ABDULLAH GÜL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING & SCIENCE
ELECTRICAL AND COMPUTER ENGINEERING PROGRAM
COURSE DESCRIPTION AND SYLLABUS

Course Title	Code	Semester	T+L Hours	Credit	ECTS
INTRODUCTION TO ROBOTICS	ECE-513	FALL-SPRING	3 + 0	3	10

Prerequisite Courses	none

Type	Elective
Language	English
Coordinator	Assist. Prof. Dr. Günyaz Ablay
Instructor	Assist. Prof. Dr. Günyaz Ablay
Adjunct	none
Aim	Learning, understanding and applying robotics elements, analysis and design tools that are needed in robotics studies.
Learning Outcomes	Students who successfully complete this course will be able to • Understand the importance of robotics systems in control engineering area. • Understand basic rigid body motions, homogenous transformations • Develop forward and inverse kinematic models for a given manipulator. • Develop differential kinematics and Jacobean operator for robot analysis & design problems • Develop dynamics models of robot manipulators • Develop motion planning and control techniques for robot manipulators. • Understand modeling and control of mobile robots. • Understand sensor and actuator technologies for robotic systems. • Use software tools to analyze and design robotics systems.
Course Content	• Introduction to Robotics • Rigid Motions • Homogeneous Transformations • Robot Forward Kinematics • Robot Inverse Kinematics • Differential Kinematics and Jacobians • Motion Planning • Trajectory Generation • Robot Dynamics • Mobile Robots • Independent Join Control • Robot Sensors and Actuators

WEEKLY TOPICS AND PRELIMINARY STUDY

Week	Topic	Preliminary Study
1	Introduction to Robotics	The relevant lecture notes
2	Rigid Motions	The relevant lecture notes
3	Homogeneous Transformations	The relevant lecture notes
4	Robot Forward Kinematics	The relevant lecture notes
5	Robot Inverse Kinematics	The relevant lecture notes
6	Differential Kinematics and Jacobians 1	The relevant lecture notes
7	Motion Planning and path generation	The relevant lecture notes
8	Midterm	
9	Robot Dynamics 1	The relevant lecture notes
10	Robot Dynamics 2	The relevant lecture notes
11	Independent Join Control	The relevant lecture notes
12	Robot Sensors and Actuators	The relevant lecture notes
13	Mobile Robots	The relevant lecture notes
14	Final Exam	

SOURCES	
Lecture Notes	Lecture notes and slides
Other Sources	**Course Textbook:** M. Spong, S. Hutchinson, and M. Vidyasagar,"Robot Modeling and Control", Wiley, 2006 **Additional Materials:** 1. Robotics: Modeling, Planning and Control, B. Siciliano, L. Sciavicco, L. Villani, G. Oriolo, Springer, 2010. 2. J. J. Craig, Introduction To Robotics: Mechanics And Control (3rd Edition), Prentrice Hall, 2005.

COURSE MATERIALS SHARING	
Documents	Lecture notes, slides and papers
Homework	Students will be given one homework each week
Exams	1 Midterm and 1 Final Exam

EVALUATION SYSTEM		
SEMESTER STUDY	**NUMBER**	**CONTRIBUTION**
Midterm	1	20
Homework	14	25
Quiz	14	25
SUB-TOTAL		70
Contribution of Semester Study		70
Contribution of Final Exam	1	30
TOTAL		100

Course Category	
Sciences and Mathematics	30%
Engineering	70%
Social Sciences	0%

RELATIONSHIPS BETWEEN LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS							
No	Program Qualifications	Contribution Level				
		1	2	3	4	5
1	The skills of using mathematics, science and engineering information in advanced research,					**X**
2	The skills of analyzing, designing and/or implementing an original system that will be able to solve an engineering problem,					**X**
3	The skills of using the required software, hardware and modern measurement equipment in their field of research,					**X**
4	The skills of planning independent research and implementing in detail,					**X**
5	The skills of following literature, listening to and making technical presentation, writing a paper in academic level,				**X**	
6	The skills of innovative and interrogative thinking and finding original solutions					**X**

*Increasing from 1 to 5.

ECTS / WORK LOAD TABLE			
Activities	Number	Duration (Hours)	Total Work Load
Course Length (includes exam weeks: 16x total course hours)	14	3	42
Out-of-class Study Time (Pre-study, practice)	14	4	56
Internet search, library work, literature search	14	5	70
Presentation	1	5	5
Homework	14	5	70
Midterm	1	27	27

Final Exam	1	30	30
Total Work Load			300
Total Work Load / 30			300/30
Course ECTS Credit			10