BA 4519/5519 – Simulation & Quantitative Models in Business
Monday & Wednesday   12:40 - 13:55

Instructor:	Dr. Gülşah Karakaya
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Office Hours:	Tuesday: 14:00-15:00
Course Web Page:	https://odtuclass.metu.edu.tr
Course Description:	

In real-life decision making problems, quantitative models have been used to represent, solve and analyze the problem. With the advances in technology, they become much more popular and serve as important consultants for the decision makers. These quantitative models not only provide a solution to the defined problem but also provide insight and guidance to the decision maker for better decisions. Among these quantitative models, in this course, we will introduce queuing models which are developed to optimize the operation of waiting lines and simulation modeling for complex business problems. We will perform Monte Carlo simulations via Excel spreadsheet models. The primary objective of this course is to provide the key concepts on queueing models and simulation, so that the students will be equipped with the necessary knowledge to use these models and conduct analysis to enhance the perspectives of the decision maker about the problem.

For this course, students should have taken BA 1502 Business Statistics and BA 3504 (for undergrads) / BA 5503 (for MBAs) with a semester grade of at least DD.

Course Student Learning Objectives: (CSLO)

Upon successful completion of this course, students should be able to:
Course Specific Skills:
1. Describe the basic queuing system settings
2. Understand how to design simulation models
3. Understand the advantages and disadvantages of simulations
4. Analyze and interpret the simulation input/output
Discipline Specific Skills:
5. Develop an understanding of how spreadsheet models can be used to solve decision making problems
6. Recognize how quantitative models are useful in making managerial decisions
Personal and Key Skills:
7. Develop problem solving skills
8. Develop writing and discussion skills
9. Develop spreadsheet modeling skills
10. Prepare a group term-project that involves the application of the techniques learnt in the course to a particular problem

Learning and Teaching Methods:

This course is going to make use of formal lectures in class/computer laboratory, in-class discussions, problem solving, and class exercises.

Required Reading:

A - Managerial Decision Modeling with Spreadsheets, 3rd Edition, Balakrishnan, Render & Stair, Pearson, 2013.

Suggested Reading:

B - An Introduction to Management Science Quantitative Approaches to Decision Making, David R. Anderson, Dennis J. Sweeney ,Thomas A. Williams, South-Western College Publishing. (There are several editions.)

Introduction to Management Science with Student CD, 4th Edition, Frederick S. Hillier, Mark S. Hillier, McGraw-Hill Publications. 2008.

Quantitative Analysis for Management, 10th Edition, Render, Stair & Hanna, Pearson-Prentice Hall, Inc., 2009.

Assessment and Grading (tentative):				
Form of Assessment	% Contribution	Size of the assessment	CSLOs covered by the assessment	Feedback Method
Midterm 1	25	Individual, 75-min exam	1,5-9	Written
Midterm 2	30	Individual, 75-min exam	2-9	Written
Project	25	Group work, written report and in-class presentation	1-10	Written and oral
Assignments, in-class exercises	15	Homework problems, quizzes	1-9	Written and oral
Participation	5	Class participation during lectures	1-10	Oral

Course Policies:

Attendance and Participation: Students are expected to attend the lectures and be active in the discussions.

Missed Exams: In case you cannot attend one of the examinations and have a valid excuse, you will be eligible to take a make-up examination. There will be one **single**, **comprehensive** and **detailed** make-up examination during the final period and it will be counted towards whichever exam(s) you are missing.

Late Submission Policy: Late submissions will **not** be accepted.

Term Project: This project will be done in teams of students. The primary aim of the term project is the simulation of a real-life problem with the techniques learnt during the course. In your project report, you should first have a problem description part. Here you should explain the problem details, state the assumptions you will make and the data you will gather, and provide all the necessary information about the problem with proper references if any.

In the second part of your project, you should explain briefly your solution approach. This can be a printout of your simulation model you developed in Excel together with the necessary explanations. This part will be helpful when your reports are being evaluated.

The third part will be the results part. Here you will include the necessary simulation outputs with explanations, comparisons, discussions and recommendations.

Presentations: Every group will prepare and give a 20-min presentation of their project. The presentations will be held in class during last week. Every member of the group is expected to participate the presentation.

Project report – (due on June, 12): You will submit a written project report together with the Excel files that include the details of your simulation experiment(s) in electronic form.

You will be graded based on the clarity and correctness of your modeling and explanations, the complexity of your problem, and your effort as well as the format. The problem you deal with shouldn't be a very easy problem to model and it should be original. Use Times New Roman font of size 12 with double spacing. You can put every material that is supplementary to your work in Appendix.

STUDENT DISABILITIES: Any student, who, because of a disabling condition, may require special arrangements in order to meet course requirements, should contact the instructor as soon as possible. Students should present the appropriate documentation from the university's Disability Support Office (Engelsiz ODTÜ Birimi, ODTÜ Kütüphanesi, Solmaz İzdemir Salonu, Tel: 210.7196; engelsiz@metu.edu.tr) verifying their disability, and outlining the special arrangements required. Please note that no accommodations will be provided to the disabled students prior to the completion of this approved University process.

ACADEMIC DISHONESTY: The Department of Business Administration has no tolerance for acts of academic dishonesty. Such acts damage the reputation of METU, the department and the BS degree and demean the honest efforts of the majority of the students. The minimum penalty for an act of academic dishonesty will be a zero for that assignment or exam.

CHEATING: All university, faculty/institute, and department principles on academic honesty will be strictly enforced. The usual consequence for academic dishonesty is failure of the course and referral of the case to the Dean of the Faculty for additional disciplinary action. Examinations are individual and are to be completed without outside assistance of any sort. Persons observed cheating during examinations will receive a failing grade in the course. Homework assignments are individual, unless otherwise specified by the instructor, and are to be completed without outside assistance of any sort, as well. Persons observed cheating in their homework assignments will receive a score of zero for the portion of the semester grade that is allocated to such assignments.

PLAGIARISM: The instructor assumes that students will do their own work. By placing their names on assignments (individual or team), students are affirming that the contents are their original work. Any previous work available from files or past students, as well as materials available on the internet may be used only as a suggestive model. Violation of this provision will be considered as unethical behavior, subject to disciplinary action. If you have any doubt about the use of a specific material, see the instructor ahead of time. Any material used from outside

sources should be referenced appropriately. Persons observed to plagiarize while preparing assignments will be referred to the Dean of the Faculty for additional disciplinary action and also they will receive a score of zero for the portion of the semester grade that is allocated to such assignments.

METU HONOR CODE

Every member of METU community adopts the following honor code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted.

"The members of the METU community are reliable, responsible and honorable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."

CIVILITY: Students are expected to assist in maintaining a course environment which is conducive to learning. Inappropriate behavior in course setting (online/offline) shall result, minimally, in a request to leave the setting.

KNOW YOUR RIGHTS AND RESPONSIBILITIES! http://oidb.metu.edu.tr/en/academic-rules-and-regulations

NOTE THE IMPORTANT DATES ON THE ACADEMIC CALENDAR! http://oidb.metu.edu.tr/en/academic-calendar

Good luck ☺

The following table gives the tentative schedule for the semester and is subject to change. The lectures will stress the most important and/or most difficult material. Appendices are required only if they are assigned. The students are required to read the chapters and appendices before they are covered in class.

Tentative Course Schedule				
Month	Day	Topic	Reading/ Assignment	CSLO
March	6	Introduction		
	8	Quantitative analysis	Chapter 1 (A)	5,6
	13	Quantitative analysis	Chapter 1 (A)	5,6
	15	Review of probability and statistics	Appendix (A)	1,2,6
	20	Review of probability and statistics	Appendix (A)	1,2,6
	22	Queuing models	Chapter 8 (A)	1,6
	27	Characteristics of queuing systems		1,5,6
	29	Characteristics of queuing systems		1,5,6
April	3	Economic analysis of queuing systems		1,5,6

	5	Psychology of queuing systems		1,6
	10	Queuing examples		1,6-8
	12	Queuing examples		1,6-8
	17	Midterm 1	All so far	1,5-8
	19	Simulation modeling	Chapter 9 (A)	2,3
	24	Simulation modeling examples		2,3
	26	Hand simulation		2,3,4
May	1	Labor and Solidarity Day		
	3	Monte Carlo simulation		2-4,5,9
	8	Spreadsheet simulation		2-4,5,9
	10	Analysis and interpretation of data		4,9
	15	Simulation examples		2-9
	17	Simulation examples		2-9
	22	Dynamic programming	Chapter 18 (B)	6,7
	24	Markov analysis	Chapter 17 (B)	6,7
	29	Midterm 2	All after Midterm 1	2-9
	31	Feedback session about projects		
June	5	Term project presentations		1-10
	7	Term project presentations		1-10