

**DEPARTMENT OF INDUSTRIAL ENGINEERING
IE 306 SYSTEMS SIMULATION**

Credits/ECTS : 4 Credits / 7 ECTS

Prerequisite : A basic course in statistics (IE 256 or equivalent) or permission of instructor

Instructor : Ali R. Kaylan (kaylan@boun.edu.tr)
Engineering Building, Room: M4032
Office-Hours: Monday, Tuesday 14:00-15:00, Thursday 16:00-18:00.

Teaching Assistant : TBA
Office-Hours: TBA

LECTURE HOURS : M 13:00-13:50 M3120, Tu 15:00-16:50 M2230.
PROBLEM SESSIONS : Fr 13:00-14:50 M1100.

COURSE WEBPAGE : moodle.ie.boun.edu.tr
Enrollment Key: SINSFIT

COURSE DESCRIPTION :

This course covers the basic notions of the discrete event simulation (DES) methodology to successfully model, analyze and improve manufacturing and service systems under study. All phases of simulation life cycle analysis including input modeling, random variate generation, model verification and validation, statistical analysis of simulation model output are introduced. Simple models will be investigated using spreadsheet and Monte Carlo simulation. A process-oriented simulation package will be utilized for more complex simulation problems. Students are expected to gain insight how to design and analyse simulation models for effective decision-making.

COURSE OBJECTIVE :

To teach students the basic concepts and algorithms of discrete-event simulation (DES) modeling/analysis.

To introduce them to a specific computer simulation language (ie. Arena/SIMAN).

To enable them to apply their probability and statistics knowledge to simulation modeling, input and output data analysis.

COURSE TEXTBOOK : Banks, Jerry and J.S. Carson, II., B.L. Nelson and D.M. Nicol, *Discrete Event System Simulation*, Fifth edition, New Jersey, Pearson Education International Edition, 2010.

Software Tool: ARENA Version 9.

GRADING:

25% (MEx1) + 25% (MEx2) + 10% (Atten. and Assign.) + 10% (Project) + 30% (Final)

COURSE OUTLINE :

	Week
1. Introduction to Simulation Modeling (Chapter 1)	1
2. Discrete Event Simulation (DES) Examples (Chapter 2)	2
3. Discrete Event Simulation (DES) Principles (Chapter 3)	3
4. Simulation Modeling of Queueing Systems (Chapter 5-6)	4
5. Random Number Generation (Chapter 7)	5

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6. Random Variate Generation (Chapter 8)	6-7
7. Input Modeling (Chapter 9)	8
8. Model Verification and Validation (Chapter 10)	9
9. Output Analysis for a Single Model (Chapter 11)	10

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10. Alternative System Designs (Chapter 12)	11-12
11. Applications using ARENA (Chapter 4, 13-15)	13

FINAL EXAM**TERM PROJECT: Team Size: 2-3 Students**

You are expected to identify a **real-life problem** suitable for discrete event simulation (DES) methodology and walk through the related steps as they are covered in the lectures. The DES methodology is listed below. At the end of each phase, you are expected to submit a written document summarizing the essential points related to that phase. The project phases and the due-dates are tabulated. You will be asked to present your project during the last week.

DES METHODOLOGY

1. Problem definition
2. Data collection and model definition
3. Check validity of the model
4. Construct a computer program and Verify
5. Make pilot runs
6. Check validity of the model
7. Design experiments
8. Make production runs
9. Analyze output data
10. Implementation of results

Project Due-Dates

Phase	Topic	Due-Date	%
1	Problem Definition	March 2, 2018	10
2	Model Definition	March 23, 2018	10
3	Arena Model Development	April 6, 2018	10
4	Validation & Verification	May 4, 2018	10
5	Output Analysis	May 11, 2018	10
6	Presentation and Final report	May 11, 2018	50

Prepared By: Ali R. Kaylan, January 2018