



Course Specifications

Course Title:	Simulation and Modelling
Course Code:	516CCS-3
Program:	BSc in Computer Science
Department:	Computer Science
College:	College of Computer Science and Information Systems
Institution:	Najran University

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A. Course Identification

1. Credit hours: 4			
2. Course type			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
3. Level/year at which this course is offered: Year 5 / Level 13			
4. Pre-requisites for this course (if any): None			
5. Co-requisites for this course (if any): N/A NA			

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	20
3	Tutorial	10
4	Others (specify)	
	Total	60
Other Learning Hours*		
1	Study	
2	Assignments	
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	Total	

B. Course Objectives and Learning Outcomes

1. Course Description

This module aims to introduce students to the modelling and analysis of dynamic systems. Students will learn about the different types of systems, based on real-world examples. Students will gain an appreciation of the overall process of modelling and analysis, from understanding the question to be answered through to the presentation of findings. Then, understanding the different approaches to system modelling, including system input-output equations, linear and non-linear system behavior, and computer based system analysis, finite difference equations, Markov models, Monte Carlo methods and automata.

2. Course Main Objective

1. Understand the general concepts: System, model, simulation.
2. Identify and explain the types of mathematical models.
3. Apply standard tools to solve practical engineering problems

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Understand the general concepts: System, model, simulation.	K ₁
1.2	Identify and explain the types of mathematical models.	K ₁
2	Skills :	
2.1	Analyze of dynamic systems	S ₁ , S ₃
2.2	Apply standard tools to solve practical computer science problems	S ₁ , S ₄ , S ₅
3	Values:	

C. Course Content

No	List of Topics	Contact Hours
1	Introduction & Summary	5
2	Statistics and Probability for Simulation	5
3	Topics in Descriptive Simulation Modeling	10
4	Techniques for Sensitivity Estimation	10
5	Simulation-based Optimization Techniques	10
6	Metamodeling and the Goal seeking Problems	10
7	"What-if" Analysis Techniques	10
Total		

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Understand the general concepts: System, model, simulation.	<ul style="list-style-type: none"> • Lectures • Assignments 	<ul style="list-style-type: none"> • Homework • Midterm exams • Final Exam
1.2	Identify and explain the types of mathematical models.	<ul style="list-style-type: none"> • Lectures • Assignments 	<ul style="list-style-type: none"> • Homework • Midterm exams • Final Exam
...			
2.0	Skills		
2.1	Analyze of dynamic systems	<ul style="list-style-type: none"> • Lectures • Assignments 	<ul style="list-style-type: none"> • Homework • Midterm exams • Final Exam

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	Apply standard tools to solve practical computer science problems	<ul style="list-style-type: none"> Lectures Assignments 	<ul style="list-style-type: none"> Homework Midterm exams Final Exam
...			
3.0	Values		
3.1			
3.2			
...			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz	3 th week	10%
2	Assignments or mini project (presentation)	2 nd week, 8 th week	20%
3	Mid Term Exam	6 th week	20%
6	Final Lab Exam	11 th	10%
7	Final Exam	12 th or 13 th week	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Each faculty member should set up to 10 hours weekly as office hours in their time tables.
- Academic advisors are assigned to advise and support students.
- Instructors set specific office hours for each course he is teaching. The teaching load of staff members are available in the front of their offices.

Instructors arrange and provide tutorials to students.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<p>A.M.Law Kelton, "Simulation Modeling and Analysis", 2006, ISBN-10: 0073294411</p> <p>Hung V. V. and Esfandiari R. S., Dynamic Systems Modelling and Analysis, McGraw-Hill, 1998</p> <p>W.David Kelton, "Simulation with Arena", 2006 , ISBN-10: 0073259896</p>
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Essential References Materials	As mentioned above
Electronic Materials	Available all uploaded lecture slides on Blackboard.
Other Learning Materials	NA

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture Rooms with 20 seats with smart table, Mic, Speaker, PC, Auto Projector with Screen and a white board or An smart board.
Technology Resources (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> • Desktop/ Laptop computer • Network printer • Internet facility for open labs to solve various case studies and for assignments
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	NA

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Learning outcomes	Instructor	Direct
Teaching strategies	Quality unit	Indirect
Assessment methods	Quality unit	Indirect
Instructor performance	Quality unit	Indirect
Instructor support	Quality unit	Indirect
Course content	Quality unit	Indirect
Student satisfaction	Quality unit	Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Computer Science Departmental Council
Reference No.	14440203-0185-00002
Date	1st Sep, 2022