ÇANKAYA UNIVERSITY
Faculty of Engineering and Architecture
Industrial Engineering Department

IE 456 - Mathematical Modeling and Applications
(3 0 3 credits – 5 ECTS)
Fall 2020

Course Description

This course aims to develop skills in understanding and formulating deterministic mathematical models of complex systems. Transportation, distribution, location, production, and economic planning problems are investigated. Real life cases are studied. Software packages are used for solution and analysis of models.

Learning Outcomes of Course:

On successful completion of this course unit, students/learners will or will be able to:

1. skills in construction of complex models and analysis of various complex problems from real life applications
2. skills in using mathematical programming and optimization software packages,
3. skills in studying a problem from various academic sources
4. skills in report writing

	Instructor	**Assistant**
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Texts

- Williams H. P. (2013), *Model Building in Mathematical Programming*, 5th ed., Wiley
- Winston W. L. (2003), *Operations Research: Applications and Algorithms*, 4th ed., Cengage Learning

Tentative Course Schedule

Every student should check course's moodle page regularly; and responsible for the material of the week, and the course in general.

Course Outline	
Week	Topic(s)
1	Introduction to Mathematical Modeling: Preliminaries, Types, Solutions
2	Linear Programming Models: The Importance of Linearity,Objectives and Constraints, Building Good LP Models
3	Integer Programming Models: Binary Variables, Logical Conditions, Disjunctive Constraints, Special Ordered Sets

4	Integer Programming Models: Linearization, Good and Bad Formulations, Simplifying an IP Model
5	Linear and Integer Programming Models: Linear and Integer Model Applications, Interpretation and Analysis of the Results
6	Network Models: Transportation/Transshipment Problems
7	Network Models: Assignment Problems, Network Flow Problems
8	Models in Production Planning: Product Mix and Blending Problems
9	Models in Production Planning: Dynamic Models, Multistage Problems
10	Models in Production Planning: Some special problems
11	Location Models: Location-Allocation Models
12	Location Models: Continuous and Discrete Space Problems, Covering Problems
13	Distribution Models: Travelling Salesman Problem
14	Distribution Models: Vehicle Routing Problems

Tentative Grading

Assessment Tool	Quantity	Percentage
Homework	2	15
Midterm Exam	1	30
Project	1	25
Final Exam	1	30

Prerequisites

Students should have taken and be successful from IE 232 and/or IE 333 courses.

Policy on Homework and Exams:

Cheating in homeworks and exams has serious consequences. Therefore, all work submitted should reflect your honest effort.

All the announcements, including the examination dates will be posted on webonline.cankaya.edu.tr

Instructor has the right of changing syllabus.