

**NATIONAL TAIWAN UNIVERSITY**  
**Department of International Business**  
**Mathematics for Management**

**Professor Jr-Yan Wang**

**Room 305, Building 2, College of Management**

[jryanwang@ntu.edu.tw](mailto:jryanwang@ntu.edu.tw)

**Fall 2017**

**Wednesday 9:10-12:10**

**02-33664987**

---

**COURSE DESCRIPTION**

This course is designed to introduce students several important methods in quantitative business analysis and equip students with programming skills to implement the introduced methods.

The focus of this course is to learn the methods of **least squares regression** (最小平方迴歸), **linear programming** (線性規劃), **Monte Carlo simulation** (蒙地卡羅模擬), and **principal component analysis** (主成分分析). In addition, students will practice to implement the above methods with **Excel VBA (Visual Basic for Applications)**. Visual Basic is a simple programming language, and VBA allows programmers to incorporate the functions provided in Microsoft Office products, such as Excel, Word or PowerPoint. It is worth noting that the introduced methods are highly useful for solving many managerial issues, and VBA is one of the most important computer programming languages widely used in the business and finance fields in practice.

However, since all of the introduced methods are expressed with matrices and vectors, students need to learn the basic knowledge associated matrices and vectors in the meanwhile. Specifically, **systems of linear equations** (線性系統), **matrix operations** (矩陣運算), **vector spaces** (向量空間), and **eigenvalues and eigenvectors** (特徵值與特徵向量) will be taught in this course.

**TEXT AND LECTURE NOTES**

Lecture Notes: <http://homepage.ntu.edu.tw/~jryanwang/> → Course Information →

[Mathematics for Management \(undergraduate level\)](#)

(The modified PowerPoint files for each week lecture are available after 9:00 p.m. every Tuesday.)

(Note: DO NOT access CEIBA for the syllabus and lecture notes.)

Required Text: Elementary Linear Algebra, by Larson, 2016, 8<sup>th</sup> ed.

(The representative bookstore of this book in Taiwan is 高立圖書. If you decide to purchase the text book together, you can contact Mr. 郭吉祥 via (02) 2290-0318 ext. 231.)

## **EXAMS AND GRADING**

Midterm Exam	30% (on Nov. 7 <sup>th</sup> )
Final Exam	30% (on Jan 9 <sup>th</sup> )
Program 1 Matrix multiplication and inversion	10%
Program 2 CAPM (least squares regression)	10%
Program 3 Portfolio frontier (quadratic programming)	10%
Program 4 Compensation plan (Monte-Carlo simulation)	10%

- ※ The exam dates are regulated by NTU. Please ensure that you will be available to attend these two exams before you decide to take this course.
- ※ If you cannot attend the exams due to other reasons, you need to notify me in advance and show me the evidence, e.g., a medical diagnosis. Any late notification is not acceptable.
- ※ The range for each exam depends on the speed of my lecture. The range is not accumulative for the final exam.
- ※ The format of both exams: 100% for calculation problems. Most calculation problems are collected from the exercises at the end of each section and chapter in the required text with minor modifications.
- ※ Students should prepare your personal calculators for the two exams. However, calculators which can implement matrix operations or vector calculations are forbidden.
- ※ To maintain the fairness in the class, there are no make-up exams or other alternatives for the two exams. I will ignore all e-mails asking for any alternative way to make up your grades.
- ※ The rule of ALTERNATE SEATING is enforced if possible. Any dishonesty in the exams will lead to a failed result.
- ※ I will curve your final grades such that the average of the grades in this class is comparable to other classes offered by College of Management of NTU.

## **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 OUTLINE

Week	Date	Topic	Reading
1	Sept. 12	Introduction of Mathematics for Management Introduction of EXCEL VBA	Syllabus
2	Sept. 19	Solving Systems of Linear Equations (Polynomial curve fitting) Matrix Operations	Ch. 1 Ch. 2
3	Sept. 26	Matrix Operations (Least squares regression)	Ch. 2
4	Oct. 3	Basic VBA programming - Program 1	Lecture Note
5	Oct. 10	Double Tenth Day	No Lecture
6	Oct. 17	Determinants	Ch. 3
7	Oct. 24	Determinants (Cramer's rule to solve systems of linear equations) Vector Space	Ch. 3 Ch. 4
8	Oct. 31	Vector Space - Program 2	Ch. 4
9	Nov. 7	<b>MIDTERM EXAM</b>	
10	Nov. 14	Vector Space	Ch. 4
11	Nov. 21	Linear Programming Problem	Ch. 9
12	Nov. 28	Linear Programming Problem (Optimization problems) - Program 3	Ch. 9
13	Dec. 5	Monte Carlo Simulation (Program 4)	Lecture Note
14	Dec. 12	Inner Product Space	Ch. 5.1 and 5.2
15	Dec. 19	Eigenvalues and Eigenvectors	Ch. 7
16	Dec. 26	Eigenvalues and Eigenvectors	Ch. 7
17	Jan. 2	Eigenvalues and Eigenvectors (Principal component analysis)	Ch. 7
18	Jan. 9	<b>FINAL EXAM</b>	

※ The topics in the parentheses are the examples of the applications based on the knowledge of linear algebra learned in that chapter.

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

## **OFFICE HOURS**

Wednesday 15:30-16:30 and Thursday 15:30-16:30

Room 513, Building 2, College of Management

- ※ It is not suggested to ask academic questions in e-mails. 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.
- ※ If you have difficulties in solving exercise questions at the end of each chapter, please ask the teaching assistant first. It is preferred to make an appointment with the teaching assistant rather than ask him questions in e-mails.
- ※ Try to fully utilize my office hours before making an individual appointment.

## **TEACHING ASSISTANT**

柯易辰 d97724012@ntu.edu.tw