INDUSTRIAL ENGINEERING DEPARTMENT
IE 306
Systems Simulation
Fall 2014

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
                                      Thursday 15:00 -17:00
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:
- Banks, Jerry and J.S. Carson, II., B.L. Nelson and D.M. Nicol, Discrete Event
- (Law, Averill M. Simulation Modeling and Analysis, fourth edition, New York,

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 Estimation
7. Goodness-of-fit Tests
8. Introduction to Random Variate Generation
9. Inverse Transformation Technique
10. Acceptance-Rejection and Some Special-Purpose Techniques
11. Process Interaction Approach and Simulation Software
12. SIMAN/ARENA Software, Examples and Applications
13. Model Verification and Validation
14. 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 2014