

IE 1083 –Simulation Modeling

Spring 2019

Course Syllabus

Instructor

Dr. Surya D. Liman (email: surya.liman@scupi.cn)

Office: 4-220

Office Hours: Tuesdays and Thursdays, 10:15 AM – 11:45 AM

Teaching Assistant

Vincent Wei

Office:

Office Hours:

Lectures

Tuesday: 1:50 PM - 3:20 PM – 4.212 (computer lab)

Thursday: 1:50 PM - 3:20 PM – 4.201

Catalog Course Description

Random number generation; distribution functions and random variates; game of chance; applications of discrete event simulation methods of queuing, inventory control, and production planning problems. Introduction to SIMIO simulation software. 3 credit hours.

Course Pre-Requisites

MATH 0240, IE 1070, IE 1081.

Course Objectives

1. Learn techniques for modeling and simulating discrete-event systems.
2. Provide an understanding of why good statistics are critical to effective decision making.
3. Use this knowledge to build models that will help solve practical problems.
4. Applications of discrete event simulation methods to queuing, inventory control, and production planning problems.
5. Learn the basics of the SIMIO simulation software.

Applicable ABET Outcomes

1. An ability to apply knowledge of mathematics, science and engineering.
2. An ability to design and conduct experiments, as well as analyze and interpret data.
3. An ability to identify, formulate and solve engineering problems.
4. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Textbook

Banks, J., Carson, J.S., Nelson, B.L., and Nicol, D.M. (2013, 5th Edition), *Discrete-Event System Simulation*, Prentice Hall, Englewood Cliffs, New Jersey.

Assessments

Homework assignments, projects, and exam questions related specifically to the objectives above.

Attendance:	10 %
Homeworks & Assignments:	20 %
Mid-Semester Examination:	30 %
Final Examination:	<u>40 %</u>
	100 %

Score	Letter Grade
90.00 – 100.00	A
85.00 – 89.99	A–
80.00 – 84.99	B+
76.00 – 79.99	B
73.00 – 75.99	B–
70.00 – 72.99	C+
66.00 – 69.99	C
63.00 – 65.99	C–
61.00 – 62.99	D+
60.00 – 60.99	D
0.00 – 59.99	F

Attendance

There are 26 90-minute lecture periods in the semester. Attendance will be taken for each lecture period. Each student is allowed **three absences**. Each absence, after the third absence, will result in a **1% deduction** from the attendance grade. After the **thirteenth** absence, the student will **not** be allowed to take the final exam.

Homework and Other Assignments

Homework problems and other assignments will be assigned periodically and are due as stated. Late submission **will not** be accepted. Submissions must be done on **A4 papers** and **stapled** together at the top left-hand corner. Students' names and ID numbers must be listed on the first page at the top right-hand corner.

Exams

There will two exams, all are CLOSED BOOK, CLOSED NOTES, CLOSED COMPUTER. Students are allowed to bring one A4 page note and it must be hand-written on one side of the paper only. It cannot be a photo copy. If you must miss an exam, you should make alternative arrangements with the instructor before the exam is given. If you miss an exam without prior notification, you will receive a score of "zero" for that exam except under extenuating circumstances.

Make-Up Exams

Students who have not taken both mid-semester and final exams are not eligible for make-up exams. Make-up exams can only be taken by students who have attained between 50.00 % and 59.99 % (out of 100 %) of the total score. Only 75 % of the make-up exam grade can be used to **replace** the final exam grade. Students taking make-up exams can only attain at most a "D" grade.

Avoiding Plagiarism

1. Unacknowledged direct copying from the work of another person, or the close paraphrasing of somebody else's work, is called plagiarism and is a serious offence, equated with cheating in examinations. This applies to copying both from other students' work and from published sources such as books, reports or journal articles.
2. Paraphrasing, when the original statement is still identifiable and has no acknowledgement, is plagiarism. A close paraphrase of another person's work must have an acknowledgement to the source. It is not acceptable for you to put together unacknowledged passages from the same or from different sources linking these together with a few words or sentences of your own and changing a few words from the original text: this is regarded as over-dependence on other sources, which is a form of plagiarism.

Tentative Course Schedule

Week	Day	Dates	Topics	Chapter
1	Tue	Feb 26	Course Introduction and Review of Syllabus Introduction to Simulation Modeling	1
	Thu	Feb 28	Systems and Models, Discrete Event System Simulation	1
2	Tue	Mar 5	Simulation Examples: Single-Server Queue	2
	Thu	Mar 7	Simulation Examples: Inventory Simulation using Excel	2
3	Tue	Mar 12	Concepts in Discrete Event Simulation	3
	Thu	Mar 14	Elements of Discrete Event Simulation, Examples of DES Models	3
4	Tue	Mar 19	Review statistical concepts: Discrete and Continuous Distributions	5
	Thu	Mar 21	Confidence Intervals, Hypothesis Testing	5
5	Tue	Mar 26	Input Modeling and Data Collection, Identifying the Distribution with the Data	9
	Thu	Mar 28	Parameter Estimation, Goodness of Fit Tests	9
6	Tue	Apr 2	Random Number Generation: Linear Congruential Method, Tests for Random Numbers	7
	Thu	Apr 4	Random Variate Generation: Inverse-Transform Method, Acceptance-Rejection Technique	8
7	Tue	Apr 9	Review	
	Thu	Apr 11	MID-TERM EXAM	
8	Tue	Apr 16	SIMIO	
	Thu	Apr 18	Model Verification and Validation	10
9	Tue	Apr 23	SIMIO	
	Thu	Apr 25	Estimation of Absolute Performance: Output Analysis – Terminating Simulation	11
10	Tue	Apr 30	SIMIO	
	Thu	May 2	Estimation of Absolute Performance: Output Analysis – Steady State Simulation	11
11	Tue	May 7	SIMIO	
	Thu	May 9	Estimation of Relative Performance: Comparison of Two System Designs	12
12	Tue	May 14	SIMIO	
	Thu	May 16	Estimation of Relative Performance: Comparison of Several System Designs	12
13	Tue	May 21	Simulation of Manufacturing and Material Handling Systems	13
	Thu	May 23	Review	
14	Tue	May 28	FINAL EXAM	