Syllabus (CDHK)

Operations Research (2016 Fall)
Professor Dr. Sidong Zhang

Office: Room 513 CDHK Building | Office Hour: Tuesday 16:30 – 17:30

1 Course abstract

Operations research has many applications in science, engineering, economics, and industry. To solve real life problems requires understanding and modeling the problem and applying appropriate optimization tools and skills to solve the mathematical models. This course will introduce you to models in operations research. You will learn to formulate, analyze, and solve mathematical models representing real-world problems in operations.

The primary models being discussed will be linear programming, network problems, integer programming. Other types of mathematical models, e.g., non-linear, uncertainty, simulation, queuing models will also be addressed.

Besides, this course will introduce you to the basics of game theory in association with the models addressed. Game theory is a way of thinking in a competitive context, it is a strategic approach in decision making process, which would be a help in understanding the dynamics in operations.

2 Objectives

All objectives listed here will be demonstrated in writing unless otherwise stated. Upon completion of this course, you will be able to:

- formulate a real-world problem as a mathematical programming model, have an understanding of modeling and rational approaches to decision making and their contribution to organizational effectiveness
- demonstrate mastery of the fundamental concepts of deterministic linear, network, and integer programs and their usefulness for both strategic and tactical decision-making
- use selected software to model and generate computer descriptions/solutions of various decision-making problems
- be able to utilize post-optimal solution information to evaluate the sensitivity of the solutions to changes in environmental assumptions
- understand the basic methods of data mining and its applications
- think about strategic situations, i.e., some strategic considerations to take into account making your choices, and of predicting how other people or organizations behave when they are in strategic settings

3 Teaching methods

The course is based on case studies, lectures, simulations and independent readings

4 Evaluation and grading

Grading

Problem sets	40%
Written Exam	50%
Participation	10%

Problem sets 40%

The class will be divided into teams, each team should independently finish the assignments.

Written Exam 50%

The final exam is comprehensive and close-book one.

Participation 10%

Your participation through discussion and answering questions through sharing relevant news items with classmates is a useful element of the class. When I prepare your final grade, I first consider your point total exclusive of class participation, and then assess participation for those near a grade borderline. Those who significantly contributed and who are just below a grade breakpoint will be moved up a grade (e.g., B+ to A-). A grade will not be lowered due to class participation unless there have been problems (e.g., incorrect answers to questions, non-constructive comments, etc.).

Final Grade

There are no extra credit assignments, so your grade is based on the problem sets/exams above. Using the weights for each assignment, I'll compute your score as a percent of total points (excluding participation) and identify grade breakpoints. At a maximum, I will use the following: [0,65) = F, [65, 72) = C-, [72, 78) = C, [78, 80) = C+, [80, 82) = B-, [82, 88) = B, [88, 90) = B+, [90, 92) = A-, [92, 100] = A. I may lower grade breakpoints to be more consistent with gaps in the score distribution.

5 Readings

Texts:

Christian Albright and Wayne Winston, Practical Management Science 4th edition, South-Western 2012

Roger B. Myerson, Game Theory, Harvard University Press 1997

Other readings:

Hand-outs distributed in class.

6 Course outline

CAUTION: this outline aims to provide you with an overall picture of the course structure. Your professor might adjust the learning path during the course according to the expectations and skills of the class.

September 13, 2016 *Tuesday 13:30 – 16:00* W1
Introduction of the Course and Syllabus
Review of Modeling

September 20, 2016 *Tuesday 13:30 – 16:00* W2
Introduction to Optimization Modeling

September 27, 2016 *Tuesday 13:30 – 16:00* W3
Linear Porgramming Models

October 04, 2016 *Tuesday 13:30 – 16:00* W4
National Holiday

October 11, 2016 *Tuesday 13:30 – 16:00* W5
Linear Programming Models

October 18, 2016 *Tuesday 13:30 – 16:00* W6
Network Models

October 25, 2016 *Tuesday 13:30 – 16:00* W7
Network Models

November 01, 2016 *Tuesday 13:30 – 16:00* W8
Optimization with Interger Variables

November 08, 2016 *Tuesday 13:30 – 16:00* W9
Nonlinear Optimization Models

November 15, 2016 *Tuesday 13:30 – 16:00* W10
Nonlinear Optimization Models

November 22, 2016 *Tuesday 13:30 – 16:00* W11
Decision Making Under Uncertainty

November 29, 2016 *Tuesday 13:30 – 16:00* W12
Decision Making Under Uncertainty

December 06, 2016 Introduction to Simulation	*Tuesday 13:30 – 16:00*	W13
December 13, 2016 Simulation Models	*Tuesday 13:30 – 16:00*	W14
December 20, 2016 Simulation Models	*Tuesday 13:30 – 16:00*	W15
December 27, 2016 Queueing Models	*Tuesday 13:30 – 16:00*	W16
January 03, 2017 Queueing Models	*Tuesday 13:30 – 16:00*	W17
January 10, 2017 Written Exam	*Tuesday 13:30 – 16:00*	W18