<table>
<tr><th colspan="2">COURSE DESCRIPTION FORM</th></tr>
<tr><td>Course Code and Name</td><td>CENG351 ROBOTICS (TECH.ELECT.)</td></tr>
<tr><td>Course Semester</td><td>5</td></tr>
<tr><td>Catalogue Data of the Course (Course Content)</td><td>Basic concepts of robotics, coordinate systems, kinematic and inverse kinematic of robots.</td></tr>
<tr><td>Course Textbooks</td><td>Kevin M. Lynch (Author), Frank C. Park (Author), Modern Robotics: Mechanics, Planning, and Control, 1st Edition, , Cambridge University Press, 2017</td></tr>
<tr><td>Supplementary Textbooks</td><td>Carl D. Crane III (Author), Joseph Duffy (Author), Kinematic Analysis of Robot Manipulators 1st Edition, Cambridge University Press, 2008</td></tr>
<tr><td>Credit (ECTS)</td><td>6</td></tr>
<tr><td>Prerequisites for the Course (Attendance Requirements)</td><td>-</td></tr>
<tr><td>Course Type</td><td>Elective</td></tr>
<tr><td>Language of Instruction</td><td>English</td></tr>
<tr><td>Course Objectives</td><td>Recognition of robot types, obtaining kinematic and dynamic relationships. Examination of linear control and nonlinear control methods.</td></tr>
<tr><td>Course Learning Outcomes</td><td>1. Explains the basics of robotics.
2. Defines kinematic and inverse kinematic in robotics.
3. Applies trajectory planning algorithms.
4. Defines vision in robotics.
5. Applies robot control algorithms in real world problems.</td></tr>
<tr><td>Instruction Method
(Face-to-face, Distance education etc.)</td><td>Face-to-face</td></tr>
<tr><td>Weekly Schedule of the Course</td><td>Week 1: Introduction to robotics and basic concepts
Week 2: Metric properties of rigid objects, coordinate systems
Week 3: Rotations and translations
Week 4: Kinematics
Week 5: Inverse kinematics
Week 6: Gradients, tangent vectors, jacobians
Week 7: Velocity kinematics
Week 8: Path and trajectory planning
Week 9: Motion planning
Week 10: Robot control
Week 11: Mobile robots
Week 12: Dynamics and sensors
Week 13: Vision in robotics
Week 14: Robotic applications</td></tr>
<tr><td>Teaching Activities
(The time spent for the activities listed here will determine the amount of credit required)</td><td>Weekly theoretical course hours: 3
Reading activities
Internet search and library work
Making a report
Preparing and making presentations
Midterm and revision for midterm
Final exam and revision for final exam</td></tr>
<tr><td>Assessment Criteria</td><td>
<table>
<tr><th></th><th>Number(s)</th><th>Weight (%)</th></tr>
<tr><td>Midterm exam</td><td>1</td><td>30</td></tr>
<tr><td>Assignment</td><td></td><td></td></tr>
<tr><td>Application</td><td></td><td></td></tr>
<tr><td>Project</td><td>1</td><td>30</td></tr>
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	Practice		
	Quiz		
	Final exam	1	40
	Total	3	100

Workload of the Course

Activity	Number of Weeks	Duration (Weekly Hour)	End of Semester Total Workload
Weekly theoretical course hours	14	3	42
Weekly practical course hours			
Reading activities	14	2	28
Internet search and library work	14	2	28
Designing and implementing materials			
Making a report	1	10	10
Preparing and making presentations	1	10	10
Midterm and revision for midterm	1	20	20
Final exam and revision for final exam	1	20	20
Total workload			150
Total workload/ 25			6
Course Credit (ECTS)			6

Contribution Level between Course Outcomes and Program Outcomes

No	Program Outcomes	1	2	3	4	5
1	Knowledge of mathematics, science, basic engineering, computing, and computer engineering; ability to use this knowledge in solving complex engineering problems.				X	
2	Ability to define, formulate and analyze complex engineering problems using basic science, mathematics and engineering knowledge and considering the UN Sustainable Development Goals relevant to the problems addressed.					X
3	Ability to design creative solutions to complex engineering problems; ability to design complex systems, processes, devices, software, algorithms or products to meet current and future requirements, considering realistic constraints and conditions.			X		
4	Ability to select, use and develop appropriate techniques, resources and modern engineering and informatics tools, including estimation and modeling, for the analysis and solution of complex engineering problems while being aware of their limitations.				X	
5	Ability to use research methods to examine complex engineering problems or research topics in computer engineering, including reviewing the literature, designing experiments, conducting experiments, collecting data, analyzing and interpreting results.				X	
6	Knowledge of the effects of engineering practices and the standards used in these practices on society, health and safety, economy, sustainability and environment within the scope of the UN Sustainable Development Goals; awareness of the consequences of engineering solutions in the fields of information security and law.		X			

	7	Acting in accordance with engineering professional principles and knowledge on ethical responsibility; awareness of acting impartially, without discrimination on any issue, and being inclusive of diversity.		X			
	8	Ability to work effectively individually and as a team member or leader in intradisciplinary and multidisciplinary teams (face-to-face, remote, or hybrid).				X	
	9	Ability to conduct effective verbal and written communication on technical issues in Turkish or English, prepare reports, make effective presentations and prepare software documentation, considering the various differences of the target audience (such as education, language, profession).				X	
	10	Knowledge of business practices such as project, risk and change management and economic feasibility analysis; awareness of entrepreneurship and innovation.		X			
	11	Lifelong learning skill that includes the ability to learn independently and continuously, to adapt to new and developing scientific practices and technologies, and to think inquisitively about technological changes.		X			
Lecturer(s) and Contact Information	Lecturer's First/Last Name: Asst. Prof. Dr. Tuba ÇAĞLIKANTAR E-mail address: tubac@gazi.edu.tr						