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
Simulation	IE 522	Fall - Spring	3 + 0	3	10

Prerequisites	There is no prerequisite.

Course Type	Elective
Course Language	English
Course Coordinator	Assistant Professor Selçuk Gören
Course Instructor	Assistant Professor Selçuk Gören
Course Assistant	
Course Objective	Simulation is one of the most used operation research tools in the analysis of complex processes or systems. This course introduces how computer models are used in the simulation of real life systems. Bu ders öğrenciye gerçek hayat sistemlerinin benzetiminde bilgisayar modellerinin nasıl kullanıldığını tanıtır. Establishing simulation models, performing experiments with these models, and the scientific techniques of interpreting the results of the experiment are covered in the course.
Course Learning Outcomes	A student who successfully completes this course, 1. Lists the stages of a simulation, 2. Describe discrete phenomenon-related concepts, 3. Put random inputs into an input model, evaluate the degree of adaptation with graphical and hypothesis tests, 4. Generates random numbers and random variables in a computer and compare the methods that can be used for this operation, 5. Applies both finite-horizon and steady-state analysis techniques to simulation outputs, explains the weak and strong aspects of different techniques, 6. Compares alternative systems with appropriate statistical methods and can determine optimal levels of input variables using simulation, 7. Students perform a simulation project from beginning to end in a public institution / firm / civil society organization. 8. Students write the results of the project as a written technical report and present it verbally
Course Content	• Concepts about discrete event simulation • Input modeling • Random variable and number generation • Output analysis • Optimization by simulation

WEEKLY SUBJECTS AND RELATED PRELIMINARY PREPARATION PAGES

Week	Subjects	Preliminary
1	Stages of a simulation	
2	Discrete event simulation, basic concepts	
3	Input modeling	
4	Random number generation methods	
5	Random variable generation methods, Monte-Carlo simulation	
6	A brief overview of the random processes of M / M / 1, MA (1), AR (1), Brown motion and geometric Brown motion	
7	Midterm, Interim report and presentation	
8	Output analysis for finite horizon simulations	
9	Output analysis for estimation of steady-state parameters	
10	Experiment design, trial designs	
11	Variance reduction techniques	
12	Comparison of alternative systems with simulations	
13	Sorting and selection techniques	
14	Simulation optimization, metamodeling	

15	Project presentations	
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:** Law, Averill. *Simulation Modeling and Analysis.* McGraw-Hill, 2014 **Supplementary Textbooks:** Banks, J., Carson, J.S., Nelson, B.L., ve Nicol, D.M. *Discrete-Event System Simulation*. Prentice Hall, 2014 Ross, S.M. *Simulation.* Academic Press, 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**
Midterm Exam	1	%20
Quiz	5	%15
Homework	5	%15
Project	1	%20
Final Exam	1	%30
TOTAL		%100
Midterm Activities Percentage		%70
Final Exam Percentage		%30
TOTAL		%100

Course Category	
Natural Sciences and Mathematics	%10
Engineering Sciences	%90
Social Sciences	%0

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)		4	64
Reading		1	16

Internet browsing, library work		1	10
Project		5	50
Report Preperation		15	30
Presentation Preperation		5	5
Presentation		2	4
Homework		5	25
Quiz		0,2	1
Midterm		20	20
Final Exam		30	30
Total Work Load			303
Total Work Load / 30			10.1
Course ECTS CREDİT			10