INDUSTRIAL ENGINEERING DEPARTMENT

IE 202
Operations Research I: Linear Models
Fall 2022

Type:	IE required
Credits/ECTS:	4 Credits / 7 ECTS (Letter Grade)
Class/Laboratory/PS schedule:	MM 13:00-14.50 / M1100
	TT 09:00-10:50 / M1100
	Th 13:00-13:50 / M1100
Instructor:	Tınaz Ekim (tinaz.ekim@boun.edu.tr)
	Office Hours: TBA
Teaching Assistant:	ilayda.celenk@boun.edu.tr
Grader:	TBA
Prerequisite(s):	Math 201 or equivalent

Important notes for online teaching: Live Zoom sessions for regular class hours and problem sessions will be recorded and videos will be shared via Moodle. Students will follow the lecture notes written on the board/paper via a document camera. Lecture Notes will also be shared via Moodle. Students will be expected to read the related sections before the lecture. Office hours will be held via zoom upon booking during the given time period. Some lecture hours can also be devoted to QA sessions if needed.

Course Description:

The purpose of this course is to introduce the most widely used deterministic operations research methodologies. The course will start with basic linear programming then move into sensitivity analysis, duality, transportation and assignment problems. Emphasis will also be given to modelling with integer programming. In the last part of the lecture, some classical network models such as shortest path, minimum spanning tree and maximum flow will be explored. Popular OR software will be highlighted.

References:

The following textbooks may help to a better understanding of some chapters:

1. Introduction to Operations Research, F.S. Hillier, G.J. Lieberman
2. Operations Research, (Hamdy A. Taha, 8th Edition, Prentice Hall, 2007)

Course objectives (and program outcomes):

The primary objective of this course is to provide students with the basic tools of Operations Research in order to handle various engineering problems. Students are expected to acquire the ability of modeling real-life problems using Linear Programming and Integer Programming models. They are also provided with several algorithmic methods to solve the related models. The fundamental concepts of modeling, optimality, duality and sensitivity are thoroughly covered with the help of several real life illustrations.
This course addresses mainly the following Student Outcomes (SOs) of the Industrial Engineering undergraduate program:

- SO (A): An ability to apply knowledge of mathematics, science, and engineering.
- SO (E): Ability to identify, model, formulate and solve industrial engineering problems.
- SO (J): Knowledge of contemporary issues.
- SO (K): An ability to use the techniques, skills, and modern engineering tools necessary for industrial engineering practice.

Topics covered:

1. Week: Intro to O.R. and LP Modeling
2. Week: LP: Graphical Solution Procedure, LP: Model Formulation
3. Week: LP: Simplex Method
4. Week: LP: Starting Methods
5. Week: LP: Matrix Form of Simplex, Revised Simplex, LP: Duality
6. Week: LP: Dual Simplex, LP: Sensitivity Analysis
7. Week: LP: Sensitivity Analysis
8. Week: Transportation Problem, Transshipment Problem
9. Week: Assignment Problem
10. Week: Integer Programming (IP): Modeling
11. Week: Network Problems
12. Week: Network Problems
13. Week: Network Problems

Grading:
Quizzes and Assignment: 30% (5-6 quizzes and 1 assignment)
Midterm: 30%
Final Exam: 40 %