the last class**. **Everyone must present and**

Participate.

VII. Homework

I will assign homework during the class sessions. Homework must be submitted on the due date before the class. **No late submissions of homework will be accepted or credited.** If you expect to miss class, obtain the homework assignment from your classmates and submit either to my office or Department of Finance **before the class. You are responsible** to keep your HW at least two months after the final exam.

VIII. Attendance and Class Participation:

Attendance will be checked occasionally. You are responsible for all information covered in class. If you miss class, obtain the information missed. To enhance your understanding, **you should read the assigned material beforehand.**

XI. Course Outline:

For many of you, this may be the most interesting and challenge course you take at this university. To do well, you **must keep up with the reading and stay focused during class. It is easy to get behind** in the study of derivatives. **You should read through the chapters prior to class.** This will help your understanding of the concepts as they are discussed. Reread the material after class. Please always keep in mind that "No pain no gain" (i.e., market efficiency). If you have any questions, please come to see me. The following outline is the order of study (I reserve the right to change this outline when necessary).

Topic

week 1	Introduction, Ch. 1
week 2	Structure of Options Markets, Ch. 2
week 3	Principles of Option Pricing; Ch. 3
week 4	Option Pricing Models (Binomial Model)); Ch. 4
week 5	Review & Exam 1
week 6	Option Pricing Models (Black/Sholes Model); Ch. 5
week 7	Basic Option Strategies; Ch. 6
week 8	Advanced Option Strategies; Ch. 7
week 9	Advanced Option Strategies, Ch. 7
week 10	Spring Break
week 11	Review & Exam 2
week 12	Forward and Futures Markets; Ch. 8
week 13	Forward and Futures Pricing; Ch. 9
week 14	Futures Hedging Strategies, Ch. 11
week 15	Futures Hedging Strategies; Ch. 11
week 16	Presentation
week 17	Final Exam!!

XII. Tentative Homework Assignments*:

<u>Chapters</u>	<u>Question & Problems</u>
1	3-9, CC 5
2	2,8,9,11,14, CC1, 1(p. 52)
3	1,5,10-18,22, CC4
4	5-9, 17.
5	2, 7-13, 17
6	2,4,5, 8-14
7	4-17,20,21, CC2-3
8	2-5,11, CC4
9	1,8-14,17,18,21, CC5
10	2,6-13, CC2
11	3, 6,9-12,15-17

* I reserve the right to add/drop homework assignments.