**NATIONAL TAIWAN UNIVERSITY**
**Department of International Business**

# Mathematics for Management

**Associate Professor Jr-Yan Wang** **Fall 2013**
**Room 305, Building 2, College of Management** **Wednesday 14:20-17:20**
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## COURSE DESCRIPTION

This course is essentially designed to teach linear algebra, which is a branch of mathematics concerned with the study of vectors and matrices. Linear algebra is a basic but important subject since linear applications arise in many fields such as engineering, chemistry, ecology, biology, psychology, and economics and business.

This course has two layers of objectives. For the first layer of objectives, students will study basic knowledge of linear algebra. More specifically, **systems of linear equations** (線性系統), **matrix operations** (矩陣運算), **vector spaces** (向量空間), **linear transformations** (線性轉換), and **eigenvalues and eigenvectors** (特徵值與特徵向量) will be taught in this course.

For the next layer of objectives, students will learn how to employ the knowledge of linear algebra to deal with management problems, including the **least squares regression** (最小平方迴歸), the **linear programming** (線性規劃), the **principal component analysis** (主成分分析), the **Monte Carlo simulation** (蒙地卡羅模擬), etc. It is worth noting that these techniques are highly applicable and useful for many management-related courses in the future.

## TEXT AND LECTURE NOTES

Lecture Notes: http://homepage.ntu.edu.tw/~jryanwang/ → Course Information → Mathematics for Management (undergraduate level)
(Note: DO NOT access CEIBA for the syllabus and lecture notes.)

Required Text: Elementary Linear Algebra, by Larson, 2012, 7th 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 GRADINGS

Midterm Exam 40% (on Nov. 6th) Final Exam 40% (on Jan 8th)

Homework 1 (CAPM) 10% Homework 2 (Portfolio frontier) 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.
* The need of travel or leaving Taiwan before the final exam cannot be the excuse to miss the exams.
* If you cannot attend the exams due to other reasons, you need to notify me in advance and show me the evidence. A late notification is not acceptable.
* The range for each exam depends on the speed of my lecture. On average, I will teach one chapter in a three-hour lecture. The range is not accumulative for the final exam.
* The format of both exams: 100% for calculation problems. All 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 the calculators for the exams by themselves. 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 exams.
* The rule of alternate seating is enforced. Any dishonesty in the exams will lead to a failed result.
* Homework 1 (2) will be assigned when I finish teaching Chapter 5 (9), which will occur in the bottom half of this semester.
* 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

* You can do anything except disturbing other students from listening to my lecture.
* If you have any questions during the lecture, just raise your hand to interrupt me.

## COURSE OUTLINE

- Systems of Linear Equations (Ch1) (Polynomial curve fitting)
- Matrices (Ch2) (Least squares regression)
- Determinants (Ch3) (Cramer's rule to solve systems of linear equations)
- Vector Space (Ch4) (Change of basis and rotation)
- Inner Product Space (Ch5) (Least squares approximation) (HW 1)
- Linear Programming (Ch9) ((Managerial) optimization problems) (HW 2)
- Eigenvalues and Eigenvectors (Ch7) (Principal component analysis)
- Linear Transformations (Ch6) (Computer graphics)

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

## 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 precise instructions or accurate answers for solving your problems.

* Try to fully utilize the office hours before making an individual appointment.

## TEACHING ASSISTANT

王筱娟 d00723003@ntu.edu.tw

* If you have difficulties to solve the quizzes or questions at the end of each chapter, please contact and ask the teaching assistant first.

## SPECIAL CLASS SCHEUDULE

October 16 (no lecture)
January 1 (national holiday, no lecture)