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
Operational Research Models in Disaster Management	IE 564	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	Disaster Management is generally handled by social sciences. However, especially in recent years, the use of Operations Research techniques seems to increase in decision making problems within disaster management. The aim of the course, (1) providing information about disasters and their types, (2) introduce the risk management process, (3) Introduce problems about Disaster management and decision making, (4) to teach the models of Operations Research used to solve the decision making problems in disaster management by taking advantage of the studies in the literature and (5) to ensure that the Operations Research techniques are applied on a real life problem.
Course Learning Outcomes	A student who successfully completes this course, 1. Defines and explains disaster and disaster types. 2. Defines and explains disaster management and phases. 3. Describe and explain the risk management process. 4. Classify decision-making problems at various stages of disaster management. 5. Knowing the literature for decision making problems at various stages of disaster management. 6. Knowing the work that can be done for decision making problems at various stages of disaster management and which operational research techniques can be used. 7. Solve a real-life problem related to disaster management by applying an appropriate Operational Research technique.
Course Content	• Disaster and types • Risk Management in the scope of Disaster Management • Disaster Management and stages • Studies in the context of disaster management • Operations Research models used in Disaster Management

WEEKLY SUBJECTS AND RELATED PRELIMINARY PREPARATION PAGES		
Week	**Subjects**	**Preliminary**
1	Disaster and types	
2	Disaster Management and stages	
3	Risk Management	
4	Academic Paper Review	
5	Academic Paper Review	
6	Academic Paper Review	
7	Academic Paper Review	
8	Academic Paper Review - **Exam**	
9	Academic Paper Review	
10	Academic Paper Review	
11	Academic Paper Review	
12	Academic Paper Review	
13	Academic Paper Review	
14	Academic Paper Review	
15	Academic Paper Review	
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:** • Coppola, Damon. Introdcution to International Disaster Management, Butterworth-Heinemann, 2nd edition (March 9, 2011) Academic Paper: • Altay, N., Green, W.G., 2006. OR/MS research in disaster operations management. European Journal of Operational Research 175 (1), 475–493. • Galindo G, Batta R., 2013. Review of recent developments in OR/MS research in disaster management. European Journal of Operational Research 230 (2), 201–11. • Balcik, B., Beamon, B.M., Krejci, C.C., Muramatsu, K.M., Ramirez, M., 2010. Coordination in humanitarian relief chains: practices, challenges and opportunities. International Journal of Production Economics 126 (1), 22–34. • Kumar, S., Havey, T., 2013. Before and after disaster strikes: A relief supply chain decision support framework. International Journal of Production Economics 145 (1), 613-629. • Beamon, B.M., Balcik, B., 2008). Performance measurement in humanitarian relief chains. International Journal of Public Sector Management 21 (1), 4 – 25. • Murray-Tuite, P., Wolshon, B., 2013. Evacuation transportation modeling:An overview of research, development, and practice. Transportation Research Part C 27, 25-45. • Brown, C., Milke, M., Seville, E., 2011. Disaster waste management: A review article, Waste Management 31, 1085-1098. • Fetter, G., Rakes, T., 2012. Incorporating recycling into post-disaster debris disposal, Socio-Economic Planning Seciences 46, 14-22. • Afshar, A., Haghani A., 2012. Modeling integrated supply chain logistics in real-time large-scale disaster relief operations. Socio-Economic Planning Seciences 46, 327-338. • Balcik B, Beamon B.M., 2008. Facility location in humanitarian relief. International Journal of Logistics: Research and Applications 11(2), 101–21. • Balcik, B., Beamon, B.M., Smilowitz, K., 2008. Last mile distribution in humanitarian relief. Journal of Intelligent Transportation Systems 12 (2), 51–63. • Görmez, N., Köksalan, M., Salman, F.S., 2011. Locating disaster response facilities in Istanbul. Journal of the Operational Research Society 62, 1–14. • Barbarosoglu, G., Ozdamar, L., Cevik, A., 2002. An interactive approach for hierarchical analysis of helicopter logistics in disaster relief operations. European Journal of Operational Research 140 (1), 118–133. • Crowther, K.G., Haimes, Y.Y., 2005. Application of the Inoperability Input–Output Model (IIM) for Systemic Risk Assessment and Management of Interdependent Infrastructures, Systems Engineering 8 (4), 323-341. • Haimes, Y.Y., Crowther, K., Horowitz, B.M., 2008. Homeland Security Preparadness: Balancing Protection with Resilience in Emergent Systems, Systems Engineering 11, 287-308. • Hamalainen, R.M., Lindstedt, M.R.K., Sinkko, K. 2000. Multiattribute Risk Analysis in Nuclear Emergency Management, Risk Analysis 20 (4). • Duran, S., Gutierrez, M.A., Keskinocak, P., 2011. Pre-Positioning of Emergency Items for CARE International. Interfaces 41(3), 223-237. • Akgün, İ., Gümüşbuğa, F., Tansel B.Ç., 2015. Risk-Based Facility Location By Using Fault Tree Analysis in Disaster Management", International Journal of Management Science (OMEGA), doi:10.1016/j.omega.2014.04.003 • Erkut, E., Ingolfsson, A., 2000. Catastrophe avoidance models for hazardous materials route planning. Transportation Science 34 (2), 165–179. • Saat, M.R., Werth, C.J., Schaeffer, D., Yoon, H., Barkan, C.P.L., 2014. Environmental risk analysis of hazardous material rail transportation. Journal of Hazardous Materials 264, 560–569. • El-Anwar, O., El-Rayes, K., Elnashai, A., 2010. Minimization of socioeconomic disruption for displaced populations following disasters, Disasters 34(3), 865−883. • El-Anwar, O., El-Rayes, K., Elnashai, A., 2010. Journal of Construction Engineering and Management 136 (7). • Ambs, K., Cwilich, S., Deng, M., Houck, D.J., Lynch, D.F., Yan, D., 2000. Optimizing restoration capacity in the AT&T network. Interfaces 30 (1), 26–44. • Yan, S., Shih, Y., 2009. Optimal scheduling of emergency roadway repair and subsequent relief distribution. Computers and Operations Research 36 , 2049-2065. • Scaparra, M.P., Church, R.L., 2012. Protecting supply systems to mitigate potential disaster : a model to fortify capacitated facilities. International Regional Science Review 35 (2), 188-210 • Valdmanis, V., Bernet, P., Moises, C., 2010. Hospital capacity, capability, and emergency preparedness. European Journal of Operational Research 207, 1628-1634 • Yi, P., George, S.K., Paul, J.A., Lin, L., 2010. Hospital capacity planning for disaster emergency management. Socio-Economic Planning Sciences 44, 151–160 • Savachkin, A., Uribe, A., 2012. Dynamic redistribution of mitigation resources during influenza pandemics, Socio-Economic Planning Sciences 46, 33-45 • Mete, H.O., Zabinsky, Z.B., 2010. Stochastic optimization of medical supply location and distribution in disaster management. Int. J. Production Economics 126, 76–84 model for the tourism industry, Tourism Management 32, 158-171

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