

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
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Manufacturing System Design & Simulation

College: College of Engineering

Department: Mechanical Engineering

First: Course Definition

1- Course Code: ME 635

2-Units : 3 credit hrs

3 – Semester : 2nd

4 -Prerequisite : Manufacturing Processes, Basic Statistics

5- Co-requisite:

6- Location (if not on main Campus):

Second: Course Objectives

1. Provide students with basic understanding of Production/Manufacturing processes using simulation
2. Allow students to use standard software ARENA to simulate the manufacturing/production process
3. The students will be familiar with the basics of modeling and simulation
4. Allow students to learn the performance of a process based on cycle time, work in process and throughput level

Third: Course Specifications

1- Topics to be covered		
Subject	No of Weeks	Units
<i>Fundamentals of simulation</i>	1	3
<i>Simulation with hand</i>	1	3
<i>modelling basic operations & inputs</i>	2	6
<i>Out put analyzers</i>	1	3
<i>Modelling detailed operations</i>	2	6

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<i>Statistical analysis for terminating simulations</i>	1	3
<i>Statistical analysis for Non-terminating simulations</i>	1	3
<i>intermediate modelling</i>	2	6
<i>Steady state statistical analysis</i>	2	6
<i>Parts transfer</i>	1	3
Case Studies		
<i>Project Group Discussions</i>	1	3
<i>Project Group Discussions/Presentation</i>		
<i>Final Exam</i>		

2- Course components (Total hrs in the Semester)

Lecture	Exercise or lab	Other
45	--	--

3- Intended Learning Outcomes of the Course (ILO's)

a. Knowledge

i) Description of the knowledge to be acquired:

- Understanding of the Basic Processes in Simulation
- Learning Dynamic, Static, discrete and continuous type of simulation
- Both low and higher level modeling; low level using SIMAN codes and Higher level using User Created Templates and Application Templates for modeling processes

ii) Teaching strategies to be used to develop that knowledge

Lectures
Tutorials (based on software)
Homework
Case studies
Mini projects

iii) Methods of assessment of knowledge acquired

Quizzes: to assess understanding of fundamentals of simulation.
Discussion Groups: to assess interactive and communication abilities.
Midterm Exams: to assess understanding of process parameters, real life problem solving and analyzing of whole process.
Final Exam: to assess **understanding** of different aspects of simulation applied to discrete as well as continuous manufacturing setups.

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Mini project: To imitate a real system on computer software and then make concrete recommendations to the case companies.

b- Cognitive (Intellectual) Skills

i) Cognitive skills to be developed

Ability to develop and analyze any discrete parts or process industry system and then suggest recommendations for the improvements

ii) Teaching strategies to be used to develop these cognitive skills

- Lectures
- Assignments, at home
 - Case study
 - Mini project (Design), Supervised

iii) Methods of assessment of students cognitive skills

- Quizzes:** to assess understanding of fundamentals of simulation.
Discussion Groups: to assess interactive and communication abilities.
Midterm Exams: to assess understanding of process parameters, real life problem solving and analyzing of whole process.
Final Exam: to assess **understanding** of different aspects of simulation applied to discrete as well as continuous manufacturing setups.

Mini project: To imitate a real system on computer software and then make concrete recommendations to the case companies.

c. Interpersonal Skills and Responsibility

i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- Team work
- Ideas development and sharing with others

ii) Teaching strategies to be used to develop these skills

- Assignments, at home
- Case study
 - Mini project (Design), Supervised

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iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

Case Study

- Mini Project
- Mini Project Presentations

d. Communication, Information Technology and Numerical Skills

i) Description of the skills to be developed in this domain

Use of Commercial ARENA software from Rockwell Simulations

ii) Teaching strategies to be used to develop these skills

Lectures

- Assignments, at home
- Case study
- Mini project (Design), Supervised

iii) Methods of assessment of students numerical and communication skills

- **Quizzes:** to assess understanding of fundamentals of Simulation.

Discussion Groups: to assess interactive and communication abilities.

Mini project: to assess **practical hands-on**, report writing, ability to deal with real world problems and systems using Simulation

e. Psychomotor (if applicable) & Other Non-cognitive Skills

i) Description of the psychomotor or other skills to be developed and the level of performance required

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ii) Teaching strategies to be used to develop these skills-

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iii) Methods of assessment of student's psychomotor skills

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4- Student Assessment Schedule

Assessment	Assessment task (test, group project, examination etc.)	Weight of
1	Quizzes and Home works	15 %
2	General Performance/ Attendance	2 %
3	Mid Term Exam1	15 %
5	Mid Term Exam2	15 %
6	Mini Project, Home Assignment	10 %
7	Final Exam	43 %

5- Student Support

Interactive simulation learning
Office hours availability
Discussion on mini project and case studies with students

6- Learning Resources

i) Essential Books (References)

1. David Kelton, Simulation with Arena, McGraw Hill 2003
2. Tafur Altiock and Benjamin M., Simulation Modelling and Analysis with Arena, Academic Press, 2010
3. Averill Law & D. Kelton, Simulation Modelling and Analysis, McGraw Hill, 2003.

ii) Course Notes

Lecture ppts
End of Chapter problems

iii) Recommended Books

David Kelton, Simulation with Arena, McGraw Hill 2003

iv) Electronic Books & Web Sites:

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Course materials are uploaded on the College Web-Site (www.qec.edu.sa) to be available for the students

v) Periodicals
Modeling and Simulation

7- Course Evaluation and Improvement Processes

i) Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- End of semester teaching evaluations
- End of semester course evaluations

ii) Other Strategies for Evaluation of Teaching by the Instructor or by the Department

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iii) Processes for Improvement of Teaching

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iv) Processes for verifying standards of student achievement (e.g. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

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v) Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

The course evaluations done by the instructor are reviewed every semester by a subject committee. This is discussed, summarized and put up to the Department Council Meeting. After further analysis and discussion; the suggestions for modification of the course are brought to the college council. Finally approval from the college council; the suggestions can be incorporated in the course