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

DBA3701/DSC3214: Introduction to Optimization
Lecturer: Hanqin ZHANG
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Office hour: By Appointment, BIZ1 8-79

Session: Semester I, 2024/2025

Objectives:
The objective of this module is to introduce students to the theory and applications of modern optimization techniques. Formulation and modelling of real life optimization problems via sophisticated software tools will be emphasized to strengthen students' understanding of various fields in optimization. Throughout the course, references will be made wherever appropriate, to business applications, such as pricing, logistics problems and others. Students who are interested in computer and quantitative approaches in business will learn many useful techniques in large business system management from this course. After this module, students should be able to achieve two major objectives:

Polish their thinking and mathematical skills in optimization;
Formulate problems arising in different business context and solve optimization problems using state-of-the-art commercial solver.

Prerequisite:
Linear algebra and basic probability, or equivalent module.

Textbooks for Reference:
Materials will be mainly based on lecture notes but the following book is relevant in further study of the subject.

• *Introduction to Linear Optimization*, by Dimitris Bertsimas, and John N. Tsitsiklis

Assessment:
- Team Term Paper: 30%
- Midterm Exam: 30%
- Individual Assignments: 30%
- Class Participation: 10%

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

Midterm Exam:
Midterm exam will be conducted in class in the middle of the semester after the recess week.

Term Paper:
Each project team is required to prepare a term paper on certain application or research topic relevant to the subjects covered in this class. Any paper used for fulfilling requirements of other courses MUST NOT be recycled in this class. The purpose of the term paper is to demonstrate

that you can apply the analytical techniques learned in this class to an analytics problem of your choosing.

The paper must include a statement of the problem, data or process(es) analyzed, and the principles learned. There is no page limitation, but a good term paper may need 5 to 8 pages of narratives to provide in-depth analysis of a selected topic.

Term Paper Presentation (for Proposal)
Each project team is required to give a 10-15 minutes presentation on their proposal for term project in the class. The presentation should give a particular emphasis on: 1) business environment and motivation of the problem; 2) the operations research tool to be used in the project; 3) preliminary results (if any).

Software:
For very simple examples, Excel will be used for quick demonstrations. But for the most part of the course, we will use Python (https://docs.python.org/3/tutorial/) and Gurobi (http://www.gurobi.com/) to solve more complicated optimization problems.