

ISOM 3710 Business Modeling and Optimization
Spring 2020

Instructor: NG Shu Ming, Office: LSK 4062, Ext: 7725, Email: imsmng@ust.hk

Lecture Schedules

L1 Venue: Room G005

Time: Wed, Fri: 15:30 – 16:20

L2 Venue: Room G021

Time: Wed, Fri: 16:30 – 17:50

Office hours: To be determined

Teaching Assistants:

Jianyue WANG: jianyue.wang@connect.ust.hk

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Course description

Companies that are competing in the global market as well as their home markets have to deal with many pressing issues or problems daily. It is critical for a company to identify solutions and trade-off different options for better decision making to these problems. After studying the course materials, students will be able to use different quantitative models and analytic tools to model a wide variety of management decision problems based on the data available using spreadsheet technology Excel and some add-on optimization packages. Students will be able to explain complex ideas and management solutions in precise and quantitative concepts, and provide managerial insight into the problems. This course emphasizes on critical thinking, and not on memorization.

Learning Outcomes (Please refer to the item numbers in the BBA OM Program Learning Goals and Objectives.)

Link: <http://www.bm.ust.hk/sbmlern/eng/thirdcat.php?sid=5&thirdid=3>)

After studying this course, students will be able to:

1. model a wide variety of management decision problems using quantitative tools [1, 3, 4, 7]¹
2. format these decision problems in the spreadsheet Excel [1, 3, 4, 7]
3. use the spreadsheet and some add-in software to find optimal or improved solutions to the problems [1, 4, 7]
4. perform sensitivity analysis under different possible scenarios, and possible risks. [1, 3, 4, 7]
5. critically evaluate and trade-off different options/solutions for better decisions [1, 3, 4, 7,8]

¹ The numbers refer to the specific learning outcomes of the BBA Program in Operations Management. Please read the document of the Program Learning Goals of the BBA Program in Operations Management

Learning resources

1. *Practical Management Science* 6th edition, by Albright and Winston, Cengage Learning, Inc.
2. *Other related Management Science books in the library.*
3. Slides and Excel files downloadable from <http://canvas.ust.hk> using your ITSC account name/password.
4. Additional reading materials posted on CANVAS.ust.hk

Specific learning outcomes under different topics

The course will cover several important tools and a wide variety of business models in management science. Each topic will provide you the opportunities to develop your ability to model the business problems on Excel and perform critical analysis and trade-off different options for better decisions based on data from the Excel solutions.

Topics (Chapters) to be covered in the course:

After completion of the following topics, students will be able to:

- Ch 1, 2: Introduction to spreadsheet modeling
 - master some important tools for spreadsheet modeling
 - use these tools to relate inputs and decision variables to outputs using spreadsheet commands
 - use spreadsheet to model some simple decision problems and identify better solutions based on the analysis of the output data
- Ch 3: Introduction to optimization modeling
 - use the basic Linear Programming (LP) spreadsheet models to model a wide variety of business decision problems
 - use these spreadsheet models and Add-in software to find the optimal solutions to these problems
 - perform sensitivity analysis for these problems
- Ch 4: Linear Programming
 - use the spreadsheet and the LP models to model a variety of business decision problems
 - use the Solver add-in to determine the optimal solutions to these problems
 - use the spreadsheet solutions to make high quality business decisions
 - evaluate alternative solutions critically under different business scenarios and changes
- Ch 5: Network models
 - model transportation and transshipment problems with the LP models
 - use the spreadsheet and the Solver add-in to solve these network problems efficiently
 - model other business decision problems with a network structure
 - use the spreadsheet solutions to make high quality business decisions

- trade-off alternative solutions critically under different possible business scenarios and changes
- Ch 6: Optimization models with integer variables
 - model business decision problems with integer decision variables
 - use the spreadsheet and the Solver add-in to solve the integer decision problems
 - use the spreadsheet solutions to compare and identify high quality business decisions
 - compare and trade-off solutions critically under different possible business scenarios and changes
- Ch 7: Nonlinear optimization models
 - model business decision problems with non-linear objectives and non-linear constraints (NLP)
 - use the spreadsheet and the Solver add-in to solve NLPs
 - use the spreadsheet solutions to compare and identify high quality business decisions
 - compare and trade-off solutions critically under different possible business scenarios and changes

Teaching approach

The general teaching approach is lecturing and tutorials, with problem solving and demonstrations in the class room; aided by web-discussion, resolving queries and problem solving (on the CANVAS system). Direct contacts and discussions with the instructor and the TAs are also made possible. Lecture notes and additional reading articles are posted well-before lectures on the web. Students are expected to attend all classes and raise questions during lectures whenever they encounter difficulties.

Assessment scheme

The most important assessment and evaluation come from each student himself/herself. How do students understand the new concepts and tools they learn from this course and being able to apply the Excel technology and management science tools to solve the critical issues in different business environments? How do students apply these concepts and the output data from Excel to evaluate and improve the business processes of business organizations? Student course grades will be assessed according to the following scheme:

Grading Scheme

- Online Homework: 10%
- Midterm: 25%; Final examination: 65%;
- Bonus (based on your class participation): 3%
- Final course scores:
 $\text{Max}\{25\% \times \text{Midterm} + 65\% \times \text{Final}, 12.5\% \times \text{Midterm} + 77.5\% \times \text{Final}\} + 10\% \times \text{HW}$

Important Policies

1. **There are no makeup quizzes:** if you miss a quiz, its weight (25%) will be automatically shifted to the final examination.
2. You are strongly encouraged to do all the homework given on CANVAS. Some of the solutions will be discussed in the tutorial sections. For those homework assignments, you must submit before the deadline. **No extension of deadline will be granted.**
3. Please don't bring food to the class room. (Considering the lecture time, snack is ok.)
4. **Please turn off your mobile phone during any lecture.**
5. To reduce interruption to the class, except approved beforehand, **students should not attend lecture if they are more than 15 minutes late, and should not leave before the end of a lecture.**
6. Without approved beforehand, students should attend their own sections of lecture / tutorial.