Course Specifications

Course Title:	**Introduction to Robotics**
Course Code:	**AI 413**
Program:	**Information and Computer Sciences**
Department:	**CSI**
College:	**Science in AL Zulfi**
Institution:	**Majmaah University**

Table of Contents

A. Course Identification

1. Credit hours: 3
2. Course type **a.** University ☐ College ☐ Department ☐ Others ☑ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: 7th Level
4. Pre-requisites for this course (if any)**:** Artificial Intelligence – **AI 314**
5. Co-requisites for this course (if any)**:** NA

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	48	80 %
2	**Blended**	6	10 %
3	**E-learning**	6	10 %
4	**Correspondence**		
5	**Other**		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	30
2	**Laboratory/Studio**	20
3	**Tutorial**	10
4	**Others** (Presentations & group discussions)	
	Total	60
Other Learning Hours*		
1	**Study**	20
2	**Assignments**	15
3	**Library**	10
4	**Projects/Research Essays/Theses**	5
5	**Others** (seminars)	
	Total	50

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

This course covers all the material needed to understand the principles behind the AI approach to robotics and to program an artificially intelligent robot for applications involving sensing, navigation, planning, and uncertainty.

2. Course Main Objective

Having successfully completed this course, the student will be able to:

1. Acquire concepts of robotics in AI.
2. Use robots to solve problems.
3. Understand robot's control processes, sensors, and algorithms.
4. Utilize robots to implement and deploy new applications.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge:**	
1.1	List capabilities and limitations of today's state-of-the-art robot systems, including their sensors and the crucial sensor processing that informs those systems	a1
1.2	Integrate sensors, actuators, and software into a robot designed to undertake some task	b3
1.3	Implement fundamental motion planning algorithms within a robot configuration space.	a1, c1
1.4	Compare and contrast at least three strategies for robot navigation within known and/or unknown environments, including their strengths and shortcomings.	c1
2	**Skills :**	
2.1	Program a robot to accomplish simple tasks using deliberative, reactive, and/or hybrid control architectures	a1, c1
2.2	Group works and learning time management	b3
2.3		
2...		
3	**Competence:**	
3.1		
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Course information, Introduction to (AI) robotics	4
2	Robotic paradigms and control architectures	8
3	Path and motion planning	8
4	Grid and graph based methods	8
5	Robotic Information Garthering - exploration of unknown environment	8
6	Randomized sampling-based motion planning Methods	8
7	Multi-Goal Planning - robotic variants of the TSP	12
8	Game theory in robotics	4
Total		60

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**		
1.1	List capabilities and limitations of today's state-of-the-art robot systems, including their sensors and the crucial sensor processing that informs those systems	Lectures, Lab demonstrations Case studies Individual presentations	Written Exam Homework assignments Class & lab Activities Quizzes
2.0	**Skills**		
2.1	Program a robot to accomplish simple tasks using deliberative, reactive, and/or hybrid control architectures	Group discussions, Lab demonstrations, Brainstorming Presentations	Home works and assignments
3.0	**Competence**		
3.1			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First written mid-term exam	6	10%
2	Second written mid-term exam	12	10%
3	Presentation, class activities, and group discussion	Every week	10%
4	Homework assignments	After Every chapter	10%
5	Practical exam	15	20%
6	Final exam	16	40%
	Total		100%

***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 :

Office hours: Sun: 1-3, Mon. 12-1, Wed. 12-1
Office call: Sun. 12-1 and Wed 9-10
Email: y.qawqzeh@mu.edu.sa

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Introduction to AI Robotics. Robin R. Murphy (2019). MIT Press
Essential References Materials	Introduction to Autonomous Mobile Robots, 2ndEdition. Roland Siegwart, Illah R. Nourbakhsh, andDavide Scaramuzza (2011). ISBN: 9780262015356
Electronic Materials	
Other Learning Materials	Video and presentations that available with the instructor

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms and Laboratories are available at the college of science at Al-Zulfi.
Technology Resources (AV, data show, Smart Board, software, etc.)	Smart Boards, software, data shows and AV technological resources are available.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	N/A

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching	Students Classroom Observation Committee Professional Development Unit External Reviewers – accreditation committee	Formal Classroom Observation - Direct Student Surveys - Indirect
Effectiveness of Assessment	Curriculum and Test Development Unit Curriculum Committee Assessment Committee External Reviewers	Faculty Feedback - indirect Student Feedback – indirect Course Reports
Extent of Achievement of Course Learning Outcomes	Quality Assurance Unit Curriculum and Test Development Unit	Course Reports Annual Program Review

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	
Reference No.	
Date	