

IE 324 SIMULATION

FALL 2020

IMPORTANT: Due to the ongoing pandemic, 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.**

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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Tutors	

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	30 %
Arena Quiz	20 % (Totally 2, 10% each)
Arena Project	20 %
Homework Assignments	15 %
Final Exam	35 %

FZ Requirement: No FZ grade will be granted.

Open-Book Policy: You may use the **Simulation with Arena** during the Arena Quizzes. 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.

Course Outline

1. Introduction to Simulation
2. Event Scheduling/Time Advance Algorithm
3. Simulation by Hand
4. Input Modeling
5. Random Number Generation
6. Random Variate Generation
7. Arena Modeling Basic Operations
8. Arena Modeling Detailed Operations
9. Output Analysis of Terminating Simulations
10. Output Analysis of Steady-State Simulations
11. Validation and Verification
12. Comparing Alternative Scenarios
13. Optimization via Simulation
14. Variance Reduction Techniques (if time permits)