

# MATHEMATICAL PROGRAMMING

1	Course Title:	MATHEMATICAL PROGRAMMING	
2	Course Code:	END 5101	
3	Type of Course:	Compulsory	
4	Level of Course:	Second Cycle	
5	Year of Study:	1	
6	Semester:	1	
7	ECTS Credits Allocated:	7.50	
8	Theoretical (hour/week):	3.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	None	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Doç. Dr. Fatih ÇAVDUR	
15	Course Lecturers:		
16	Contact information of the Course Coordinator:	hco@uludag.edu.tr 294-2082 Endüstri Mühendisliği Bölümü Görükle Bursa	
17	Website:		
18	Objective of the Course:	The objective of the course is to provide students with the Linear Algebra concepts and theorems that provide the basis for linear programming. After a brief review of undergraduate level methodologies, graduate level methods are conveyed to increase the level of knowledge	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	Ability to understand the constraints and objective functions for various problems
		2	Ability to choose the most suitable optimization algorithm for real-life problems
		3	Ability to understand the linear algebra and other mathematical theorems that provide the basis for optimization methodologies
		4	Ability to understand and build mathematical models of complex real life systems
		5	Ability to follow and present current Industrial Engineering literature
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21	Course Content:		
		<b>Course Content:</b>	
Week	Theoretical	Practice	

1	Fundamentals of linear programming, convexity and review of linear algebra	
2	Mathematical models for linear programming	
3	Finding solutions using graphical approach and sensitivity	
4	Simplex algorithm	
5	Duality theorem and sensitivity analysis	
6	M-method, two-phase method, artificial variable methods	
7	Network models, uni-modularity	
8	Network models and solution methodologies (shortest route, spanning tree, maximum flow, minimum cost capacity flow)	
9	Repeating courses and midterm exam	
10	Integer Linear Programming	
11	Integer Linear Programming Algorithms (Branch-and-Bound, Cutting Plane)	
12	Simplex method for the bounded variables	
13	Nonlinear optimization	
14	Project presentations	

22	Textbooks, References and/or Other Materials:	1. Bazaraa, S.M., Jarvis, J.J. and Sherali, H.D., Linear Programming and Network Flows, Second edition, Wiley, 1990
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Activities			Number	Duration (hour)	Total Work Load (hour)
Theoretical			Verlag, 1998.	3.00	42.00
Practicals/Labs			0	0.00	0.00
Self study and preparation			13	10.00	130.00
Homeworks			2	7.00	14.00
Midterm Exam			1	36.00	36.00
Field Studies			0	0.00	0.00
Module work project			2	3.00	3.00
Others			0	0.00	0.00
Final Exams			4	3.00	3.00
Total Work Load					228.00
Success Grade					7.60
ECTS Credit of the Course					7.50
Total			100.00		
Measurement and Evaluation Techniques Used in the Course					

24	ECTS / WORK LOAD TABLE
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25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	5	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK2	5	5	4	0	0	3	3	0	3	0	0	0	0	0	0	0

ÖK3	5	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	0	0	3	3	2	5	5	5	5	5	0	5	0	0	0	0
ÖK5	0	0	3	3	2	5	5	5	5	5	0	5	0	0	0	0
LO: Learning Objectives    PQ: Program Qualifications																
Contrib ution Level:	1 very low			2 low			3 Medium			4 High			5 Very High			