Course Specification
(Bachelor)

Course Title:	Simulation and Modelling
Course Code:	516CCS-3
Program:	Bachelor of Science in Computer Science
Department:	Department of Computer Science
College:	Computer Science and Information Systems
Institution:	Najran University
Version:	2.0
Last Revision Date:	August 2022

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (2, 2, 1) [Theory, Lab, Tutorial]					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 9/Year 5)					
4. Course General 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, understand the different approaches to system modelling, including system input-output equations, linear and non-linear system behaviour, computer-based system analysis, finite difference equations, Markov models, Monte Carlo methods and automata.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
1. Understand the general concepts: System, model, and simulation. 2. Identify and explain the types of mathematical models. 3. Apply standard tools to solve practical engineering problems					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand the general concepts: System, model, simulation.	K_1	Lectures Assignments	Homework Midterm exams Final Exam
1.2	Identify and explain the types of mathematical models.	K_1	Lectures Assignments	Homework Midterm exams Final Exam
1.3				
2.0	**Skills**			
2.1	Analyze of dynamic systems	S1, S3	Lectures Assignments	Homework Midterm exams Final Exam
2.2	Apply standard tools to solve practical computer science problems	S1, S4, S5	Lectures Assignments	Homework Midterm exams Final Exam
2.3				
2.4				
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.1				
3.2				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Simulation and Modeling	10
2.	Statistics and Probability for Simulation	10
3.	Topics in Descriptive Simulation Modeling	15
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	**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	3th and 6th week	10%
2.	Assignments or mini project (presentation)	2nd and 8th week	20%
3.	Mid Term Exam	9th week	20%
4.	Final Lab Exam	14th week	10%
5.	Final Exam	16th or 17th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1. A.M.Law Kelton, "Simulation Modeling and Analysis", 2006, ISBN-10: 0073294411

	2. Hung V. V. and Esfandiari R. S., Dynamic Systems Modelling and Analysis, McGraw-Hill, 1998 3. W.David Kelton, "Simulation with Arena", 2006 , ISBN-10: 0073259896
Supportive References	As mentioned above
Electronic Materials	Available all uploaded lecture slides on Blackboard.
Other Learning Materials	NA

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture Rooms with 20 seats with smart table, Mic, Speaker, PC, Auto Projector with Screen and a whiteboard or A smart board.
Technology equipment (projector, smart board, software)	• Desktop/ Laptop computer • Network printer • Internet facility for open labs to solve various case studies and for assignments
Other equipment (depending on the nature of the specialty)	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Collecting students' suggestions to facilitate more during the class.	Students	Verbal discussion
Student's questionnaire once during the semester about course learning outcomes.	Students	Indirect Survey
Achievement percentage of course learning outcomes, direct evaluation using CLO assessment sheet	Course Instructor	Direct evaluation using CLO achievement calculation
Teaching strategies	Quality unit	Indirect
Assessment methods	Quality unit	Indirect
Instructor performance	Quality unit	Indirect
Course content	Quality unit	Indirect

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Computer Science Departmental Council
REFERENCE NO.	14440203-0185-00002
DATE	1st Sep, 2022