



Course Specification

— (Postgraduate)

Course Title: Introduction to Robotics

Course Code: 503880-3

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.	<input type="checkbox"/> University	<input type="checkbox"/> College	<input checked="" type="checkbox"/> Department <input type="checkbox"/> Track
B.	<input checked="" type="checkbox"/> Required		<input type="checkbox"/> Elective
3. Level/year at which this course is offered: (Year: 1, Level: 1)			
4. Course general Description:			
The course introduces robotics to students by offering the following topics; homogeneous and coordinates transformations, locomotion and manipulation, Forward and inverse kinematics, path and trajectory planning, sensors and actuators, and robot programming and control.			
5. Pre-requirements for this course (if any):			
None.			
6. Co-requirements for this course (if any):			
None.			
7. Course Main Objective(s):			
The purpose of this course is to introduce students to basics of robotics and its modeling, design, planning, and control. Students will be able to understand the fundamentals of robotics and differentiate between different types of robots and its control and applications.			

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	Describe the fundamentals of robotics and its main components.	K1	Lecture, Brainstorming, Discussion	Direct: Quiz, Exam Indirect: Survey
2.0	Skills			
2.1	Analyze and recognize different types and applications of robot's sensors and actuators.	S1	Lecture, Problem Solving	Direct: Exam, Quiz, Assignment Indirect: Survey
2.2	Calculate Kinematics for different Robotic systems with different DOF.	S3	Lecture, Project, Problem Solving	Direct: Exam, Quiz, Assignment Indirect: Survey
2.3	Plan robot path and trajectory	S3	Lecture, Project, Problem Solving	Direct: Exam, Quiz, Assignment Indirect: Survey
2.4	Develop an algorithm to program a robot	S2	Lecture, Project, Problem Solving	Direct: Exam, Quiz, Assignment 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 robotics.	V2	Discussion, Problem Solving	Direct: Project, Presentation Indirect: Survey

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction: Definitions, history, classifications, and applications of robots. Robotics system components.	3





2.	Foundations: Homogeneous vector, plane and transformation. coordinate frames, position, and orientation transformations of rigid body. DOF	9
3.	Forward and Inverse Kinematics	6
4.	Locomotion and Manipulation	6
5.	Sensors and Actuators	6
6.	Path and Trajectory Planning	6
7.	Robot Programming and Control	6
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignment I: Transformations	3 rd week	5%
2.	Assignment II: Forward and Inverse Kinematics	6 th week	5%
3.	Mid-term exam	8 th week	25%
4.	Assignment III: Path and Trajectory Planning	11 th week	5%
5.	Term-project & presentation	14 th week	30%
6.	Final Exam	16 th Week	30%

*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"> ▪ Sciavicco L. and Siciliano B., Modeling and Control of Robot Manipulators. Second Edition (ISBN 1-85233-221-2), Springer Verlag, London, 2000. ▪ Nikolaus Correll, Introduction to Autonomous Robots, Magellan Scientific; 2nd edition, 2016.
Supportive References	▪ -
Electronic Materials	▪ -
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

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