NATIONAL TAIWAN UNIVERSITY
Department of International Business
Financial Computation

Associate Professor Jr-Yan Wang	**Spring 2015**
Room 203, Building 1, College of Management	**Wednesday 9:10-12:10**
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COURSE DESCRIPTION

The discipline of Financial Computation or Financial Engineering combines four fields: finance, computer science, mathematics, and statistics. The major goal of this course is to learn how to solve many pricing problems for derivative contracts by developing analytic formulae or by computer programming. More specifically, the pricing methods and their mathematical fundamentals for various exotic options will be introduced 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 that students are equipped with the basic knowledge in Finance, especially that about derivatives. Therefore, students should already learn the courses of Futures and Options or other 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, various numerical techniques, 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 students 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).
(DO NOT access CEIBA for the syllabus and lecture notes)

Reference:

1. Options, Futures, and Other Derivatives, by John C. Hull, 9th ed., 2014.
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, 2nd 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 programs from others. The copying behavior will result in a reduced score according to my discretion.

※ In addition to these 5 pieces of 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 DISTRACT other students from listening to my lecture, e.g., do not chat with other students when I am talking.

※ If you have any questions during my lecture, FEEL FREE to INTERRUPT me by raising your hand.

COURSE SCHEDULE

Week	Date	Topic	Reading
1	Feb. 25	Introduction of Financial Computation	Syllabus and reference books
2	Mar. 4	Overview of Options	Ch 3 of my lecture note
3	Mar. 11	Stochastic Process	Ch 1 of my lecture note
4	Mar. 18	Stochastic Process	Ch 1 of my lecture note
5	Mar. 25	Stochastic Process and Black-Scholes Model	Ch 1 and 2 of my lecture note
6	Apr. 1	No Lecture (Holiday for studying)	
7	Apr. 8	Black-Scholes Model	Ch 2 of my lecture note
8	Apr. 15	Black-Scholes Model* and Binomial Tree model	Ch 2 and 4 of my lecture note
9	Apr. 22	Binomial Tree Model	Ch 4 of my lecture note
10	Apr. 29	Binomial Tree Model*,†	Ch 4 of my lecture note
11	May 6	Monte-Carlo Simulation and Finite Difference Method	Ch 5 of my lecture note
12	May 13	Monte-Carlo Simulation* and Finite Difference Method†	Ch 5 of my lecture note
13	May 20	Lookback Option*	Ch 9 of my lecture note
14	May 27	Lookback Option and Asian Option	Ch 9 and 10 of my lecture note
15	June 3	Asian Option*	Ch 10 of my lecture note
16	June 10	Monte Carlo Simulation for American Options†	Ch 11 of my lecture note
17	June 17	No Lecture (I will attend a conference abroad)	
18	June 24	Interest Rate and Credit Models	Ch 12 of my lecture note

* Homework supposed † Extra bonus supposed

※ Note that the above schedule is an estimated version, I will dynamically adjust the speed of my lecture according to the feedback of students.

※ If time is enough, I will also introduce barrier options (Ch8), non-constant volatility models (Ch6), and the Greek letters of options (Ch 7).

OFFICE HOURS

Thursday 14:00-16:00 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

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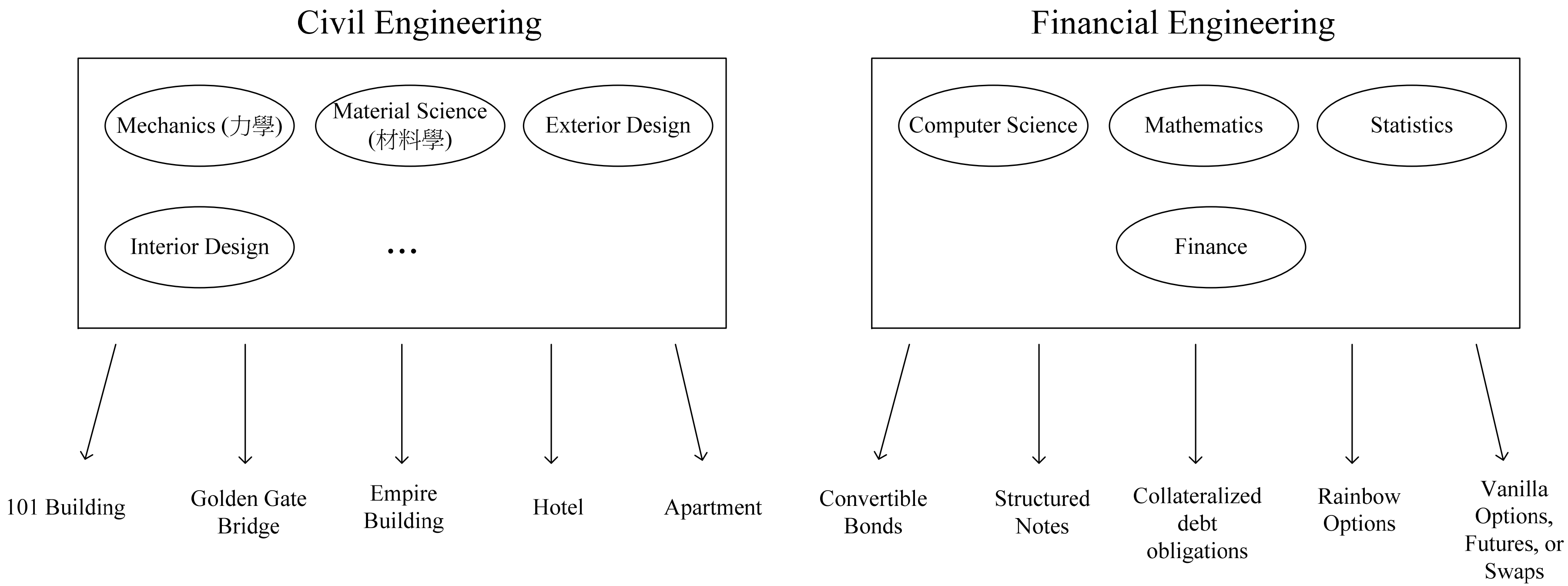
The reason for the name of "Financial Engineering"



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