DA 507 – Modeling and Optimization
Fall 2020-2021

Meeting Times and Locations

Saturday 9:00 am-12:00 pm
Wednesday 7:00 pm – 10:00 pm
Altunizade Room G08-G09

Instructor

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Course Description, Aim and Content

In today's economy, business professionals make decisions which may prescribe the course of actions whose extent may vary from day-to-day operations to strategies that influence the future of their companies. Although analytical modeling tools have been out there a very long time, they were typically judged to be useless and cumbersome in the past in the context of business decision making processes. With the advances in computing power, information collection and data processing technologies, analytics has become of very critical interest in this context, and modeling tools have turned out to be essential in implementing analytics.

In this course, we cover various analytical modeling tools with a focus on optimization models. Each tool is to be covered to an extent where decision makers will be able to

- identify the necessity of analytical modeling
- realize the use of optimization models in data analytics
- distinguish the type of models that could be used for a decision problem
- lead/participate in a team of problem solvers
- understand the underlying

in the course of business decision making processes.
Examples of modeling and optimization techniques from other courses will be covered. Case studies from real-life businesses will be delivered by professionals who are employing such tools and techniques.

Topics

1) Decision Making Processes - Analytical Models (1 course)
2) Linear and Integer programming problems and formulations (3 courses)
   a) Examples of LP and IP
   b) Solution methods for linear programming problems
   c) Solution interpretation and sensitivity analysis
   d) Integer programming problems and formulations

3) Applications with Gurobi (1 course)
4) Heuristics (2 courses)
5) Nonlinear optimization and gradient descent (1 course)
6) Simulation (2 courses)
7) Stochastic Models (3 courses)
   a) Discrete time Markov Chains
   b) Continuous time Markov Chains
8) Project presentations

Software

You are required to install Python distribution of Anaconda. I recommend you install the latest version with Python 3.X (check https://www.anaconda.com/).

You are also required to install Gurobi solver from https://www.gurobi.com/

Grading (The dates are tentative)

Assignments (~4) 40%
Project report & presentation 25% (Report 15 January)
Final 20% - 8 January (Saturday)
Quizzes (~3) 15%

References

Model Building in Mathematical Programming, H. P. Williams, 4th edition, John Wiley & Sons, 1999. ISBN-13: 978-0471997887
Operations Research: Applications and Algorithms, W. L. Winston, 4th edition, Cengage Learning, 2003. ISBN-13: 978-0534380588
Optimization Models For Decision Making: Volume 1, Katta G. Murty, Internet Edition, http://ioe.engin.umich.edu/people/fac/books/murty/opti_model/.

Announcements and SUCourse

Students are responsible for all announcements made during the regular class meetings. Students should follow the SUCourse site for this class regularly as they are responsible for all announcements and postings on this site.

Academic Integrity

Please be aware that violations of academic integrity will be subject to disciplinary action. I strongly advise you to go through the academic integrity policy implemented at Sabancı University. This policy as well as the related announcements can be accessed through the internal website of the university.
This document may be modified during the semester due to unforeseen reasons.