Syllabus
DECISION MODELS & ANALYTICS
Fall 2025

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TA : TBD

TEXTBOOK

We do not have any required textbook for this class. The following two optional books are good references. NYU students have free online access to these books with their NYU credentials.

- *Optimization Modelling with Spreadsheets,* (3rd edition), by Kenneth Baker
- *Financial Modelling with Crystal Ball and Excel,* (2nd edition), by John Charnes

COURSE OBJECTIVE

This course introduces the basic principles and techniques of applied mathematical modeling for managerial decision-making. You will learn to use some important analytic methods (spreadsheet modeling, optimization, Monte Carlo simulation), to recognize their assumptions and limitations, and to employ them in decision-making.

Students will:

- Develop mathematical models that can be used to improve decision making within an organization.
- Sharpen their ability to structure problems and to perform logical analyses.
- Practice translating descriptions of decision problems into formal models, and investigate those models in an organized fashion.
- Identify settings in which models can be used effectively and apply modeling concepts in practical situations.
- Strengthen their computer skills, focusing on how to use the computer to support decision-making.

The emphasis will be on model formulation and interpretation of results, and less on mathematical theory. The emphasis is on models that are widely used in diverse industries and functional areas, including finance, operations, and marketing. The class may have lectures that are on more advanced topics (such as convex optimization via CVXPY, a Python solver), which are meant to broaden students' intellectual horizon. Such material will not be tested on exams.

COURSE CONTENTS

Linear Programming – formulating optimization problems, spreadsheet modeling, using Solver and SolverTable, sensitivity analysis, multi-period modeling.
Integer Programming – Integer and binary variables, logical relationships, project selection, facility location, crew scheduling.
Network Optimization – Assignment problem, transportation problem, minimum-cost flow, funds-flow model, project management, currency exchange.
Non-linear Optimization – Portfolio optimization, demand estimation, pricing.

PRE-REQUISITES

Prior knowledge of probability concepts (probability distributions, percentiles, expected value, standard deviation, variance and covariance) and linear algebra (matrix multiplication, rank, determinant) is necessary.

WEBSITE/COURSE MATERIALS

NYU Brightspace will be used as the main communication tool, and materials will be posted in the system. This includes the homework assignments, the problems studied and the problem solutions. To log in, you will need your Stern email account and the associated password.

GRADING

At NYU Stern we seek to teach challenging courses that allow students to demonstrate differential mastery of the subject matter. Assigning grades that reward excellence and reflect differences in performance is important to ensuring the integrity of our curriculum.
The grades for this course will be based on 5 homework assignments, class participation, and two midterms. Details will be explained in the first lecture.

RE-GRADING

In line with the grading guidelines for NYU Stern, the process of assigning of grades is intended be one of unbiased evaluation. This means that students are encouraged to respect the integrity and authority of the professor's grading system and discouraged from pursuing arbitrary challenges to it. If a student feels that an inadvertent error has been made in the grading of an individual assignment or in assessing an overall course grade, a request to have that the grade be re-evaluated may be submitted. Students should submit such requests in writing to the TA (and cc the professor) within 7 days of receiving the grade, including a brief written statement of why he or she believes that an error in grading has occurred.

HOMEWORKS

There are five (individual) homework assignments in total. If you are late by up to 24 hours, you will get a 20% off. Beyond 24 hours, you will receive no credit. Further late assignments will not be accepted unless due to documented serious illness. All homework assignments are individual.

ACADEMIC INTEGRITY

Integrity is critical to the learning process and to all that we do here at NYU Stern. All students are expected to abide by the NYU Stern Student Code of Conduct. A student's responsibilities include, but are not limited to:

- A duty to acknowledge the work and efforts of others when submitting work as one's own. Ideas, data, direct quotations, paraphrasing, creative expression, or any other incorporation of the work of others must be clearly referenced.
- A duty to exercise the utmost integrity when preparing for and completing examinations, including an obligation to report any observed violations.

Please see www.stern.nyu.edu/uc/codeofconduct for more information.

STUDENTS WITH DISABILITIES

Students whose class performance may be affected due to a disability should notify the professor early in the semester so that arrangements can be made, in consultation with the Henry and Lucy Moses Center for Students with Disabilities, to accommodate their need.

INCLUSION STATEMENT

This course strives to support and cultivate diversity of thought, perspectives, and experiences. The intent is to present materials and activities that will challenge your current perspectives with a goal of understanding how others might see situations differently. By participating in this course, it is the expectation that everyone commits to making this an inclusive learning environment for all.