ÇANKAYA UNIVERSITY
Department of Industrial Engineering

IE 333 – Operations Research II – Deterministic Problems

Fall 2024

Instructor:
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Course Schedule:

Section 1: Monday 09:20- 12:10 (LB-05)
            Friday 09:20-11:10 (LB-05) (Rec. & Lab.)
Section 2: Tuesday 09:20- 12:10 (LB-05)
            Friday 11:20-13:10 (LB-05) (Rec. & Lab.)

Textbook:
Winston, W.L., Operations Research: Applications and Algorithms, Thomson Brooks/Cole, 2004.

Reference Books:
Hillier, F.S., and Lieberman, G.J., Introduction to Operations Research, Mc Graw-Hill, 2011.
Taha, H.A., Operations Research, Prentice Hall/Pearson Education, 2003.

Course Description:
This course is designed to introduce the fundamentals of Operations Research (OR) applied to deterministic problems. The emphasis is on the solution procedures and interpretation of the solutions. The topics covered are the basic deterministic models used in decision making: linear programming, simplex methods, duality, post optimality analysis, integer programming, network models and nonlinear programming.

Course Objective:
This course aims to introduce solution techniques of deterministic Operations Research models and their implementations in real life by means of available software packages.

At the end of the course, students will have:
- An understanding of the solution methodology for mathematical programming models
- Ability to solve linear programming models using simplex method and its extensions, an understanding of duality and its ramifications, ability to conduct post optimality analysis
- Ability to solve some special network problems, integer programming models, deterministic dynamic programming models and non-linear programming models using specialized algorithms and the optimality conditions for those models
- Skills in using basic mathematical programming and optimization software (such as GAMS, LINGO, CPLEX, etc.) and interpreting the solutions obtained
- Skills in report writing

Tentative Course Schedule:

Week	Subject
1	Introduction to OR and Review of Basic Linear Algebra
2	Introduction to LP Solution Methodology: Graphical and Simplex Solution Approaches
3	Simplex Method
4	Duality
5	Duality
6	Post Optimality Analysis
7	Transportation Simplex Method
8	Hungarian Method, Dijkstra's Algorithm
9	Network Simplex Method
10	Introduction to IP Solution Methodology: Branch and Bound
11	Introduction to IP Solution Methodology: Branch and Bound, Cutting Planes
12	Introduction to IP Solution Methodology: Heuristic Solutions
13	Deterministic Dynamic Programming Models: Shortest Path, Knapsack, Production Planning Problems
14	Introduction to Nonlinear Programming: Optimality Conditions

Course Web Page:

A web page will be available for this course at https://webonline.cankaya.edu.tr. You will need to access this web page for announcements about class, lecture notes, and assignments. These lecture slides may not contain all the discussion, examples, and the solutions of the problems solved in the class; you are expected to use the slides to go over the plan of the week and to take notes during the class.

Grading:

Midterm	30 %
Final Exam	30 %
*Case Study	20 %
*Homework (2)	20 %
Total	100 %

*For case study and homeworks, students should work in **teams of at most three**. It is the student's responsibility to find his/her team members. The composition of the study teams cannot be changed throughout the semester. One member of each study team should upload the group information form to the webonline site of the course. Further information on group formation will be announced. Please note that if a student name is not included in any one of the submitted group list, it will be treated as a single member team by herself or himself.

Classroom Policy:

Every student is expected to respect the other students' right to learn. Any behavior which distracts or disturbs the other students or the instructor or disrupts class in any way is unacceptable and will not be tolerated.

Make-up Policy:

A make-up examination for the midterms and the final exam will only be given under highly unusual circumstances (such as serious health problems). The student should contact the instructor as early as possible and provide the instructor with proper documentation (a medical report certified by Çankaya University's Health Center). A make-up exam may have a different format and may contain different type of questions than the regular exam.

Attendance:

Attendance will be taken via webonline. It is strongly recommended to attend all the lecture and recitation hours to understand the course material.

Conditions that lead to the letter grade "NA":

Any of the following may lead to letter grade NA.
- If a student fails to take the midterm exam(or its makeup) or the final exam will receive the letter grade NA.
- If you fail to take the midterm exam (or its makeup), you will NOT be able to take the final exam and you will receive the letter grade NA.
- Less than 45% attendance to the lectures.
- Less than 45% attendance to the labs.
- If you can get a passing overall grade which is greater than or equal to the letter grade **DD**, this 45% minimum attendance requirement is dropped.

Note that this syllabus is subject to change as required. The students will be notified about the change, if any.