

Detailed Course Description - Course Plan Development and Updating Procedures/ Computer Information Systems Department	QF01/0408-3.0E
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Faculty	Science and Information Technology	Department	Computer Information Systems
Course Number	0113415	Course Title	Simulation and Modeling
Number of Credit Hours	3	Pre-Requisite/Co-Requisite	System Analysis and Design (0113342)

Brief Course Description

Modelling and simulation of information systems aims to provide an insight into how simulation modeling can aid in effective decision-making. The bulk of the time in the course is spent on discrete event simulation modeling. Simulation model building aspects of discrete systems (such as manufacturing and logistics facilities, supply-chains) are covered in detail. It is also demonstrated how computer simulation can be used to successfully model, analyze and improve systems under study. Simulation software is used to demonstrate building and executing the models. Systems dynamics and continuous simulation are also covered in earlier part of the course.

Course Goals and Learning Outcomes	
Goal 1	Have an understanding of differences simulations and model main concepts.
Learning Outcomes	1.1 Be able to apply basic math and statistics including the differences between discrete event and continuous simulation models, important random numbers generators and frequency distributions. 1.2 Be able to formulate a simulation study and develop a simulation model within the simulation language such as Arena. 1.3 List applications of simulation.
Goal 2	Simulation Modeling and Analysis Intellectual and Skills.
Learning Outcomes	2.1 Be able to formulate, design, and implement a simulation solution for real problems or modelled ones in business areas such as scheduling and warehouse systems using simulation techniques with or without a simulation tool such as Arena. 2.2 Be capable of analyzing the results from simulation models. 2.4 Analyze output results of simulation experiments.
Goal 3	Simulation and Modeling Transferable Skills.
Learning Outcomes	3.1 Work in a group in order to implement a simulation project. 3.2 Present the final work (project) and make a demo.
Textbook	1. "Simulation with Arena", by W. David Kelton, Randall P Sadowski, David T Sturrock, W. Kelton, Randall Sadowski, David Sturrock, McGraw-Hill, 5 th Edition, 2015. 2. "Simulation Modeling and Arena", by Rossetti, Manuel D, Wiley; 2 nd Edition Wiley, 2015,
Supplementary	1. "Simulation Modeling and Analysis", Averil M. Law and W. David

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References	Kelton.. 3 rd Edition, McGraw-Hill International Series. 2000.
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Course Timeline

Week	Number of Hours	Course Topics	Pages (Textbook)	Notes
01	1 1 1	Chapter 1: What is Simulation? <ul style="list-style-type: none"> ▪ Modeling ▪ Computer Simulation ▪ How Simulation Get Done ▪ When Simulation Are Used 	1-13	
02	1 1 1	Chapter 1: Basic Simulation Modeling <ul style="list-style-type: none"> ▪ Discrete-Event Simulation ▪ Simulation of an Inventory System 	60-78	Simulation Modeling and Analysis
03	1 1 1	Chapter 1: Basic Simulation Modeling <ul style="list-style-type: none"> ▪ Alternative Approached to Modeling and ▪ Coding Simulations ▪ Steps in a Sound Simulation Study ▪ Other Types of Simulation ▪ Advantages, Disadvantages, and Pitfalls of ▪ Simulation 	80-91	Simulation Modeling and Analysis
04	1 1 1	Chapter 3: Simulation Software <ul style="list-style-type: none"> ▪ Introduction ▪ Comparison of Simulation Packages with ▪ Programming Languages ▪ Classification of Simulation Software ▪ Desirable Software Features 	202-214	Simulation Modeling and Analysis
05	1 1 1	Chapter 3: Simulation Software <ul style="list-style-type: none"> ▪ General-Purpose Simulation Packages ▪ Object-Oriented Simulation ▪ Examples of Application-Oriented Simulation Packages 	215-234	Simulation Modeling and Analysis
06	1 1 1	Chapter 6: Selecting Input Probability Distribution <ul style="list-style-type: none"> ▪ Introduction ▪ Useful Probability Distributions ▪ Techniques for Assessing Sample Independence 	292-331	Simulation Modeling and Analysis

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07	1 1 1	<p>Chapter 2: Fundamental Simulation Concepts</p> <ul style="list-style-type: none"> ▪ An Example ▪ Analysis Options ▪ Pieces of a Simulation Model ▪ First Exam 20% 	15-24	
08	1 1 1	<p>Chapter 2: Fundamental Simulation Concepts</p> <ul style="list-style-type: none"> ▪ Event- Driven Hand Simulation ▪ Event-and Process-Oriented Simulation ▪ Randomness in Simulation 	25-48	
09	1 1 1	<p>Chapter 3: Guided Tour Through Arena</p> <ul style="list-style-type: none"> ▪ Starting Up ▪ Exploring the Arena Window ▪ Browsing Through an Existing Model 	53-77	
10	1 1 1	<p>Chapter 3: Guided Tour Through Arena</p> <ul style="list-style-type: none"> ▪ Building Model, Yourself ▪ Case Study 	78-95	
11	1 1 1	<p>Chapter 3: Guided Tour Through Arena</p> <ul style="list-style-type: none"> ▪ More Menus, Toolbars, Drawing, and Printing ▪ Case Study 	96-110	
12	1 1 1	<ul style="list-style-type: none"> ▪ Practice Simulation Modeling and Testing ▪ Second Exam 20% 		
13	1 1 1	<p>Queuing Theory</p> <ul style="list-style-type: none"> ▪ Introduction to queuing theory ▪ Exponential and Poisson distributions ▪ Poisson process 		Notes
14	1 1 1	<p>Queuing Theory</p> <ul style="list-style-type: none"> ▪ Notation ▪ Single Server Queue System ▪ Multi-Server Queue System 		Notes
15	1 1 1	<p>Chapter 5: Modeling Detailed Operations</p> <ul style="list-style-type: none"> ▪ Simple Call Center ▪ New Modeling Issues ▪ Modeling Approached 	201-205	

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16	1 1 1	Chapter 5: Modeling Detailed Operations <ul style="list-style-type: none"> ▪ Building the Model ▪ <u>Final Exam 50%</u> 	206-226	
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Theoretical Course Evaluation Methods and Weight	Participation = 10% First exam 20% Second exam 20% Final exam 50%	Practical Course Evaluation Methods	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%
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Approved by head of department		Date of approval	
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Extra information (to be updated every semester by corresponding faculty member)

Name of Teacher		Office Number	
Phone Number (extension)		Email	_____@zuj.edu.jo
Office Hours			