University: **Alexandria**
Faculty: **Science**
Program: **Computer Science**

Form no. (12)
Course Specification

1- Course Data

Course Code:	**Course Title:**	**Academic Year/Level:**
CS 214	***System Simulation and Modeling***	Second level (Second semester)
Specialization: Computer Science	**No. of Instructional Units:** **Lecture** 2 **Tutorial** 1	

2- Course Aim	• Demonstrate theoretical knowledge and have practical skills in different areas of Simulation that are applicable in computer science such as Discrete and continuous systems, Event scheduling..etc. • Demonstrate an ability to initiate and sustain in-depth research relevant to **application of** Types of systems**.** • Have an opportunity to put theory into practice via work-based learning.
3- Intended Learning Outcome	
a- Knowledge and Understanding	a1. Describe the nature and Simulation languages its importance in computer science applications. a2. Identify the steps required to carry out a piece of research on a topic within applications of Object oriented simulation. a3. Basic Input modeling concepts in computer science a4. The Data collection a5. The Effect of covariance and correlation of the quality of data a6. The Verification and validation of models

b- Intellectual Skills	b1. Use appropriate theories, principles and concepts relevant to the simulation methods that are applicable to computer science; b2. Analyze and interpret information from a variety of sources relevant to the topics under consideration; b3. Develop a reasoned argument to the solution of familiar and unfamiliar problems relevant to these topics (see the contents);
c- Professional Skills	**c1.** Plan practical activities using techniques and procedures appropriate to applications of simulation in computer science; **c2.** Execute a piece of independent research using simulation and computer media and techniques;.
d- General Skills	**d1.** Develop appropriate effective written and oral communication skills relevant to simulation **applications in computer science**; **d2.** Work effectively as part of a group, involving leadership, group dynamics and interpersonal skills such as listening, negotiation and persuasion relevant to simulation and computer science; **d3.** Use organization skills (including task and time management) relevant to **computer science** both individually and in a group situation; **d4.** Solve problems relevant to **applications of** simulation in computer science using ideas and techniques some of which are at the forefront of the discipline;
4- Course Content	• Types of systems, Types of models, • Discrete and continuous systems, • Stages of a typical simulation study, • Concepts of system clocks, • Event scheduling Vs time advance algorithms, • Random numbers, Roles of random numbers in simulation, Pseudo random number generation techniques, • Methods of testing PRN sequences, Random varieties, • Generation, Inverse transformation techniques with exponential distributions and empirical continuous distributions, • Direct isolations with normal distributions, Acceptance, Rejection techniques, With poison distribution, • Simulation languages, CPSS, SIMULA, SIMSCRIPT, • Object oriented simulation, Input modeling, Data collection, • Distribution functions such as normal, Poisson, • Exponential distributions, Goodness of fit tests, • Chi square test, Input model with out data, • Effect of covariance and correlation of the quality of data, • Verification and validation of models, • Guidelines for verification of models, • Their calibration and validation, Face validity, • Validation of model assumptions, • Validating input-output transformations,

	• Use of historical data, • Evaluation of simulation experiments, • Length of simulation run, • Static and dynamic stochastic simulations, • Elimination of transients, • Auto correlated observations, • Variance reduction techniques.
5- Teaching and Learning Methods	Lecturers – Home works - Oral discussion - Quizzes
6- Teaching and Learning Methods for Students with Special Needs	NONE
7- Student Assessment:	
a- Procedures used:	Lecturers – tutorials- homework – oral discussion - Quizzes

b- Schedule:	Mid-Term exam… …. Week 10 Final exam …….. Week 17
c- Weighing of Assessment:	Term work (exam + home works) 20% Oral exam 10% Final exam 70%
8- List of References:	Theory of Modeling and Simulation
a- Course Notes	Course notes provided by the Faculty member of Computer Science Division, Math department, to be handled at the beginning of the semester.
b- Required Books (Textbooks)	Theory of Modeling and Simulation
c- Recommended Books	Theory of Modeling and Simulation
d- Periodicals, Web Sites, …, etc.	

Course Instructor: Dr. Yasser Fouad
Head of Department: Prof. Dr. Mahmoud El-Alem.
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