IE7039 Introduction to Optimization (最佳化概論)

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Class time: 9:20am-12pm on Wednesdays

Description:

This course provides an introduction to optimization including the topics of mathematical preliminaries, linear programming, and advanced topics related to linear programming. The course also covers modeling of dynamic programming, integer programming, and nonlinear programming. The topic of linear programming is discussed at a greater depth than in introductory Operations Research (OR) courses, with an emphasis on its geometric interpretation. The knowledge of the first half of the course is extended to Integer Programming, Nonlinear Programming and Dynamic Programming at an introductory level to broaden the knowledge of optimization.

This course is intended for Masters and PhD graduate students with prior knowledge of introductory OR and Calculus.

Objectives:

It is designed for developing mathematical sophistication that is required in research work and it covers deterministic models and methods that are useful in solving problems of resource configuration, portfolio and mix planning, supply chain planning, scenario-based planning, risk management, operation scheduling, and policy design.

Prerequisite: Introductory Operations Research and Calculus.

References:

1. *Linear programming, by* Vasek Chvatal, 1983
2. *Introduction to Linear Optimization*, by Bertsimas and Tsitsiklis, Athena Scientific, 1997
3. *The Elements of Real Analysis*, Robert G. Bartle, 1976.
4. *Nonlinear programming: theory and algorithms*, Bazaraa, Sherali, and Shetty:
5. *Handouts*

Course website:

https://ceiba.ntu.edu.tw/1061IE7039_

Grading:

Homework: 10 %; Exam 1: 40%, Exam 2: 50%.

Course requirements:

Homework will be assigned approximately once every two weeks. Homework will be posted on the course website with associated due dates. Late assignments will be accepted only in case of unavoidable occurrences. You are encouraged to discuss homework and learn from each other, but each person must submit his/her own work, unless the homework specifically indicates that you should work in groups.

Exams 1 and 2 are not cumulative. Exam 1 covers the topics from the first week to the Exam 1 week, and Exam 2 covers the topics after Exam 1 to the final week. All of exams of this course are closed-notes and closed-book, but you are allowed to bring one-page (A4-sized, double-sided) of “note” filled with equations or whatever you want in compressed writing or typing. You need to prepare the cheat sheet on your own. Copying from others is prohibited.

Tentative schedule:

Week		Topic	Instructor
1	Sep. 13	Introduction	Hong
2	Sep. 20	Supremum and infimum, Open and closed sets, Compactness	Hong
3	Sep. 27	Sequence and subsequence, convergence criteria	Hong
4	Oct. 4	No class (official holiday)	
5	Oct. 11	Linear programming modeling, Simplex method	Hong
6	Oct. 18	Geometric interpretation of linear programming	Hong
7	Oct. 25	Duality and Farkas Lemma, sensitivity analysis	Hong
8	Nov. 1	Exam 1	TA/Hong
9	Nov. 8	Interior point method	Hong
10	Nov. 15	No class (University anniversary)	
11	Nov. 22	Related topics of linear programming	Hong
12	Nov. 29	Related topics of linear programming	Hong
13	Dec. 6	Dynamic programming modeling	Wu
14	Dec. 13	Dynamic programming modeling	Wu
15	Dec. 20	Integer programming modeling	Huang
16	Dec. 27	Integer programming modeling	Huang
17	Jan. 3	Nonlinear programming modeling	Hong
18	Jan. 10	Exam 2 (final week)	TA/Hong