

ÇANKAYA UNIVERSITY

Department of Industrial Engineering

Fall, 2021

IE 508 - Graph Theory with Applications

(3 0 3 credits – 7.5 ECTS)

Course Definition:

Basics of graph theory. Directed and undirected graphs, and subgraphs. Shortest paths and spanning trees. Solution techniques for maximum flow and minimal cost flow problems. Multi-commodity networks and graph representations. Network simplex algorithm. Applications in scheduling and sequencing.

	Instructor
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Course Outline

Week	Topic(s)
1	Introduction of graph theory
2	Minimum spanning tree; Prim Algorithm, Kruskal Algorithm, Sollin Algorithm
3	Shortest path problems; Bellman Algorithm, Moore-Dijkstra Algorithm, Floyd Algorithm. Maximum path problem.
4	Maximum flow problem
5	Transportation problems; <i>i</i>) initial solution; North-West Method, Minimum Cost Method, VAM method. <i>ii</i>) Optimality test
6	Transportation problem; Minimum Cost Method, Buffer Stock Method.
7	Assignment problems; Generalized Assignment Method, Hungarian Method
8	Minimum Cost Network Flow
9	Network Simplex Method, Capacitated Network Simplex Method.
10	Multi-commodity networks and graph representation
11	Project networks; CPM, PERT.
12	Matching and covering. Euler Graph; <i>i</i>) Euler Tour and Fleury Algorithm, <i>ii</i>) Directed and Undirected Postman Problems <i>iii</i>) Mixed Postman Problem
13	Travelling Salesman Problems
14	Vehicle Routing Problems

Textbooks

- Ravindra K Ahuja, Thomas L Magnanti, James B Orlin, "Network Flows: Theory, Algorithms, and Applications", Prentice Hall, 1993, 978-0136175490
- James R. Evans, Edward Mineka, "Optimization Algorithms for Networks and Graphs", Marcel Dekker, 1992, 978-0824786021

Grading:

Homeworks:	30% (3 hws)
Midterm:	30%
Final:	40%
Total:	100%

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.