FUTURE UNIVERSITY IN EGYPT
جامعة المستقبل

Faculty of Computers and Information Technology

Modeling and Simulation

Information :

Course Code :	IS251	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Faculty of Computers and Information Technology

Instructor Information :

Title	Name	Office hours
Lecturer	Samah Ahmed Zaki Hassan	5
Lecturer	Samah Ahmed Zaki Hassan	5
Assistant Lecturer	Mohamed Mahmoud Hasan Hamada	1
Teaching Assistant	Bayan Elsaeed Bedair Omar Elakhdar	
Teaching Assistant	Yomna Alaa Elsayed Aly Darwish	
Teaching Assistant	Salma Ahmed Elsayed Ahmad	
Teaching Assistant	Hanan Hossam Eldeen Mohamed Abdelaziz	
Teaching Assistant	Bayan Elsaeed Bedair Omar Elakhdar	
Teaching Assistant	Yomna Alaa Elsayed Aly Darwish	
Teaching Assistant	Salma Essam Eldin Ali Mohamed Mohamed Yassin	

Area Of Study :

Apply the basic concepts of computer modeling and simulation to discrete event simulation systems for decision support.
Combine general purpose languages such as JAVA and special simulation packages such as OPNET simulator to evaluate the simulation study.
Use basic probability concepts such as random variables, mean value, variance and probability distributions.
Infer the measures of effectiveness in real systems, and then design an appropriate model to improve the system performance.
Deal with different aspects of modeling and simulation applications in industry.
Use effectively communication skills.
Carry out a self-learning and research in computing and information field.
Develop and evaluate the sequence of components related to computer simulation (problem statement, data acquisition, model design, simulation experiment, verification, techniques and methods in different industrial and research applications.

Description :

This course provides an introductory treatment of the concepts and methods of modeling-discrete-event simulation. The students begin to learn how to do manual simulators with extensive examples through spread sheets. Many mathematical and statistical models are discussed including queueing models. The techniques of random number generation are introduced. The analysis of simulation data are presented including the input modeling, verification and validation models, and output analysis model.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Describe modeling and simulation of real systems such as queuing systems, inventory models, and reliability and maintainability systems.
2 -	Explain functional requirements and constrains in a real system by observing the system behavior.
3 -	Describe different data analysis methods such as mean, standard deviation, regression and hypothesis testing.
b.Intellectual Skills: :	
1 -	Analyze and design appropriate input models for simulated systems considering their limitations and constrains.
2 -	Test and evaluate the functionality of input models of simulated systems using hypothesis testing.
3 -	Apply and implement simulation models by general purpose language (i.e., JAVA) and a specific simulation package (i.e., OPNET Modular) with in commercial and industrial constrain.
c.Professional and Practical Skills: :	
1 -	Use different simulation techniques (i.e., manual and computer based) in discrete event simulation study.
2 -	Evaluate the quality of designed systems using different simulation experiments (i.e., several scenarios).
3 -	Create a technical report for simulation phases.
d.General and Transferable Skills: :	
1 -	Work the course project in a team effectively and efficiently considering time and stress management.
2 -	Apply communication skills and techniques to present simulation and modeling tools.
3 -	Search for information and adopt lifelong self-learning.

ABET Course outcomes :	
1 -	Apply the principles and methods of modelling discrete time simulation, including both discrete-event and continuous-time (dynamic systems) simulation systems
2 -	Use basic probability concepts such as random variables, mean value, variance and probability distributions
3 -	Demonstrate adequate understanding of the technical approaches for generation and testing of random numbers and random variates. Uniformity and independency Statistical tests for the generated random Numbers
4 -	Demonstrate adequate understanding of the measures of effectiveness in real systems
5 -	Design an appropriate model to improve the system performance
6 -	Demonstrate adequate understanding of modeling and simulation applications in industry to simulate different types of dynamic (continuous time) systems such as: Electrical systems, Mechanical systems and hydraulic systems
7 -	Develop and evaluate the sequence of components related to computer simulation

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Steps of Simulation Study	4	2	2
Simulation Examples	4	2	2
General Principles and Simulation Software	4	2	2
Statistical Models	4	2	2
Queuing Systems	4	2	2
Random-Number Generation	4	2	2

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Verification and Validation of Simulation Models	4	2	2
Mid-Term	2		
Output Analysis for a Single Model	4	2	2
Comparison and Evaluation or Alternative System Designs	4	2	2
Applications Simulation of Computer Networks: OPNET	4	2	2
Project Presentation	4	2	2
Final Exam	2		

Teaching And Learning Methodologies :

Interactive Lectures including Discussions
Tutorials
Practical Lab Sessions
Self-Study (Project / Reading Materials / Online Material / Presentations)
Case Studies
Problem Solving

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments	5.00	4	
Final Exam	40.00	14	
Midterm Exam (s)	20.00	9	
Others (Participations)	5.00		
Presentations	5.00	12	
Quizzes	10.00	5	
Team Work Projects	15.00	12	

Course Notes :

Course Notes are available with all the slides used in lectures in electronic form on Learning Management System (Moodle)

Web Sites :

ÅInternational Journal of Simulation Modeling and Practice Theory, Elsevier.www.journals.elsevier.com/ Simulation Modeling and Practice Theory/
ÅFrontline Solver www.solver.com/simulation-tutorial-introduction