

TED University
IE 341 Simulation
Fall 2016-2017

Credit Hours: (2+2+0) 3 TEDU Credits, 7 ECTS Credits

Instructor:	Class Hours:	Location:
Çağrı Latifoğlu, Ph.D.	Wednesday 10:00 – 11:50 (Section 1 Lab)	A316
Industrial Engineering Department	Wednesday 14:00 – 15:50 (Section 2 Lab)	A316
Office: A427	Friday 10:00 – 11:50 (Section 1)	A326
Phone: 205	Friday 13:00 – 14:50 (Section 2)	A229
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Teaching Assistant:

Sırma Karakaya

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Office Hours: by appointment

Course Description:

Simulation methodology and model building. Modeling with a simulation language. Random number and random variate generation. Basic issues in the design, verification and validation of simulation models. Analysis of simulation output.

Course Objectives:

The course aims to teach the basic principles and the methods in developing simulation models. The goal is to teach simulation modeling with a simulation package, ARENA including the design of the simulation experiments and statistical analysis of the input and output data for simulation models.

Pre-requisites:

Math 232

Learning Outcomes:

Upon successful completion of this course, a student will be able to

1. Apply the basic concepts in discrete-event simulation modeling including model components, event list and flowchart. [e][B3]
2. Use simulation techniques and tools to model systems. [e, k][B3]
3. Construct simulation models using a simulation package and conduct simulation experiments. [b1, e] [B3]
4. Analyse the input and output data for simulation models. [b2][B4]
5. Perform verification and validation - for simulation models. [b2, e] [B3]
6. Identify engineering problems by using performance measures of simulation models. [e][B1]
7. Analyze solutions for industrial engineering problems and compare design alternatives by using simulation techniques. [e, b2][B4]

	Monday	Tuesday	Wednesday	Thursday	Friday
08:00					
09:00					
10:00			IE 341_01		IE 341_01
11:00			A316-Lab		A326
12:00					
13:00		Office			IE 341_02
14:00		Hours	IE 341_02		A229
15:00			A316-Lab		
16:00					
17:00					

Required Text Book:

W. David Kelton and Randall Sadowski and Nancy Zupick (2014), *Simulation with Arena (6th edition)*, McGraw-Hill, New York

Supplementary Text Books:

Banks, J., Carson, J. S., Nelson, B. L., and Nicol, D. M. (2009), *Discrete Event System Simulation (5th edition)*, Prentice Hall

Law, A. M. (2007), *Simulation Modeling and Analysis (4th edition)*, McGraw-Hill, New York

Pegden, C.D., Shannon, R.E., and Sadowski, R.P., (1995), *Introduction to Simulation Using SIMAN (2nd edition)*, McGraw-Hill, New York

Software: The simulation software package ARENA will be used.

Important Dates: Midterm I- November 16, 2016 Wednesday
Midterm II- December 21, 2016 Wednesday
Final Exam- To Be Announced

Course Management System:

Moodle (<http://moodle.tedu.edu.tr/>). All announcements and course related material such as homework assignments, lecture notes will be posted on Moodle course page. It is the students' responsibility to check the web page regularly and not miss any activity or information.

Planned Learning Activities and Teaching Methods:

Telling / Explaining, Discussion/Debate, Questioning, Problem Solving, Inquiry, Collaborative Learning, Hands-on Activities

Grading:

Assignments: 4 x 5% = 20%
Midterm Exams: 2 x 15% = 30%
Final Exam: 25%
Term Project: 15%
Active Learning Exercises: 10%

Term Project:

In the term project, you will be asked to solve one or two realistic case-based problems which will require evaluation of the performance of a process, component or system and proposing preferred solution alternatives based on sensitivity and scenario analysis

Active Learning Assignments:

These will be in-class activities that will help to enhance the learning process. You will receive full credits if you are engaged in the activity in-class.

Estimated Student Workload:

Lectures	42 hrs
Readings	30 hrs
Observation	6 hrs
Quizzes / Homeworks	40 hrs
Midterm Exams	24 hrs
Final Exam	18 hrs
Case Study	10 hrs

Total workload is 170 hours.

Tentative Course Schedule:

Week	Topics	Chapters
1	Introduction to Simulation	Kelton, Chapter 1
2	Fundamental Simulation Concepts	Kelton, Chapter 2
3	Hand Simulation, Introduction to Arena	Kelton, Chapter 2, Chapter 3
4	Introduction to ARENA (Create-Process Modules), Modeling Basic Operations (Constructing Model 4.1)	Kelton, Chapter 3, Chapter 4
5	Modeling Basic Operations (Record Modules, Schedules, Failures)	Kelton, Chapter 4
6	Modeling Basic Operations (Set Concept, Frequency Type Statistics, Utilizations)	Kelton, Chapter 4
7	Modeling Basic Operations (Stations, Routes)	Kelton, Chapter 4
8	Intermediate Modeling (Sequence)	Kelton, Chapter 7
9	Random Number Generation Random Variate Generation	Banks, Chapter 7, Chapter 8
10	Input Modeling (Selecting Distribution, Parameter Estimation)	Banks, Chapter 9
11	Input Modeling (Goodness of Fit Tests, Non-stationary Arrival Processes)	Kelton, Chapter 4
12	Modeling Detailed Operations (Shared Queues; Batch-Match-Separate-Search-Remove Modules)	Kelton, Chapter 5, Chapter 9
13	Output Analysis for Terminating Simulation	Kelton, Chapter 6
14	Output Analysis for Steady-State Simulation	Banks, Chapter 11

Attendance and Participation:

Attendance is not mandatory in this course. However, the active learning assignments will be graded based on attendance and involvement. Please also note that this course can be learned best when the students participate in class-discussions.

Academic Integrity:

Please avoid all types of actions that can be considered as cheating or plagiarism. All of the following are considered plagiarism among others according to the web site www.plagiarism.org:

(i) turning in someone else's work as your own, (ii) copying words or ideas from someone else without giving credit, (iii) failing to put a quotation in quotation marks by referencing it, (iv) giving incorrect information about the source of a quotation, (v) changing words but copying the sentence structure of a source without giving credit, (vi) copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not.

Plagiarism is a very serious offense and will be penalized accordingly by the university disciplinary committee. The best way to avoid accidentally plagiarizing is to work on your own before you ask for the help of other resources.

Cheating has a very broad description which can be summarized as "acting dishonestly". Some of the things that can be considered as cheating are the following:

(i) copying answers on exams and all types of assignments, (ii) using prohibited material on exams, (iii) lying to gain any type of advantage in class, (iv) providing false, modified or forged data in a report, (v) modifying graded material to be re-graded, (vi) causing harm to colleagues by distributing false information about an exam or an assignment.

TED University takes academic integrity seriously. We, the students and faculty of the TED University, dedicate ourselves to upholding the highest standards of academic integrity. Academic integrity means that one's work is the product of one's own effort, and one neither receives nor gives unauthorized assistance in any assignment. Because advanced academic work depends on the sharing of information and ideas, academic integrity at the college level includes rigorous adherence to the conventions for acknowledging one's use of the words and ideas of other people, and instruction in this fundamental skill of college life is available to all TED University students. (www.tedu.edu.tr)

Syllabus Change: The course schedule announced is tentative. It will be adapted to the pace of class in agreement with the students.

Make up policy: Make up exams will be given only for medical excuses documented by medical reports that are approved by the Student Health Center or other documented excuses approved by the university's executive branches. There will only be one comprehensive make up exam.

Assignment submission policy:

- Assignment solutions must be handed in at the beginning of class on the day that it is due.
- Late submissions are not accepted.
- Your solutions must be written neatly and in an understandable fashion.
- Under no circumstances it is allowed to copy another student's work. Otherwise, the student(s) involved will receive 0 for that assignment.