

Bilkent University

Fall 2022

Department of Industrial Engineering

IE 411 Introduction to Nonlinear Optimization

Instructor: Firdevs Ulus

Department of Industrial Engineering

Engineering Building EA 301, x-2859, e-mail: firdevs@bilkent.edu.tr

Office Hours: By appointment.

Teaching Assistant: ...

e-mail: ...@bilkent.edu.tr

Office Hours: By appointment.

Course Hours and Classroom:

Monday, 13:30 - 15:20, B-204

Thursday, 8:30 - 10:20, B-204

Catalog Description:

Fermat rule, Lagrange multipliers, duality theory, Karush-Kuhn-Tucker conditions, convexity, conic optimization, linear optimization, networks, integer programming.

Textbook:

Introduction to Nonlinear Optimization: Theory Algorithms and Applications with MATLAB, Amir Beck, 2014, MOS-SIAM Series on Optimization.

Exams and Evaluation: One midterm, homework assignments and a final exam of essay type will be given. The weights and the tentative dates for the exams are given below.

Midterm	30 %	11 November 2021, Friday
Final	40 %	To be announced
Homework	25 %	
Attendance and participation	5 %	

The following is a tentative schedule for the content of the course material.

Week # / Begins		Subject	Mon.	Tue	Wed	Thur.	Fri
0	Sep. 12	Introduction and motivation				L	
1	Sep. 19	Mathematical preliminaries	2L			2L	HW1-post
2	Sep. 26	Unconstrained optimization	2L			2L	
3	Oct. 3	Unconstrained optimization	HW1-due 2L			2L	HW2-post
4	Oct. 10	The gradient method	2L			L	
5	Oct. 17	No lectures	HW2-due -			-	
6	Oct. 24	Convex sets and convex functions	2L			-	HW3-post
7	Oct. 31	Convex optimization	2L			L	
8	Nov. 7	Optimality conditions	HW3-due 2L			L	MT
9	Nov. 14	Optimality conditions continued	2L			L	HW4-post
10	Nov. 21	Optimality conditions continued	2L			L	
11	Nov. 28	Duality - motivation and definition	HW4-due 2L			L	
12	Dec. 5	Duality - convex case	2L			L	HW5-post
13	Dec. 12	Vector optimization - solution concepts	2L			L	
14	Dec. 19	Vector optimization - solution methods	HW5-due 2L			L	