COURSE INFORMATON					
Course Title	*Code*	*Semester*	*C +P + L Hour*	*Credits*	*ECTS*
Advanced Robotic Systems	EE 584	Fall/Spring	3+0+0	3	10

Prerequisites	-------

Language of Instruction	English
Course Level	Master's
Course Type	Elective
Course Coordinator	Prof. Dr. Duygun Erol Barkana
Instructors	Prof. Dr. Duygun Erol Barkana
Assistants	------
Goals	The course provides students with robotic basic definitions, the basic analysis of robot arms kinematics and dynamics and robot control
Content	Introduction, classification of robots, robot arms kinematic,Jacobian, robot arms dynamic, computation of kinematics and dynamics using Mathematica, trajectory planning, robot sensors, robot control, simulation of robot control in MATLAB

Learning Outcomes	**Program Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Ability to recognize, repeat and recall the mathematical foundations related to robotic systems,	1	1	A,B,E
2) Ability to model the robotic systems (kinematics, dynamics),	2,11	1,2,3	A,E
3) Ability to simulate robotic systems using software programs (MATLAB, Mathematica),	1,4,6	1,3	A,B,E
4) Ability to define the controller for robotic systems and evaluate the responses of these systems in time domain,	1,2,4,6,11	1,3	A,B,E
5) Ability to define the electronic connections that satisfies the communication of robots with the environment.	1,4	1	A

Teaching Methods:	1: Lecture, 2: Problem Solving, 3: Simulation, 4: Seminar, 5: Laboratory, 6: Term Research Paper

Assessment Methods:	A: Exam, B: Quiz, C: Experiment, D: Homework, E: Project

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Introduction and Basic Definitions	Course Textbook
2	Classification of Robots	Course Textbook
3	Robot Coordinate Frames and Transformations, Quiz 1	Course Textbook
4	Robot Kinematics, Quiz 2	Course Textbook
5	Midterm I	Course Textbook
6	Jacobian	Course Textbook
7	Robot Dynamics	Course Textbook
8	Applications of Robot Dynamics	Course Textbook
9	Computation of Kinematics and Dynamics Using Mathematica Program	Mathematica Help (Web)
10	Trajectory Planning in Robots, Quiz 4	Course Textbook
11	Robot Sensors	Course Textbook
12	Robot Control	Course Textbook
13	Simulation of Robot Control in MATLAB	MATLAB Help (Web)
14	Final Project	Course Textbook

RECOMMENDED SOURCES	
Textbook	Introduction to Robotics Mechanics and Control, John Craig, 3rd Edition, Prentice Hall
Additional Resources	Introduction to Robotics, Analysis, Systems and Applications, Saeed B. Niku, Prentice Hall, 2001

MATERIAL SHARING	
Documents	Publications related to the robotic and control systems, notes on the web.
Exams	Midterm exam questions and answers

Quiz	Quiz questions and answers

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Midterms	1	50
Quiz	4	50
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE (Project)	1	40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE	5	60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution					
		1	2	3	4	5	
1	Can reach information in breadth and depth, and can evaluate, interpret and apply this information to scientific research in the area of Electrical and Electronics Engineering.					x	
2	Can complete and apply information with scientific methods using limited or missing data; can integrate information from different disciplines.				x		
3	Sets up Electrical and Electronics Engineering problems, develops and implements innovative methods for their solutions.						
4	Develops new and/or original ideas and methods; finds innovative solutions to the system, component, or process design.			x			
5	Has comprehensive knowledge about the state-of-the-art techniques and methods in Electrical and Electronics Engineering and their limitations.						
6	Can design and conduct research of analytical, modeling or experimental orientation; can solve and interpret complex cases that come up during this process.				x		
7	Can communicate verbally and in writing in one foreign language (English) at the General Level B2 of the European Language Portfolio.						
8	Can assume leadership in multi-disciplinary teams; can develop solutions in complex situations, and take responsibility.						
9	Can systematically and openly communicate in national and international venues the proceedings and conclusions of the work he/she performs in Electrical and Electronics Engineering.						

10	Respects social, scientific and ethical values in all professional activities performed during the collection, interpretation and announcement phases of data.					
11	Is aware of new and emerging applications in Electrical and Electronics Engineering; investigates and learns them, whenever necessary.				x	
12	Can identify the social and environmental aspects of Electrical and Electronics Engineering applications.					

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	11	154
Mid-term	1	5	5
Quiz	4	4	16
Final Project	1	25	25
Total Work Load			242
Total Work Load / 25 (h)			9.68
ECTS Credit of the Course			10