

IE 324 SIMULATION

SPRING 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.**

As per the senate decision, you **MUST** have your **masks covering your face and mouth on at all times!** This means **NO EATING** and **NO DRINKING** except for water. A window will be kept open, so dress appropriately. You **MUST** keep your social distance as much as possible. You should sit at the same seat at each lecture.

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.

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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
Jan 31	Introduction to Simulation, Simulation Exercise Event Scheduling/Time Advance Algorithm		
Feb 7	Simulation by Hand, Input Modeling		
Feb 14	Input Modeling	Lab 1 – Simulation by Hand	
Feb 21	Input Modeling, Random Number Generation	Lab 2 – Simulation Examples	HW 1 Due
Feb 28	Random Number and Random Variate Generation	Lab 3 – Input Modeling	
Mar 7	Random Variate Generation	Lab 4 – Random Number Generation	
Mar 14	Introduction to Arena	Lab 5 – Random Variate Generation, Intro. to Arena	
Mar 21	Arena Basic Modeling		HW 2 Due Project Assigned
Mar 28	Arena Detailed Modeling	Lab 6 – Arena	HW 3 Due
Apr 4	Arena Detailed Modeling		Project Part 1 Due
Apr 11	Further Modeling with Arena		
Apr 18	Output Analysis	Lab 7 – Arena	HW 4 Due
Apr 25	Output Analysis, Verification/Validation		Project Part 2 Due
May 2	Comparing Alternative Configurations		
May 9	Comparing Alternative Configurations Optimization via Simulation	Lab 8 – Output Analysis	