ABDULLAH GÜL UNIVERSITY
GRADUATE SCHOOL OF ENGINNERING & SCIENCE
INDUSTRIAL ENGINEERING DEPARTMENT
COURSE DESCRIPTION AND APPLICATION INFORMATION

Course Name	Code	Semester	T+P (Hour)	Credit	ECTS
Critical Infrastructure Planning	IE 567	Fall - Spring	3 + 0	3	10

Prerequisites	IE 511 Modelling and Optimization or equivalent, IE 501 Probability Theory or equivalent

Course Type	Elective
Course Language	English
Course Coordinator	Associate Professor İbrahim Akgün
Course Instructor	Associate Professor İbrahim Akgün
Course Assistant	-
Course Objective	The aim of the course is to teach the techniques of operational research that can be used in planning critical infrastructure systems (health, transportation, energy, etc.) to be flexible and sustainable against human or nature threats by exploiting the literature and applying them on a real life problem.
Course Learning Outcomes	A student who successfully completes this course, 1. Define and describe critical infrastructure definitions and types and planning process. 2. Know the processes to be followed in the planning of critical infrastructure systems in the energy sector and apply necessary operational research techniques. 3. Know the processes to be followed in the planning of critical infrastructure systems in the water and wastewater sector and apply the necessary operational research techniques. 4. Know the processes to be followed in the planning of the critical infrastructure systems in the transportation, mail and distribution sectors and apply the necessary operational research techniques. 5. Know the processes to be followed in the planning of critical infrastructure systems in the health care sector and apply the necessary operational research techniques. 6. Knowing the processes to be followed in the planning of the critical infrastructure systems in the emergency services sector and apply the necessary operational research techniques. 7. Know the processes to be followed in the planning of critical infrastructure systems in the telecommunication sector and apply the necessary operational research techniques. 8. Know the processes to be followed in the planning of the critical infrastructure systems in the banking and finance sector and apply the necessary operational research techniques.
Course Content	The concept of sustainable and flexible critical infrastructure systems is a paradigm (in social, economic, social and environmental dimension) that emerges in a time when resources are decreasing and natural / human threats are increasing to provide a sustainable and high quality standard of living. This methodology will be discussed on the basis of studies in the literature that can be used to design, optimize and evaluate critical infrastructure systems.

WEEKLY SUBJECTS AND RELATED PRELIMINARY PREPARATION PAGES

Week	Subjects	Preliminary
1	Overview of critical infrastructure protection and planning	
2	Energy sector	
3	Energy sector	
4	Water and wastewater sector	
5	Water and wastewater sector	
6	Transport, mail and distribution sector	
7	Transport, mail and distribution sector	
8	Healthcare sector	
9	Healthcare sector	
10	Emergency services sector	

11	Emergency services sector	
12	Telecommunication sector	
13	Telecommunication sector	
14	Banking and finance sector	
15	Banking and finance sector	
16	Final Exam	

SOURCES	
Lecture Notes	Lecture notes and slides of the course will be shared with students during the semester via CANVAS system.
Other Sources	**Textbook:** • Murray, A.T., Grubesic, T.H. Critical Infrastructure: Reliability and Vulnerability, Springer, 2007. • Gopalakrishnan, K., Peeta, S. Sustainable and Resilient Critical Infrastructure Systems: Simulation, Modeling, and Intelligent Engineering, Springer, 2010. • Biringer, B.E., Vugrin, E.D, Warren, D.E. Critical Infrastructure System Security and Resilience, CRC Press, 2013. • McCarthy, J.A., Brashear, J.P. Critical Infrastructure Protection in the National Capital Region: Risk-Based Foundations for Resilience and Sustainability, University Consortiim for Infrastructure Protection, 2005. (Volumes 1-20). • Lopez, J., Setola, R., Wolthusen, S.D. Critical Infrastructure Protection:Information Infrastructure Models, Analysis, and Defense. Springer, 2012.

MATERIAL SHARING	
Documents	will be shared with students during the semester via CANVAS system.
Homework	will be shared with students during the semester via CANVAS system.
Exams	1 (one) midterm exam and 1 (one) final exam. 2 exams in total

EVALUATION SYSTEM		
ACTIVITIES	**QUANTITY**	**WEIGHT**
Academic Paper Review	5	%40
Project Midterm Exam	1	%20
Project Final Exam	4	%40
TOTAL		%100
Midterm Activities Percentage		%60
Final Exam Percentage		%40
TOTAL		%100

Course Category	
Natural Sciences and Mathematics	%40
Engineering Sciences	%40
Social Sciences	%20

LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS RELATIONSHIP							
No	Program Qualification	Contribution Level					
		1	2	3	4	5	
1	PQ1.					X	
2	PQ2.				X		
3	PQ3.					X	
4	PQ4.				X		
5	PQ5.					X	

6	PQ6.				X	

*Increasing from 1 to 5.

ECTS / WORK LOAD TABLE			
Activities	Activity	Duration (Hour)	Total Work Load
Course Duration (including exam week: 16x total course hours)		3	48
Out-of-class Study Time (Pre-study, practice)		6	96
Reading		0	0
Internet browsing, library work		3	30
Project		6	60
Report Preperation		15	30
Presentation Preperation		6	30
Presentation		2	4
Homework		0	0
Quiz		0	0
Midterm		0	0
Final Exam		0	0
Total Work Load			298
Total Work Load / 30			9.93
Course ECTS CREDİT			10