IE 324 SIMULATION
FALL 2022

IMPORTANT NOTES: Due to COVID-19, any change in the university policies about conducting classes and examinations will result an update on the topics covered and grading assessments including their percentages. **All effort will be made to make these changes as smooth as possible.**

In order to sit at the front row, you MUST have your **masks covering your face and mouth on at all times**! This means **NO EATING** and **NO DRINKING** except for water. There are no restrictions for other rows. A window will be kept open at all times, so dress appropriately. You MUST keep your social distance as much as possible.

The simulation software **ARENA** can only be installed to Windows computers. This means Mac users should either have their computers a Dual-Boot, or they will need an emulator software (like parallels). You are welcome to use the BCC Computer Labs but this might change during the semester.

Course Description: Use of simulation as a decision tool. The design and analysis of simulation models. The use of simulation for estimation, comparison of policies, and optimization. Emphasis is primarily on applications in the areas of production management. Topics include principle of simulation modeling, software, general-purpose computer simulation languages, and statistical analysis of simulation input and output data.

Instructor	Dr. Emre Uzun **E-mail:** emreu@bilkent.edu.tr **Office:** EA 328 **Tel:** x3484 ***Office Hours by appointment only!***
Teaching Assistants	Seyit Ulutaş – seyit.ulutas@bilkent.edu.tr
Tutors	TBA

Course Web Page: https://courses.ie.bilkent.edu.tr/ie324

***Required Text Books*:**

- Banks, J., Carson, J. S., Nelson, B. L., and Nicol, D. M., Discrete-Event System Simulation, 2013, Pearson
- Kelton, W. D., Sadowski, R. P., and Zupick, N. B., Simulation with Arena, 6th Ed., McGraw Hill, 2015

Required Software:

- Arena version 14.5 (Install this version ONLY! Do not download the latest version online! This version will be made available to you by the TAs)

Recommended Text Books:

- Seila, A., Ceric, V., Tadikamalla, P., Applied Simulation Modeling, Duxbury, 2003
- Law, A. M., Simulation Modeling and Analysis, 4th Ed., McGraw Hill, 2006
- Fishman, G. S., Discrete-Event Simulation: Modeling, Programming, and Analysis, Springer, 2001
- Rosetti, M. D., Simulation Modeling and Arena, Wiley, 2009

***Grading*:**

Midterm	35 %
Arena Quiz	10 %
Arena Project	15 %
Homework Assignments	5 %
Final Exam	35 %

FZ Requirement: No FZ requirement.

Open-Book Policy: Arena Quiz will be **OPEN BOOK** (**Simulation with Arena ONLY)** and **OPEN NOTES.** However, the midterm and final exam will be **CLOSED BOOKS** and **CLOSED NOTES**. Necessary statistical tables and formulas will be provided.

Group Policy: Your project will be done in groups of maximum 3 students.

Lab Assignments: In certain weeks, announced in advance, each section will have a lab assignment during the lab hours.

Homework Assignments: Homework assignments will be given and graded based on effort.

Attendance: Attendance will be taken during the lecture and lab hours but will NOT be counted in part towards the course grade. However, it is highly recommended to attend to the lectures and labs.

Makeup Policy: A make-up examination for the midterm will only be given under highly unusual circumstances (such as serious health or family problems). The student should contact the instructor as early as possible and provide the instructor with proper documentation (such as a medical note certified by Bilkent University's Health Center). **There is no make-up for quizzes**.

Classroom Policy: Every student is expected to respect the instructor's right to teach and other students' right to learn. Any behavior, which distracts or disturbs the other students or the instructor, or disrupts class in any way is unacceptable and will not be tolerated. Any student engaging in inappropriate behavior will be asked to leave. Such behavior might also reflect negatively on the course grade of the student.

Tentative Course Outline

WEEK	LECTURE	LAB WORK	HW/Project
Sep 19	Introduction to Simulation, Simulation Exercise Event Scheduling/Time Advance Algorithm		
Sep 26	Simulation by Hand, Input Modeling	Lab 1 – Simulation by Hand	
Oct 3	Input Modeling	Lab 2 – Simulation Examples	HW 1 Due
Oct 10	Random Number Generation	Lab 3 – Input Modeling	
Oct 17	Random Variate Generation		
Oct 24	Random Variate Generation		
Oct 31	Introduction to Arena, Arena Basic Modeling	Lab 4 – Random Number and Random Variate Generation, Intro. to Arena	HW 2 Due Project Assigned
Nov 7	Arena Basic Modeling, Arena Detailed Modeling		HW 3 Due
Nov 14	Arena Detailed Modeling	Lab 5 – Arena	Project Part 1 Due
Nov 21	Further Modeling with Arena		
Nov 28	Output Analysis	Lab 6 – Arena	HW 4 Due
Dec 5	Output Analysis, Verification/Validation		Project Part 2 Due
Dec 12	Comparing Alternative Configurations		
Dec 19	Comparing Alternative Configurations Optimization via Simulation	Lab 7 – Output Analysis	