

**NATIONAL TAIWAN UNIVERSITY**  
**College of Management**  
**Financial Computation**

**Associate Professor Jr-Yan Wang**

**Spring 2013**

**Room 302, Building 2, College of Management**

**Wednesday 14:20-17:20**

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**02-33664987**

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**COURSE DESCRIPTION**

This course of Financial Engineering and Computation is the combination of three fields: finance, computer science, and mathematics. It is the major goal of this course that students will practice to solve many derivative-pricing problems by computer programming. The pricing algorithms for various exotic options will be emphasized in this course, such as Asian options, barrier options, lookback options, convertible bonds, and rainbow options.

To ensure the fluency of my lecture, I assume students are equipped with the basic knowledge in the area of Finance, especially the part about derivatives. It is strongly suggested that students should learn the courses of Futures and Options or similar courses before. Extended from the basic knowledge, several topics will be fully studied in this course, such as the stochastic process, the option pricing models, several basic numerical methods, the option hedging strategies, etc.

In addition, the basic ability of computer programming is needed to complete the homework (or can be learned yourself via assigned homework). DO NOT worry about the lack of the computer programming skill. According to my ten-year experience to teach this course, at least 95% of students never wrote a computer program before this course, but less than 1% of students failed this course.

It is my hope that you can learn many financial theories, good programming practices, advanced mathematics, and most importantly, the true meaning of the financial engineering in this course.

**LECTURE NOTES AND REFERENCES**

Lecture Notes: <http://homepage.ntu.edu.tw/~jryanwang/>→Course Information  
→[Financial Computation or Financial Engineering \(graduate level\)](#).  
(Note: **DO NOT** access CEIBA for the syllabus and lecture notes)

Reference:

1. Options, Futures, and Other Derivatives, by John C. Hull, 8<sup>th</sup> ed., 2011.
2. Financial Engineering and Computation: Principles, Mathematics, Algorithms, by Yuh-Dauh Lyuu, 2002.
3. Derivatives: The Theory and Practice of Financial Engineering, by Paul Wilmott, 1998.
4. Monte Carlo Methods in Financial Engineering (Stochastic Modelling and Applied Probability), by Paul Glasserman, 2003.
5. Introduction to Stochastic Calculus with Applications, by Fima C. Klebaner, 2005.
6. Financial Calculus: An Introduction to Derivative Pricing, by Martin Baxter and Andrew Rennie, 1996.
7. Numerical Recipes in C: The Art of Scientific Computing, by William H. Press, Saul A. Teukolsky, William T. Vetterling, and Brian P. Flannery, 1992.
8. The Complete Guide to Option Pricing Formulas, by Espen G. Haug, 2<sup>nd</sup> ed., 2006.
9. 金融工程學：金融商品創新與選擇權理論，第三版，陳松男，2008.
10. C++財務程式設計，戴天時，2005.

## **HOMEWORK AND GRADINGS**

Homework (5 computer programs) 100%

- \* For each homework, you have two weeks to accomplish it.
- \* On the due date, the demonstration of your program takes place in the third hour of the lecture.
- \* The basic requirement is worth 80 points. The delay of each one week results in a deduction of 5 points.
- \* For each homework, there are at most 3 bonuses, each of which is worth 5 additional points.
- \* It is encouraged to discuss the homework with classmates, but DO NOT copy the program from others. The copying behavior will result in a reduced score according to the instructor's discretion.
- \* In addition to these 5 homework, there are two or three extra bonuses, each of which is worth 5 additional points for your final grades.

## **RULES IN CLASS**

- \* DO NOT disturb other students from listening to my lecture.
- \* If you have any questions about my lecture, just raise your hand to interrupt me.

## **COURSE OUTLINE**

1. Overview of Options (Ch 3)
2. Stochastic Process (Ch 1)
3. Option Pricing Methods (Ch 2\*, Ch 4\*<sup>†</sup>)
4. Monte-Carlo Simulation and Rainbow Options (Ch 5\*)
5. Barrier Options (Ch 8)
6. Lookback Options (Ch 9\*)
7. Asian Options (Ch 10\*)
8. Monte-Carlo Simulation for American Options (Ch11<sup>†</sup>)
9. Interest Rate and Credit Models (Ch 12<sup>†</sup>)
10. Non-constant Volatility (Ch 6<sup>†</sup>) (if time is enough)
11. The Greek Letters (Ch 7) (if time is enough)

\* Homework supposed    <sup>†</sup> Extra bonus supposed

## **OFFICE HOURS**

Thursday 13:30-15:30

Room 513, Building 2, College of Management

- \* It is not suggested to ask academic questions in emails. The face-to-face communication is the best way to make me understand your questions and give you the most accurate instruction to solve your problems.
- \* Try to fully utilize the office hours before making an individual appointment.

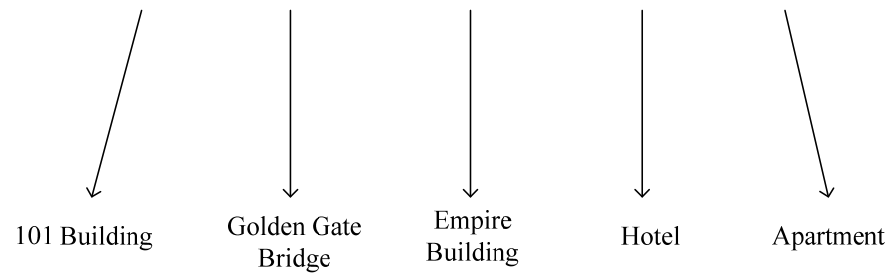
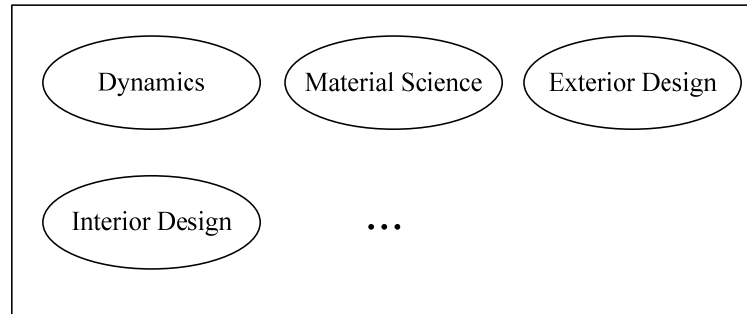
## **TEACHING ASSISTANT**

王筱娟            d00723003@ntu.edu.tw

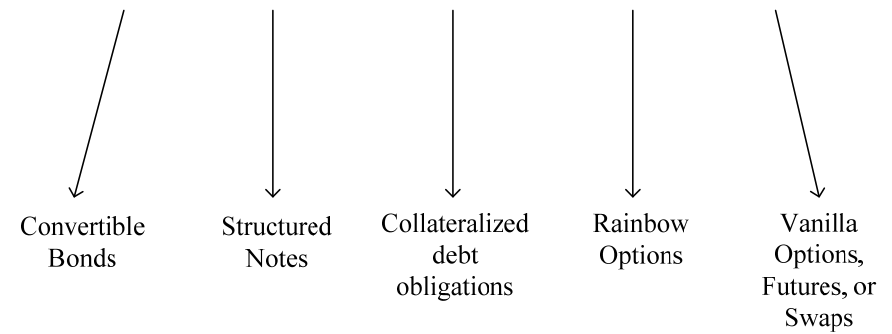
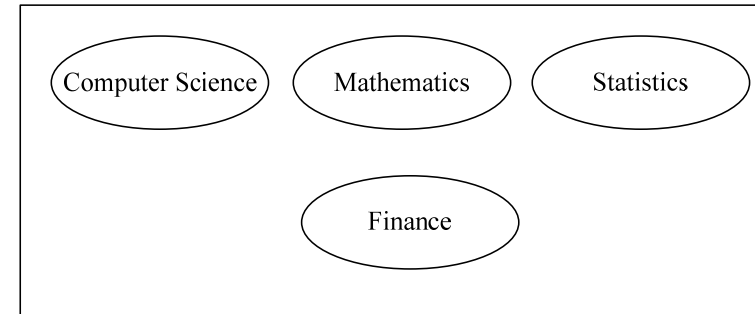
## **SPECIAL LECTURE SCHEDULE**

- 4/3 (holiday for studying (溫書假), no lecture)
- 6/12 (Dragon Boat Festival, no lecture)

## Civil Engineering



## Financial Engineering



❖ Common business model: Produce or create products with least costs, and sell these products with highest prices