BA in Management Program
Spring 2021
OPIM 402 – Analytics for Business Decisions

Instructor : Can Akkan
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Time & Place : Monday 12:40-14:30 and Wednesday 08:40-09:30 (ZOOM-online)
Office hour : By appointment

Course Objective:
This course provides a detailed introduction to solving managerial problems using various optimization techniques. The aim is to show why and how certain types of deterministic optimization models can be used to assist decision makers make better decisions. Hence, the focus will be on teaching a wide variety of applications rather than the theoretical fundamentals of the optimization techniques used. Problems from different domains of management, such as operations management, marketing and finance will be modelled and solved. We will also discuss how one can gain insight from these models, as opposed to just finding one optimal solution.

Learning Outcomes:
Upon successful completion of the course, the student should be able to:

1. Identify an opportunity to use mathematical modeling to solve a given decision problem.
2. Develop an appropriate decision model (linear, integer or nonlinear programming) using MS Excel to solve a given decision problem.
3. Use add-in solver tools for MS Excel to solve a given optimization model.

Optional/supplementary Textbook:
S. Christian Albright, Wayne L. Winston. *Practical Management Science*, 5th edition, CENGAGE Publishing, 2016. (call number T57.62.W56 2016). You could find the other (older or newer) editions of this book beneficial as well.

Suggested readings on spreadsheet modeling

1. Croll, G.J. The Importance and Criticality of Spreadsheets in the City of London, *Proc. European Spreadsheet Risks Int. Grp.* (*EuSpRIG*), 2005, 82-92 (arXiv:0709.4063v2 [cs.CY])
2. Grossman, T., Mehrotra, V., & Özlük, Ö. (2007). Lessons from Mission-Critical Spreadsheets. *Communications of the Association for Information Systems*, 20. https://doi.org/10.17705/1CAIS.02060
3. Olavson T, Fry C (2008) Spreadsheet decision-support tools: Lessons learned at Hewlett-Packard. *Interfaces* 38(4):300–310.
4. Read, N., Batson, J. (1999) Spreadsheet modeling best practices. Retrieved Jan 30, 2019, http://www.eusprig.org/smbp.pdf
5. EuSpRIG, European Spreadsheet Risks Interest Group, http://www.eusprig.org/
6. Oggier, C., Fragnière, E. and Stuby, J. (2995) Nestlé Improves Its Financial Reporting with Management Science, *Interfaces*, 35 (4) pp. 271-280

Course Web:
SUCourse+ will be used as the course's web site. Course slides, Excel files, assignments, in-class exercises and grades will be posted on this web site. Students will be expected to submit their solutions to all assignments through SUCourse+.

Instructional Design:
The course requires the use of Microsoft Excel. We will use Excel's functions, Excel Solver. In some parts of the sessions hands-on active learning exercises will be done using laptops. The students should not use their laptops for checking e-mail, accessing the internet, or doing any other activity not related to the lecture while in class. For online classes it is essential that students add a second screen to their laptops and use it in the extended desktop setting, so that as they follow the instruction on one screen, they can work on their Excel files (in-class exercises, examples, etc.) on the second screen.

Requirements:
During the in-class exercises students will be able to receive help from each other (in break-out rooms) and occasionally from the instructor, since these are not meant to be quizzes. Their main purpose is to provide feedback to both the students and the professor during the lecture and facilitate learning by doing. A certain fraction of the mark received for each in-class exercise will come simply from participating.

Individual assignments will comprise of problems assigned from the end-of-chapter problems from the textbook. Students will be expected to carry out the required work individually. To clarify this point, the students can talk to each other about how they tackle the assignments, but they should work on it individually. More specifically, since the assignments are going to be delivered as a MS Excel or a MS Word file, students should not give their own files to others. It is very tempting for the receiving student to submit that file as his/her own and that would clearly be cheating; in that case both students would be held responsible not just the receiving one. If you want to help a fellow student, discuss your approach but do not give your file.

For team assignments, students will work in teams of two or three. A student can change his/her team for different team assignments. Students will submit peer evaluation for each team assignment. Many of the team assignments will be in the form of a case study, for which the students will be assigned a set of questions that they need to answer. In the lectures immediately after the assignment deadline, we may work on other questions and do further analyses of the assigned case. Often, there will be an in-class exercise related to a case study. After the submission of the completed team assignment one student from each team (chosen by the instructor) will be given a 15-minute online Q&A session with the instructor in which he/she will answer questions on the assignment. Overall team assignment grade for the team will be based on the written submission (80%) and this question/answer session (20%).

Grading:
The weights of each requirement in the overall grade of a student are as follows:

In-class exercises	: 40%
Individual Assignments	: 15%
Team assignment 1	: 15%
Team assignment 2	: 15%
Team assignment 3	: 15%

Grading of MS Excel files will be done in a semi-automated fashion (a MS Excel Macro processes the data but the instructor or a grader assigns the grades). So, it is essential that students follow the instructions for the assignment carefully. Otherwise, the macro may fail to capture the work done by the students.

Peer Evaluation in Teamwork

Students will be asked to provide an evaluation of the members of their team in the team project. Each student will divide 100 points between the members of her team, including herself. This division should reflect that person's judgment of the contribution of the members of her team. The scores should not be merely functions of time spent by each member, but they should be measures of the "contribution;" their relative contribution to the idea generation, research, analysis, writing, oral presentation, report writing, etc. If the team was highly functional, and each member did what they committed themselves to, then the student can assign the same mark to each member of the team. If, on the other hand, some members of the team did not fulfill their commitments and did not contribute as much as the others, then points can be distributed unevenly.

The points submitted by all members of the team will be aggregated by the instructor. Every student will be given his/her aggregate peer evaluation, without disclosing the individual peer evaluations to the students.

In case there is no consensus among the team, for example, if three students divide the marks evenly and the fourth one divides them unevenly, then the instructor will use his/her judgment to assign peer evaluation marks--possibly after meeting with the members of the team.

In cases where there are conflicting marks, it is most likely that the instructor will meet with the team members and provide a mark based on an interview. For example, in a group of four, if Students A and B believe they did most of the work, and Students C and D believe otherwise, the team may be called in for an interview in order to be fair to everyone.

Past experience indicates that in most teams points will be distributed evenly. There will be a few teams where peer evaluations will play a role in the marks. The primary goal of this exercise is to avoid giving undeserved credit to individuals who did not help their teams. However, it is possible to have upwards adjustments of marks in case of students who have done more than what the team expected of them.

The peer evaluation will have a direct impact on your team project. To give a simple example, if the team mark is 25 out of 30, and if your peer evaluation indicates that your contribution was less than what was expected, then your team project mark will be less than 25 out of 30. There are no simple rules for adjustment.

Academic Honesty:

Learning is enhanced through cooperation and as such you are encouraged to work in groups, ask for and give help freely in all appropriate settings. At the same time, as a matter of personal integrity, you should only represent your own work as yours. Any work that is submitted to be evaluated in this class should be an original piece of writing, presenting your ideas in your own words. Everything you borrow from books, articles, or web sites (including those in the syllabus) should be properly cited. Although you are encouraged to discuss your ideas with others (including your friends in the class), it is important that you do not share your writing (slides, MS Excel files, reports, etc.) with anyone. Using ideas, text and other intellectual

property developed by someone else while claiming it is your original work is *plagiarism*. Copying from others or providing answers or information, written or oral, to others is *cheating*. Unauthorized help from another person or having someone else write one's paper or assignment is *collusion*. Cheating, plagiarism and collusion are serious offenses that could result in an F grade and disciplinary action. Please pay utmost attention to avoid such accusations.

Classroom policies and conduct

Sabancı BA in Management Program values participatory learning. Establishing the necessary social order for a participatory learning environment requires that you:

- Keep your video on during online lectures (if you have a legitimate reason for not doing this, contact the instructor before the first lecture, explaining your reason).
- Keep your microphone off when you are not speaking during online lectures.
- Come prepared to make helpful comments and ask questions that facilitate your own understanding and that of your classmates. This often requires that you review the previous lectures' topics, solutions to the previous assignments, etc.
- Participate in discussions (e.g. in Zoom Breakout rooms) in an active and meaningful manner while respecting the appropriate participation of other students.
- Come to class on time.
- Do not tolerate discrimination on the basis of religion, race, nationality, gender, or alike.

Course Schedule:
(subject to change, updated version will be made available if any changes are made)

Week	Date	Topics	Chp	Team Assg Due
1	Feb 22 & Feb 24	0. Course introduction 1. Introduction to linear programming - LP assumptions - Excel Solver	1	
2	Mar 1 & Mar 3	2. Introduction to linear programming - The graphical method - Sensitivity analysis	2, 3	
3	Mar 8 & Mar 10	3. LP Models - Advertisement purchasing decisions - Blending problems	4	
4	Mar 15 & Mar 17	4. Review & Creating dynamic charts to visualize results		1
5	Mar 22 & Mar 24	5. Network Models – 1 - Transportation model	5	
6	Mar 29 & Mar 31	6. Network models - Assignment models - Minimum cost network flow models	5	
7	Apr 5 & Apr 7	7. Review & Visualization of Solver results using Pivot Tables -		2
8	Apr 12 & Apr 14	8. Introduction to Integer programming (IP) - Selection (combinatorial) models - Capital budgeting models	6	
9	Apr 19 & Ap 21	9. IP models – 1 - Logical constraints in IP - Supply chain location decision	6	
10	Apr 26 & Apr 28	10. IP models – 2 - Hub selection and set covering	6	
11	May 5	**No class on Monday** 11. Bi-criteria optimization		3
Week of May 10th – Ramadan Holiday, no class				
12	May 17 & May 19	11. Introduction to nonlinear programming - Basic ideas of nonlinear optimization - Pricing decisions - Advertising response models	7	
13	May 24 & May 26	12. Evolutionary Algorithms	8	