INDUSTRIAL ENGINEERING DEPARTMENT
IE 306
Systems Simulation
Fall 2015

Type: Required
Credits/ECTS: 4 Credits / 7 ECTS
Prerequisite(s): IE 256 (Engineering Statistics) or equivalent.

Class/Laboratory/PS schedule: Tuesday 09:30-10:50 - Class lecture
                               Friday 09:30-10:50 - Class lecture
                               Wednesday 14:00-14:50 - Problem Session

Instructor:                    Yaman Barlas
                                 Room M4045, tel. 6407
                                 Office Hours: Tuesday 11:00 -13:00
                                 Wednesday 15:00 -16:30

Assistant: TBA

Course Description: Basic concepts, tools and algorithms of discrete-event simulation modeling/analysis. Event-scheduling versus Process-interaction approach. Random number and random variate generation; inverse transformation and other selected techniques. Input data analysis, estimation and goodness of fit tests. Use of a specific computer simulation language (such as SIMAN, ARENA). Analysis of simulation output and model validation.

Textbook(s) / other required and suggested material:

Course objectives (and program outcomes):
- To teach students the basic concepts and algorithms of discrete-event simulation 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.

By seeking the above objectives, this course mainly addresses the following student outcomes of the industrial engineering undergraduate program:
- Student Outcome (b): An ability to design and conduct experiments, as well as to analyze and interpret data
- Student Outcome (k): An ability to use the techniques, skills, and modern engineering tools necessary for industrial engineering practice
- Student Outcome (a): An ability to apply knowledge of mathematics, science, and engineering
- Student Outcome (e): An ability to identify, model, formulate and solve industrial engineering problems
Topics Outline:
1. Course Organization and Introduction to Simulation
2. Continuous vs. Discrete Simulation Modeling
3. Discrete Event Simulation Examples and Principles
4. Event Scheduling Approach and Algorithm
5. Random Number Generation and Tests for Random Numbers
6. Input Data Analysis and Parameter Estimation
7. Goodness-of-fit Tests
8. Introduction to Random Variate Generation and Inverse Transformation Method
9. Acceptance-Rejection and Some Special-Purpose Techniques
11. SIMAN/ARENA Software, Examples and Applications
12. Model Verification and Validation
13. Statistical Analysis of Simulation Output

GRADING:
- Assignments: 15%
- ExamNo.1: 25%
- ExamNo.2: 25%
- Final Exam: 35%

ASSIGNMENTS:
There will be several homework/programming assignments. These are to be done individually by each student. You may only discuss conceptual questions with your friends; you are expected to do the actual specific work individually. No Homework will be accepted after its due date.

EXAMS:
There will be two midterm exams, and a comprehensive final exam*. Dates of midterm exams will be specified immediately at the beginning of the course. I will give you more specific information on the nature of the exams several days before each midterm exam.

*Important note: To be admitted to the final exam, a student must obtain a ‘final exam visa’. The requirements to obtain a final exam visa are: i- to have had both midterm exams, AND ii- to have accumulated from the midterm exams and homework assignments, at least 25% of the total score.

Prepared by: Yaman Barlas, September 2015