



Course Specification

(Postgraduate)

Course Title: Simulation and Modeling

Course Code: 501831-3

Program: Master in Artificial Intelligence

Department: Computer Science

College: Computers and Information Technology

Institution: Taif University

Version: V2

Last Revision Date: 5 May 2024

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Computer Science Department

جامعة الطائف
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A. General information about the course:

1. Course Identification:

1. Credit hours: (3)

2. Course type

A. University College Department Track

B. Required Elective

3. Level/year at which this course is offered: (Year: 1, Level: 1)

4. Course general Description:

Modeling and simulation are dynamic fields that are utilized in engineering, science, health, science, business, education, and many other disciplines. Due to its dynamic nature, the modeling and simulation (M & S) field has tremendous potential for creating student interest in science, technology, engineering, and mathematics (STEM) disciplines. Content includes but is not limited to geospatial technologies (i.e. GPS, GIS, remote sensing), gaming, medical and scientific imaging, animation, engineering drawing, transportation, distribution, warehousing, and architectural drawing. In Modeling and Simulation, students will develop an understanding of the systems, processes, tools, and implications of this field. Individual and group activities are designed to help students understand, use, manage, and assess historical, current, and emerging developments.

5. Pre-requirements for this course (if any):

None.

6. Co-requirements for this course (if any):

None.

7. Course Main Objective(s):

The course gives an overview of methods for modelling and simulation of physical processes, for use in control applications. The course also introduces techniques for design, execution, and analysis of simulation models. Topics include discrete event simulation techniques, input and output analysis, random numbers, simulation tools and languages.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	36	80%
2	E-learning	9	20%
3	Hybrid <ul style="list-style-type: none"> ▪ Traditional classroom ▪ E-learning 	0	0%
4	Distance learning	0	0%



3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	-
3.	Field	-
4.	Tutorial	-
5.	Others (specify): Mid-Term and Final Exams	-
Total		45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Define Modeling and simulation terms.	K1	Lecture, Brainstorming, Discussion	Direct: Exam Indirect: Survey
2.0	Skills			
2.1	Analyze and distinguish the basic concepts and tools in the field.	S1	Lecture, Problem Solving	Direct: Exam, Project Indirect: Survey
2.2	Apply discrete event simulation techniques, input and output analysis, random numbers, simulation tools and languages.	S2	Lecture, Project, Problem Solving	Direct: Exam, Project Indirect: Survey
3.0	Values, autonomy, and responsibility			
3.1	Function effectively as a member or leader of a team engaged in activities appropriate to the field of simulation and modelling.	V2	Discussion, Problem Solving	Direct: Project, Presentation Indirect: Survey

C. Course Content:

No	List of Topics	Contact Hours
1.	Basic Concepts and Tools.	9
2.	Continuous simulation.	9
3.	Discrete and combined simulation	6





4.	Dynamical, Finite State, and Complex Model Simulations	6
5.	Probability and Statistics for Simulations and Analysis	9
6.	Simulations Results Analysis and Viewing Tools	6
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Lab and Practical	Weekly	15%
2.	Project. Simulation implementation	Week 3, 6, 9	10%
3.	Project. Report	Week 10	10%
4.	Student presentation	Week 12	5%
4.	Mid-Term Exam	Week 8	20%
5.	Final Exam	Week 16	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	<ul style="list-style-type: none"> Event System Simulation, Jerry Banks, John Carson, Barry L. Nelson, David Nicol, 2004 Spreadsheet modeling & decision analysis: a practical introduction to business analytics
Supportive References	<ul style="list-style-type: none"> -
Electronic Materials	<ul style="list-style-type: none"> The world's most trusted open ecosystem for sourcing, building, and deploying data science and AI initiatives: https://www.anaconda.com/
Other Learning Materials	<ul style="list-style-type: none"> Links provided by the instructor. Handouts and Presentations Slides prepared by the instructor. Blackboard.

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	<ul style="list-style-type: none"> Classroom (20 students/class) Computer labs
Technology equipment (Projector, smart board, software)	<ul style="list-style-type: none"> Video projector / data show White board
Other equipment (Depending on the nature of the specialty)	<ul style="list-style-type: none"> To be announced during the course!



F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students Coordinator	Indirect (Course exit survey) Indirect (Feedback from Course Coordinator)
Effectiveness of students assessment	Faculty member Coordinator	Indirect (Feedback from Faculty member) Indirect (Feedback from Course Coordinator)
Quality of learning resources	Students Faculty member Coordinator Council Curriculum Committees	Indirect (Course exit survey) Indirect (Feedback from Faculty member) Indirect (Feedback from Course Coordinator) Indirect (Feedback from council) Indirect (Feedback from Graduate Committees)
The extent to which CLOs have been achieved	Students Faculty member Coordinator Curriculum Committees	Indirect (Course exit survey) Indirect (Feedback from Faculty member/ Course Coordinator/ Graduate Committee)
Other	-	-

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	GRADUATE PROGRAMS COMMITTEE – CS DEPT.	
REFERENCE NO.	V2	
DATE	5/5/2024	

