İzmir Institute of Technology

INSTITUTE OF ENGINEERING AND SCIENCE(M.S.)
MECHANICAL ENGINEERING

ME574	PRINCIPLES OF ROBOTICS I				
Semester	**Course Unit Code**	**Course Unit Title**	**L+P**	**Credit**	**Number of ECTS Credits**
1	ME574	PRINCIPLES OF ROBOTICS I	3	3	8

Mode of Delivery:
Face to Face
Language of Instruction:
English
Level of Course Unit:
Second Cycle
Work Placement(s):
No
Department / Program:
MECHANICAL ENGINEERING
Type of Course Unit:
Elective
Objectives of the Course:
The course objective is to introduce the students to the principles of robotics. In particular, the course will cover spatial kinematics, forward and inverse kinematics analyses of industrial robots.
Teaching Methods and Techniques:
- Spatial Kinematics - Kinematic Modeling Using the Denavit-Hartenberg Approach - Position, Velocity, and Acceleration Forward and Inverse Analyses - Singularity Analyses
Prerequisites and co-requisities:

Course Coordinator:

Name of Lecturers:
Asist Prof.Dr. MEHMET İSMET CAN DEDE
Assistants:

Recommended or Required Reading

Resources J. J. Craig, "Introduction to Robotics: Mechanics and Control," Prentice Hall, 3rd Edition, New Jersey, 2004.,A. J. Critchlow, "Introduction to Robotics," M

Weekly Detailed Course Contents

Week	Topics	Study Materials	Materials
1	Introduction to industrial robot concepts		J. J. Craig, "Introduction to Robotics: Me
2	Introduction to Spatial Kinematics		J. J. Craig, "Introduction to Robotics: Me
3	Vectors and vector transformations		J. J. Craig, "Introduction to Robotics: Me
4	Vector operationsExponential representation of rotation matrix		J. J. Craig, "Introduction to Robotics: Me
5	Representing vectors in different framesHomogeneous transformation matrix		J. J. Craig, "Introduction to Robotics: Me
6	Denavit-Hartenberg Convention		J. J. Craig, "Introduction to Robotics: Me
7	Midterm Exam #1		J. J. Craig, "Introduction to Robotics: Me
8	Position Level Forward kinematicsSimplifying forward kinematics expressions		J. J. Craig, "Introduction to Robotics: Me
9	Position Level Inverse kinematicsSemi-analytical method		J. J. Craig, "Introduction to Robotics: Me
10	Forward Velocity and Acceleration Analyses		J. J. Craig, "Introduction to Robotics: Me
11	Jacobian matrixAcceleration analysis via Jacobian matrixAnalytical inverse velocity solution		J. J. Craig, "Introduction to Robotics: Me
12	Singularity Analyses of Industrial Robots		J. J. Craig, "Introduction to Robotics: Me
13	Midterm Exam #2		J. J. Craig, "Introduction to Robotics: Me
14	Application of Kinematic Analyses to Industrial Robots		J. J. Craig, "Introduction to Robotics: Me
15	Final 1st week		J. J. Craig, "Introduction to Robotics: Me
16	Final 2nd week		J. J. Craig, "Introduction to Robotics: Me

Course Learning Outcomes

No	Learning Outcomes
C01	Ability to apply spatial kinematics solution to a multi degree of freedom serial kinematic chain
C02	Ability to develop forward kinematic model of an industrial robot
C03	Ability to find inverse kinematics solutions of industrial robots in position level by analytical and semi-analytical methods
C04	Ability to carry out forward and inverse analyses of industrial robots in velocity and acceleration levels
C05	Ability to conduct singularity analyses of industrial robots

Program Learning Outcomes

No	Learning Outcome
P05	To have advanced skills in scientific and technical writing and oral communication.
P06	To have the ability to present his/her study in national or international congresses, conferences and other scientific meetings.
P07	To have an appreciation of ethical values in scientific and technical studies.
P04	To have the ability to identify, model, formulate, and solve mechanical engineering problems in the field of research.
P01	To have advanced knowledge in the master thesis subject.
P02	To have the ability to carry out independent research and study.
P03	To have the ability to use the knowledge learned in the courses.

Assessment Methods and Criteria

In-Term Studies	Quantity	Percentage
Midterm exams	2	%50
Quizzes	5	%15
Homeworks	0	%0
Other activities	0	%0
Laboratory works	0	%0
Projects	0	%0
Final examination	1	%35
Total		**%100**

ECTS Allocated Based on Student Workload

Activities	Quantity	Duration	Total Work Load
Weekly Course Time	1	36	36
Outside Activities About Course (Attendance, Presentation, Midterm exam,Final exam, Quiz etc.)	1	112	112
Application (Homework, Reading, Self Study etc.)	0	0	0
Laboratory	0	0	0
Exams and Exam Preparations	1	36	36
Total Work Load			**184**
ECTS Credit of the Course			**8**

Contribution of Learning Outcomes to Programme Outcomes

Contribution: 0: Null 1:Slight 2:Moderate 3:Significant 4:Very Significant

	P01	P02	P03	P04
C01	4	3	3	
C02	4	3		3
C03	4	3		3
C04	4	3		3
C05	4	3		3