



University/Academy: Arab Academy for Science, Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: B.Sc. Computer Engineering

Form no. (12): Course Specification

1- Course Data

Course Code: CC517	Course Title: System Modelling and simulation	Academic Year/Level: 4th year / 8th semester
Specialization: Computer Engineering	No. of Instructional Units 3	Lecture 2
		Practical 2

2- Course Aim

- Understand the basic principles of the field of Modelling and Simulation.
- Use the modelling of queuing systems using Markov chains.
- Evaluate performance of queuing systems.
- Highlight the different stages in building a discrete event simulation model and the architecture of simulation software

3- Intended Learning Outcomes

a- Knowledge and Understanding	<p>Through knowledge and understanding, students will be able to:</p> <p>a3. Methodologies of solving engineering problems, data collection and interpretation.</p> <ul style="list-style-type: none"> • Summarize probability theory • Define State diagrams • Identify Different queuing models • Explain parametric estimation • Explain joint and conditional distributions • Identify simulation software <p>a4. Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues, business and management principles relevant to engineering, professional ethics and impacts of engineering solutions on society and environment.</p> <ul style="list-style-type: none"> • Distinguish between different simulation models • Show scatter diagrams • Define and calculate goodness of fit test • Show random variable generation <p>a6. Related research and current advances in the field of computer software and hardware and contemporary engineering topics.</p> <ul style="list-style-type: none"> • Explain MLE method • Show stochastic and heuristic process
b- Intellectual Skills	<p>Through intellectual skills, students will be able to:</p> <p>b1. Select/Apply appropriate mathematical and computer-based methods for modeling and analyzing problems and select appropriate solutions for engineering problems based on analytical thinking.</p> <ul style="list-style-type: none"> • Classify queuing models • Classify simulation models <p>b2. Think in a creative and innovative way in problem solving and design using the latest technologies and solve engineering problems, often on the basis of limited and possibly contradicting information while identifying symptoms in problematic situations.</p> <ul style="list-style-type: none"> • Demonstrate simulation case study

c- Professional Skills	<p>Through professional and practical skills, students will be able to:</p> <p>c2. Create and/or re-design a process, component or system, and carry out specialized engineering designs with neatness and aesthetics in design and approach.</p> <p>c3. Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment, wide range of analytical tools, techniques, and software packages pertaining to the computer engineering to design experiments, collect, analyze and interpret results and develop required computer programs.</p> <p>c4. Apply numerical modeling methods to engineering problems</p> <ul style="list-style-type: none"> • Experiment with Matlab programming • Write simulation program • Design simulation model using Arena software • Output analysis using Arena
d- General Skills	<p>Through general and transferable skills, students will be able to:</p> <p>d1. Collaborate effectively within multidisciplinary teams.</p> <p>d2. Work in stressful environment and within constraints, communicate effectively, lead and motivate individuals and effectively manage tasks, time, and resources.</p> <ul style="list-style-type: none"> • Estimate the role of probability in simulation • Understand different simulation software • Verify Queuing models • Verify the role of statistics in simulation

4- Course Content

Week No.1	Random Variables and Probability Theory
Week No.2	Parametric Estimation of Mean, variance, Covariance, Correlation
Week No.3	Joint and Conditional Distributions
Week No.4	Introduction to Simulation Software
Week No.5	Introduction to Queuing Models
Week No.6	Simulation models
Week No.7	7th week exam + Simulation Models
Week No.8	Scatter Diagrams
Week No.9	Goodness of Fit Tests
Week No.10	Generation of Random variables
Week No.11	Random variables Generation Methods
Week No.12	12th week exam + Random Variables Generation Methods
Week No.13	Maximum Likelihood Estimator
Week No.14	Stochastic and Heuristic Processes
Week No.15	State Diagrams
Week No.16	Presentation of projects and Final Exam.

5- Teaching and Learning Methods

<ul style="list-style-type: none"> • Lectures • Tutorials • Reports & sheets • Laboratories • Seminars

6-Teaching and Learning Methods for Students with Special Needs

- Lectures
- Tutorials
- Reports & sheets
- Laboratories
- Seminars

The academic advisors of each student, as well as dedicated department TAs monitor the students' progress and solve any problem he/she may encounter.

7- Student Assessment

a-Procedures used	1-Written Examinations to assess The Intended Learning Outcomes.	
	2-Class Activities (Reports, Discussions, -----) to assess The Intellectual Skills.	
b- Schedule:	Assessment 1	7 th Week Written Exam
	Assessment 2	12 th Week Written Exam
	Assessment 3	Continuous
	Assessment 4	16 th Week Final Written Exam
c- Weighing of Assessment	7 th Week Examination	30 %
	12 th Week Examination	20 %
	Final-term Examination	40 %
	Oral Examination	00 %
	Practical Examination	00 %
	Semester Work	10 %
	Total	100%

8- List of References:

a- Course Notes	
b- Required Books (Textbooks)	• Barry L. Nelson, Stochastic Modeling: Analysis and Simulation, McGraw - Hill, 1995.
c- Recommended Books	• Averill M Low & W.David Kelton, Simulation Modeling and Analysis, 3rd edition, McGraw -Hill, 2000.
d- Periodicals, Web Sites, etc.	

Course Instructor:
Prof. Dr. Khaled Mahar

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