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

Prerequisites	None

Language of Instruction	English
Course Level	M. Sc.
Course Type	Compulsory
Course Coordinator	
Instructors	Prof. Linet Özdamar
Assistants	
Goals	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.
Content	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.	1	1,2,4	A,D
2) Student can construct a mathematical model for a problem that is described in written or verbal form.	1,4	1,2,4	A,D
3) Student can check for model consistency, can analyze model outputs and complete modeling feedback loop.	4	1,2	A,D
4) Student can perform sensistivity analysis and interpret dual variables.	9	1,2,4	A,D
5) Student can code and implement models repoted in articles using GAMS modeling language.	3,10	1,2	D

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study
Assessment Methods:	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	
Textbook	Linear Programming and Network Flows Mokhtar S. Bazaraa , John J. Jarvis , Hanif D. Sherali , 2009.
Additional Resources	Case studies: on sye522@gmail.com address

MATERIAL SHARING	
Documents	Case studies
Assignments	Six case studies
Exams	1 final

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Paper presentations	1	20
Case Studies	6	80
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		20
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		80
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Ability to understand and apply natural sciences, mathematics and engineering sciences in advanced level.					**X**
2	Ability to possess wide and deep knowledge in the field of Industrial and Systems Engineering including the most recent advances.					
3	Ability to possess advanced level of required skill, techniques and methods to conduct research by using and evaluating up-to-date information.					**X**
4	Ability to model, design and develop solutions, under realistic					**X**

	constraints, a system, a process or a product by generating innovative and original ideas.					
5	Ability to transfer advancements in scientific, technical and cultural developments to the society with the ethical responsibility and scientific objectivity.					
6	Ability to perceive, design and apply an original research process independently: manages this process successfully.					
7	Ability to execute a comprehensive study that brings innovation to the science and technology or develops technological product/process or adapts an already known method to a new field.					
8	Ability to contribute to the development of science and technology literature by publishing research results in respectable scientific platforms.					
9	Ability to analyze, synthesize and evaluate critically the ideas and developments in the field of specialization.					**X**
10	Ability to communicate effectively in writing, orally and visually with peers and wide scientific and social communities by using a foreign language at a level of European Language Portfolio C1 General Level.					**X**

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam weeks: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	10	140
Paper presentation	1	2	2
Case study peraparation and presentation	6	10	60
Final examination	1	3	3
Total Work Load			247
Total Work Load / 25 (h)			9,88
ECTS Credit of the Course			10