

COURSE INFORMATION					
Course Title	Code	Semester	L+P Hour	Credits	ECTS
Operations Research	ESYE522	1	3	3	10

<b>Prerequisites</b>	None
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<b>Language of Instruction</b>	English
<b>Course Level</b>	M. Sc.
<b>Course Type</b>	Compulsory
<b>Course Coordinator</b>	
<b>Instructors</b>	Prof. Linet Özdamar
<b>Assistants</b>	
<b>Goals</b>	The goal of this course is to convey the basic mathematical concepts behind linear programming and enable students to develop their mathematical modeling skills while solving practical optimization problems.
<b>Content</b>	Linear programming, geometric concepts, simplex method, duality theory, assignment and transportation problems, network problems, mathematical modeling-linear and mixed integer models

Course Learning Outcomes	Program Learning Outcomes	Teaching Methods	Assessment Methods
1) Student can classify a problem in terms of convexity and linearity.	5	1,2,4	A,D
2) Student can construct a mathematical model for a problem that is described in written or verbal form.	3,5	1,2,4	A,D
3) Student can check for model consistency, can analyze model outputs and complete modeling feedback loop.	5	1,2	A,D
4) Student can perform sensitivity analysis and interpret dual variables.	5	1,2,4	A,D
5) Student can code and implement models reported in articles using GAMS modeling language.	3,5,8	1,2	D

<b>Teaching Methods:</b>	1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study
<b>Assessment Methods:</b>	A: Testing, B: Experiment, C: Homework, D: Project

COURSE CONTENT		
Week	Topics	Study Materials
1	Introduction to Linear Programming: geometric concepts, convex sets, systems of linear equations, review of linear algebra	Textbook
2	The Simplex Algorithm	Textbook
3	The Simplex Algorithm	Textbook
4	Sensitivity Analysis	Textbook
5	Duality Theory	Textbook

6	The Assignment Problem	Textbook
7	The Transportation Problem	Textbook
8	The Maximal Flow and Shortest Path problems	Textbook
9	The Minimal Cost Network Flow problem	Textbook
10	Examples of Mathematical Models	Textbook
11	Examples of Mathematical Models	Textbook
12	Case Presentations	Modeling practical applications
13	Case Presentations	Modeling practical applications
14	Paper Presentations	Literature survey

RECOMMENDED SOURCES	
<b>Textbook</b>	Linear Programming and Network Flows Mokhtar S. Bazaraa , John J. Jarvis , Hanif D. Sherali , 2009.
<b>Additional Resources</b>	Case studies: on <a href="mailto:sye522@gmail.com">sye522@gmail.com</a> address

MATERIAL SHARING	
<b>Documents</b>	Case studies
<b>Assignments</b>	Six case studies
<b>Exams</b>	1 final

ASSESSMENT		
	IN-TERM STUDIES	PERCENTAGE
Paper presentations	1	20
Case Studies	6	80
	<b>Total</b>	<b>100</b>
<b>CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE</b>		20
<b>CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE</b>		80
	<b>Total</b>	<b>100</b>

<b>COURSE CATEGORY</b>	Expertise/Field Courses
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COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Ability to reach knowledge in breadth and depth through scientific research in Systems Engineering field; to have extensive knowledge about current techniques and procedures together with their constraints.					
2	Ability to complement and apply knowledge by scientific methods utilizing limited or missing data; to use knowledge in different disciplines effectively by blending them.					



