



**DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
INDUSTRIAL ENGINEERING PROGRAM, BSC.**

Course Syllabus

1. Course number and name

IE 482 Simulation

2. Credits and contact hours

(3+0) 3 credit hours, 3 contact hours

3. Course type

Blended Learning Course (2+1)

4. Instructor's or course coordinator's name

Dr. Fadwa Dababneh

5. Textbook information

Averill Law, Simulation Modeling and Analysis, 5th edition, McGraw-Hill Education, 2015

ISMN: 9781259254383

Other supplemental materials

- Promodel user guide, 2015
- Simulation with Arena, W. David Kelton, et al, 6th edition, McGraw-Hill, Boston, MA, 2014
- Charles Harrell , Simulation Using ProModel , 3rd Edition, WCB/McGraw-Hill,2000
- Instructor's Notes

6. Specific course information

a. Catalog description

Discrete event simulation , generate random numbers using Excel, input distribution modeling, review of probability and statistics, Monte Carlo simulation, Queuing systems, simulation modeling using ProModel, simulation output analysis, verification and validation of simulation models

b. Prerequisites or co-requisites

Prerequisite: IE 330 operation research 1

c. The course is:

Required in the Industrial Engineering program.

7. Specific goals for the course

a. Course outcomes:

After completion of the course, students are expected to be able to:



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1. Introducing manual simulation that can be done using pen-and-paper or by using a spreadsheet
2. Identify a probability distribution to represent input process, choose parameters for distribution, and evaluate them for goodness of fit.
3. Solve problems by using Monte Carlo simulation that utilizes a sequence of random numbers to perform the simulation.
4. Draw flow charts, build Models to a real life problems, simulate modeling using ProModel package
5. Simulation output analysis and verification and validation of simulation models.

b. The following student outcomes are addressed by the course:

SO-(a) an ability to apply knowledge of mathematics, science, and engineering.

SO-(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

SO-(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

SO-(pc-2) ability to apply advanced statistics and probability to engineering problems. .

8. Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
CO-(1): Introducing manual simulation that can be done using pen-and-paper or by using a spreadsheet	-	Asynchronous active learning	Excel Exercise
CO-(2): Identify a probability distribution to represent input process, choose parameters for distribution, and evaluate them for goodness of fit.	-	Lectures (Example and Problems)	Assignment



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CO-(3): Solve problems by using Monte Carlo simulation that utilizes a sequence of random numbers to perform the simulation.	-	Lectures (Example and Problems)	Assignment
CO-(4): Draw flow charts, build Models to a real life problems, simulate modeling using ProModel package		Online Video	Term Project & In class Activities
CO-(5): Simulation output analysis and verification and validation of simulation models.		Online Video	Term Project & In class Activities
CO-(6) Model a real life system as a simulation model		Lectures (Example and Problems)	Term Project
Student Outcomes			
SO-(a) an ability to apply knowledge of mathematics, science, and engineering.		Lectures (Example and Problems)	Midterm Exam
SO-(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		Term Project	Term Project
SO-(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.		Term Project	Term Project
SO-(pc-2) ability to apply advanced statistics and probability to engineering problems		Lectures (Example and Problems)	Midterm Exam

9. Weekly Teaching Plan

Week	Lecture	Topic	Method of Delivery
1	Lec_1	Introduction and Syllabus	Lecture
1	Lec_2	Basic Simulation Modelling Introduction	Lecture
1	Lec_3	Basic Simulation Modelling Introduction	Asynchronous active learning



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2	Lec_4	Steps in a Simulation Study	Lecture
2	Lec_5	Steps in a Simulation Study	Lecture
2	Lec_6	Steps in a Simulation Study	Online Lecture
3	Lec_7	Generating Random Numbers	Lecture
3	Lec_8	Generating Random Numbers	Lecture
3	Lec_9	Generating Random Numbers In class assignment	Online Lecture/ synchronous active learning
4	Lec_10	Queuing Discipline	Lecture
4	Lec_11	Hand Simulation and Performance calculations	Lecture
4	Lec_12	Hand Simulation and Performance calculations	Online Lecture
5	Lec_13	Hand Simulation and Performance calculations	Lecture
5	Lec_14	Hand Simulation and Performance calculations Excel Assignment	Lecture
5	Lec_15	Queuing Systems	Online Lecture
6	Lec_16	Queuing Systems	Lecture
6	Lec_17	Queuing Systems	Lecture
6	Lec_18	Review of Probability/Statistics and Input/output data analysis + PROMODEL DOWNLOAD	Online Lecture/ synchronous active learning
7	Lec_19	Review of Probability/Statistics and Input/output data analysis	Lecture
7	Lec_20	Review of Probability/Statistics and Input/output data analysis	Lecture
7	Lec_21	Review of Probability/Statistics and Input/output data analysis	Online Lecture
8	Lec_22	Review of Probability/Statistics and Input/output data analysis	Lecture
8	Lec_23	Review of Probability/Statistics and Input/output data analysis	Lecture
8	Lec_24	Review of Probability/Statistics and Input/output data analysis + STATFIT TUTORIAL	Online Lecture/ synchronous active learning
9	Lec_25	Review of Probability/Statistics and Input/output data analysis	Lecture



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9	Lec_26	Simulation Using Promodel Introduction (entities, arrivals, locations, etc.) + Introduction Video	Lecture
9	Lec_27	PROMODEL TUTORIAL VIDEO + PROJECT ANNOUNCEMENT	Online Lecture
10	Lec_28	Simulation Using Promodel Introduction (entities, arrivals, locations, etc.)	Lecture
10	Lec_29	Simulation Using Promodel Introduction (entities, arrivals, locations, etc.)	Lecture
10	Lec_30	Promodel Worksheet 1	Asynchronous active learning
11	Lec_31	Simulation Using Promodel (location capacities, decision statements, arrival cycles)	Lecture
11	Lec_32	Simulation Using Promodel (location capacities, decision statements, arrival cycles)	Lecture
11	Lec_33	Promodel Worksheet 2	ASynchronous active learning
12	Lec_34	Promodel Manual	Lecture
12	Lec_35	Advanced Routing VIDEO TUTORIAL	Lecture
12	Lec_36	Promodel Worksheet 3	Asynchronous active learning
13	Lec_37	Promodel Worksheets 1-3 Review	Lecture
13	Lec_38	Promodel Worksheets 1-3 Review	Lecture
13	Lec_39	Promodel Worksheet 4	Asynchronous active learning
14	Lec_40	Review	Lecture
14	Lec_41	Project Presentations	Lecture
14	Lec_42	Project Presentations	Lecture
15	Lec_43	Project Presentations	Lecture
15	Lec_44	Project Presentations	Lecture
15	Lec_45	Project Presentations	Lecture

1. Grade Distribution:

Assessment	Grade	Week No.
- Exams	30%	7 th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works)	30%	1-16 th Week



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- Final Examination	40%	16 th Week
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Note: Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.