Quantitative Methods
Fall 2025

Instructor: Chun-Ting Chen

Lecture: MTRF (8/18 - 9/5), Social Sciences Building 112

First half: 10:00-12:00
Second half: 14:00-16:00
(15 minutes break in each half)

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Office Hours: W 2:00-4:00pm, Social Sciences Building 435

Course Description

This is a mathematical analysis course for doctoral and master students in economics. The course is designed to prepare you for advanced courses in economics and your future research. The material includes basic concepts in linear algebra, point-set topology, and optimization. Given the time constraint, the focus of the course is not to have an extensive coverage of mathematical concept and theorem, but rather to give you a decent training in the mathematics techniques widely used in economics.

Grading

- Midterm exam (August. 26 Tue) 50%

- Final exam (Sep. 5 Fri) 50%

Except for emergencies, no special consideration on grading and makeup exams will be granted.

Textbook

There is no official textbook. Lecture notes/slides will be provided and posted on NTPU Course 3.0.

Recommended Readings

- *Real Analysis with Economic Applications* by Efe A. Ok, Preceton University Press, 2007.

- *A First Course in Optimization Theory* by Rangarajan K. Sundaram, Cambridge University Press, 1996.

- *Infinite Dimensional Analysis* by Charalambos D. Aliprantis and Kim C. Border, Springer, 2006

Course Outline

Euclidean Space

- Point-set topology

Linear Algebra

- Convexity

- Hyperplane

(One Variable Calculus)

- Economics application: the cost function

Optimization

- Constrained Optimization

- Unconstrained Optimization

- Kuhn-Tucker Condition

Fixed Points

- Economics application: the existence of Nash Equilibrium