323 U6930
FINANCIAL MARKET AND DERIVATIVES

# COURSE SYLLABUS

**Spring 2010**
**INSTRUCTOR: YILIN WU**

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| **OFFICE LOCATION:** | |
| **OFFICE HOURS:** | Monday 4:00-5:30 pm. Outside this time period please do contact me to set an appointment and we will meet at any point during the week in my office |
| **OFFICE PHONE:** | 02- 2351-9641 ext 386 |
| **E-MAIL ADDRESS:** | yilinwu@ntu.edu.tw |
| **COURSE WEB PAGE:** | CEIBA |
| **CLASS HOURS:** | Mon A.M. 9:10-12:10 |
| **CLASS ROOM:** | 社科14 |
| **TEACHING ASSISTANT** | 黃耀民 |
| **OFFICE HOURS OF TA:** | |
| **E-MAIL ADDRESS OF TA:** | f96323016@ntu.edu.tw |
| **PHONE NUMBER OF TA:** | |

## A. OVERVIEW OF THE COURSE

The course provides a broad overview of the fields of derivatives and financial market. It is divided in three parts. Part I is devoted to the basic knowledge of bonds and stocks and valuation of forwards and futures.

After that, in Part II, we turn to the problem of option valuation. We first deal with simple no arbitrage restrictions that can be imposed on the price of European and American call and put options. These are the slope and convexity restrictions, useful bounds that are model-free. We then cover in detail the Binomial Option pricing Model. This part of the course is fundamental in everything that follows. It contains the two main concepts in what concerns derivatives valuation: the concept of dynamic replication and the principle of risk neutral valuation. Once the Binomial Option Pricing Model is well understood the transition to the Black-Scholes Model is rather straightforward. Finally, we dwell in an important empirical flaw of the Black-Scholes Model, the volatility smile. We study the consequences of this important empirical regularity for option valuation. We then cover one important applications of option valuation: the valuation of corporate securities.

Part III, the last part of the course, is devoted to fixed income derivatives valuation. We study the valuation of swap contracts, the futures on interest rate and then options on interest rate.

## B. PREREQUISITES

1. Basic knowledge of standard statistics and mathematical equations. Basic knowledge in statistics such as variance and covariance will be very helpful. For those who have not taken a course in statistics but are willing to work hard, do not worry! I will cover in class the technical concepts necessary for understanding the class material.

## C. TEXTBOOK(S)

1. Textbook (required): Options, Futures, and Other Derivatives, Seventh Edition, by John C. Hull, Prentice- Hall, 2009, ISBN #0-13-500994-4

2. Textbook (strongly recommended): Fundamentals of Derivatives Markets, Prentice- Hall, 2009, by Robert L McDonald, Addison Wesley, ISBN 0-321-35717-5

3. Non-required: Financial Markets and Institutions: An introduction to the risk management approach, Third Edition, by Anthony Saunders and Marcia Millon Cornett, McGraw-Hill, 2007, ISBN # 0-07-319549-9

## D. GRADING

1. **Weekly Problem sets**
   a. The problem sets from Hull's textbook and other sources will be assigned on a weekly basis during the semester. The main purpose of the problem sets is to increase your understanding of the material and to help you prepare for the exams.
   b. The problem sets *will not be collected and graded*. The problem sets and solutions will be posted on the blackboard.
   c. The TA will go through the problem sets on the help session.

2. **Three sets of Homework**
   a. You are permitted to discuss homework sets with other students.
   b. You are to submit your own solutions --which may represent a synthesis of personal analysis and discussions with others.
   c. Homework sets are due at the beginning of class as indicated in the schedule. Under no circumstances will faxed assignments be accepted and no late homework sets are accepted and will be given a grade of 0%.
   d. Solutions will be posted on the blackboard after the due date.
   e. The TA will go through the homework on the help session.

3. **Quizzes**
   a. The 5-minute quizzes are closed book, but you are permitted to bring a calculator.
   b. There will in general not be any makeups for the quizzes.

    c.   There will be around 9 quizzes. If you miss only one quiz, it will count as your lowest score and be dropped.

    d.   Solutions will be discussed on the next class.

4. **Midterm and Final Exam**

    a.   A typical exam format would include a mixture of quantitative and qualitative problems and questions covering lecture notes, text chapters and assignments.

    b.   The examination is closed book, but you are permitted to bring a calculator and a "crib sheet" with notes and/or formulae. You may use two sides of an 81/2x11 page.

    c.   Exams are scheduled according to school so that you can plan around these dates. Please do not ask to be excused from exams as makeup is rarely given.

    d.   If you want to submit a regrade request, please do it within one week after the graded exam is handed back to do so. You have to hand back (1) your exam and (2) a brief memo detailing your concerns. The exam will be regraded in full.

5. **Grade Structure**

    a.   Midterm 35%
    b.   Final 35%
    c.   3 Homework 20%
    d.   8 Quizzes 10%
    e.   As you can see from the grade distribution, you have to work hard THROUGHOUT the course in order to receive a good grade.

6. **Course Schedule and Reading List**

**Lecture Note 1:** *Introduction to Derivatives Securities*         **2/22**

- Hull 7th ed. Ch. 1
- McDonald 1st ed. Ch.1

**Lecture Note 2:** *Stock Market and Mutual Funds, Hedge*         **2/22**
*Funds, and Pension Funds*
- Saunders and Cornett. Ch.9 and Ch. 16
- Saunders and Cornett. Ch.17 and 18


### PART I: FORWARDS AND FUTURES

**Lecture Note 3:** *An Introduction to Financial Forwards*         **03/01**
*and Futures and Commodity Forwards and Futures*

- Hull 7th ed. Ch. 2
- McDonald 1st ed. Ch.2

**Lecture Note 3:** *Risk Management with Forward and*         **03/08**
*Futures*

- Hull 7th ed. Ch. 3
- McDonald 1st ed. Ch.4

**Lecture Note 4:** *Determination of Financial Forward and*         **03/15**
*Futures Prices*

- **Quiz on Lecture Notes 1-3**
- Hull 7th ed. Ch. 5
- McDonald 1st ed. Ch.5

**Lecture Note 5:** *Determination of Commodity Forward*         **04/12**
*and Futures Prices*

- **Quiz on Lecture Note 4**
- Hull 7th ed. Ch. 5
- McDonald 1st ed. Ch.6
- Homework 1 is assigned

### PART II: OPTIONS

**Lecture Note 6:** *An Introduction to Options*         **04/19**

- Hull 7th ed. Ch. 8
- McDonald 1st ed. Ch.2

**Lecture Note 7:** *Trading Strategies Involving Options*         **04/19**

- Hull 7th ed. Ch. 10
- McDonald 1st ed. Ch.3
- **Homework 1 is due**

**Lecture Note 8:** *Put-Call Parity and Other Option*         **05/03**
*Relationships*

- **Quiz on Lecture Notes 6-7**
- Hull 7th ed. Ch. 9
- McDonald 1$^{st}$ ed. Ch.9

**Lecture Note 9:** *Binomial Option Pricing*          **05/10**

- **Quiz on Lecture Note 8**
- Hull 7th ed. Ch. 11
- McDonald 1$^{st}$ ed. Ch.10-11
- Homework 2 is assigned

**Midterm Exam**          **05/17**

- Midterm exam on Lecture Notes 1-8, related text chapters and problem sets.

**Lecture Note 10:** *The Black-Scholes Formula*          **05/24**

- **Quiz on Lecture Note 9**
- Hull 7th ed. Ch. 12-13
- McDonald 1$^{st}$ ed. Ch.12, 18, 20, and 21
- Homework 2 is due

**Lecture Note 11:** *The Greek Letters*          **05/31**

- **Quiz on Lecture Note 10**
- Hull 7th ed. Ch. 17
- McDonald 1$^{st}$ ed. Ch.12-13

**Lecture Note 12:** *Volatility Smiles*          **05/31**

- **Quiz on Lecture Note 11**
- Hull 7th ed. Ch. 18
- McDonald 1$^{st}$ ed. Ch.21

**Lecture Note 13:** *Using Option Pricing Theory to Value*          **06/07**
*Corporate Securities*

- McDonald 1$^{st}$ ed. Ch.16

### PART III: FIXED INCOME DERIVATIVES

**Lecture Note 14:** *Term Structure*          **06/14**

- ***Quiz on Lecture Notes 13***
- Hull 7th ed. Ch. 4
- McDonald 1$^{st}$ ed. Ch.7

**Lecture Note 15:** *Swap*          **06/14**

- Hull 7th ed. Ch. 7
- McDonald 1$^{st}$ ed. Ch.8

**Final Exam**          **06/21 Schedule according to School**

- Final exam on Lecture Notes 1-17, related text chapters and problem sets.
- Homework 3 is due