NATIONAL UNIVERSITY OF SINGAPORE
NUS Business School
Department of Analytics & Operations

DBA3701 Introduction to Optimization (Tentative Course Syllabus)

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Office hour: By Appointment, BIZ1 8-73

TA: TBD.

Sessions: Thursdays, 12-3pm, BIZ2 0413A.

Course Objectives

This course introduces a quantitative framework for decision-making in diverse business contexts through an Operations Research lens. The first half of the course emphasizes applications and model building, and covers the topics of linear programming, network flow problems and integer programming. The second half of the course focuses on solution methods and advanced topics. Excel and Python will be used. By the end of the course, students will have a rigorous understanding of how to formulate and solve diverse problems that arise in transportation, logistics, healthcare operations, supply chain management and marketing.

Prerequisites

Basic understanding of linear algebra.

Assessment

Individual Assignments	20%
Class Participation	20%
Midterm Test	20%
Final Test	20%
Team Term Paper	20%

Individual Assignments

Individual assignments are expected to be completed alone. The assignment can be typeset or handwritten and photocopied. Everyone should turn in an individual e-copy and submit online via Canvas.

In-Class Tests

Two tests will be given in class, on paper. Each test will be given at the start of class, so please **arrive on time**. You will be allowed to bring a cheat sheet but will not be allowed to use any digital devices (phones, tablets, computers, calculators).

Term Paper

The term paper is to be done in teams of 4-5 students, on a certain application or business problem of your choosing. You are free to choose your team and topic. The purpose of the paper is to demonstrate that you can apply the techniques learned in this class to a "real-world" problem. The paper must include a complete end-to-end description and solution to the problem, covering a problem statement, mathematical model, data analysis, solution method, discussion and potential references. There is no official page limit, but try to keep it within 8-10 pages (excluding references).

Near the end of the term, there will be a week dedicated to project meetings with me, where I can help give some (ungraded) feedback and advice on project proposals.

Textbooks for Reference

The lecture notes are self-sufficient. If you are interested, you can consider the following textbook for a more in-depth examination of the topics taught in the class:

- Introduction to Linear Optimization, by Dimitris Bertsimas, John N. Tsitsiklis

Software

Excel will be used for simple examples and quick demonstrations. We will use Python (https://docs.python.org/3/tutorial/) and Gurobi (http://www.gurobi.com/) to solve more complicated optimization problems.

Academic Honesty & Plagiarism

Academic integrity and honesty is essential for the pursuit and acquisition of knowledge. The University and School expect every student to uphold academic integrity & honesty at all times. Academic dishonesty is any misrepresentation with the intent to deceive, or failure to acknowledge the source, or falsification of information, or inaccuracy of statements, or cheating at examinations/tests, or inappropriate use of resources.

Plagiarism is 'the practice of taking someone else's work or ideas and passing them off as one's own' (The New Oxford Dictionary of English). The University and School will not condone plagiarism. Students should adopt this rule - You have the obligation to make clear to the assessor which is your own work, and which is the work of others. Otherwise, your assessor is entitled to assume that everything being presented for assessment is being presented as entirely your own work. This is a minimum standard. In case of any doubts, you should consult your instructor.

Additional guidance is available at:

- http://www.nus.edu.sg/registrar/administrative-policies-procedures/acceptance-record#NUSCodeofStudentConduct
- http://nus.edu.sg/osa/resources/code-of-student-conduct

Tentative Course Outline

Week One (Jan 12 – 16)

- Introduction to Operations Research
- Introduction to Linear Programming

Read

- Note on Installation of Anaconda (for Python) and Gurobi

Week Two (Jan 19 – 23)

- Review of Linear Algebra
- Linear Programming Continued

Week Three (Jan 26 – 30)

- Linear Programming Applications and Sensitivity Analysis

Week Four (Feb 2 – 6)

- Introduction to Network Flows

Week Five (Feb 9 – 13)

- Network Flows Continued
- **Individual Assignment 1 due**
- **Submit project teams**

Week Six (Feb 16 – 20)

- **In-Class Test 1 (at the beginning of class)**
- Guest Lecture (TBD)

Recess Week (Feb 23 – 27)

Week Seven (Mar 2 – 6)

- Introduction to Integer Programming

Week Eight (Mar 9 – 13)

- Integer Programming Continued

Week Nine (Mar 16 – 20)

- Duality
- Inverse Optimization

Week Ten (Mar 23 – 27)

- Solving Linear Programs
- Convexity
- Guest Lecture (TBD)

Week Eleven (Mar 30 – April 3)

- **Class cancelled due to NUS well-being day**
- Class will be replaced with (optional) project meetings with me
- **Individual Assignment 2 due**

Week Twelve (April 6 – 10)

- Solving Integer Programs

Week Thirteen (April 13 – 17)

- **In-Class Test 2 (at the beginning of class)**
- Time for Project Questions

Submit Final Term Paper Before April 23, 2026 (23:59)