

DEPARTMENT OF MECHATRONICS ENGINEERING

Course Details						
Code			Academic Year			Semester
MEC427			3			SoSe
Title			T	A	L	ECTS
Smart Systems Project I			1	-	4	6
Language	German					
Level	Undergraduate	✓	Graduate		Postgraduate	
Department / Program	Mechatronics Engineering					
Forms of Teaching and Learning	Formal, group work, selfstudy					
Course Type	Compulsory		Elective	✓		
Objectives	<p>In the automation of the value added process of the "Intelligent Systems" Project, the "Machine Learning" deals with application possibilities. Purpose group according to the principle "Software as a Service" a server-based, intelligent state recognition of electrical facilities and equipment in its operation and to design and realize its control. Sensor for students, production, assembly and transportation in addition to controlled value-added processes, the sensor system in group work signal processing, pattern recognition and control basics.</p> <p>It is also important that the obtained information is sufficiently included in the group performance. In addition the meaning of the content and organizational interfaces in the working framework of the overall theme of the project should be detailed.</p> <p>Students obtain the following information:</p> <ul style="list-style-type: none"><li>- Machine Learning applications in Automation</li><li>- Programming PLC, Arduino, Raspberry PI</li><li>- Signal analysis, image and pattern processing fundamentals</li><li>- Adhere to solution-oriented thinking and group work</li></ul> <p>◆ Professional competence: %20      ◆ Methodological competence: %20</p> <p>◆ System competence: %30      ◆ Social competence: %30</p>					
Content	<p>Lecture:</p> <ul style="list-style-type: none"><li>- Project planning from the offer phase to the complete commissioning of the</li><li>- Control in a complex industrial automation system</li><li>- Application of engineering methods to a specific system of Automation technology</li><li>- Sensors, controls, measurement data acquisition and analysis in the field of</li><li>- Industrial robotics, production facilities and equipments</li><li>- Basics of GUI and human-machine interfaces</li></ul> <p>Laboratory:</p> <ul style="list-style-type: none"><li>- Selection and integration of sensors</li><li>- Interface programming / adaptation and system integration</li><li>- Signal analysis, image and pattern recognition with Python, C / C ++</li><li>- MATLAB Applications</li><li>- PLC, Arduino and Raspberry PI programming</li><li>- Design and programming of human-machine interfaces</li></ul>					

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Prerequisites	-	
Coordinator	Doç. Dr. Tuba Çonka YILDIZ, Dr.-Ing Soner Emeç, Dr. Öğr. Üyesi Abdülkadir Şanlı, Dr. Öğr. Üyesi Ali Can Kaya, Doç. Dr. Haydar Uncu	
Lecturer(s)	Doç. Dr. Tuba Çonka YILDIZ, Dr.-Ing Soner Emeç, Dr. Öğr. Üyesi Abdülkadir Şanlı, Dr. Öğr. Üyesi Ali Can Kaya, Doç. Dr. Haydar Uncu	
Assistant(s)	MSc. Fatih Çögen, MSc. Mustafa Hakan Sandık, MSc. Ali Korucu, MSc. Onur Akgün, MSc. Osman Taha Kütük, BSc. Oğuzhan Memişoğlu, BSc. Ebru Subutay	
Work Placement	-	
Recommended or Required Reading		
Books / Lecture Notes	<ul style="list-style-type: none"><li>- Trächtler Ansgar, Gausemeier Jürgen, Semantische Technologien im Entwurf mechatronischer Systeme: Effektiver Austausch von Lösungswissen in Branchenwertschöpfungsketten</li><li>- Czichos Horst, Grundlagen und Anwendungen technischer Systeme</li><li>- Trächtler Ansgar, Gausemeier Jürgen, Intelligente Technische Systeme – Lösungen aus dem Spitzencluster Intelligente Technische Systeme OWL</li></ul>	
Other Sources	<ul style="list-style-type: none"><li>- Exercises are available in electronic form</li></ul>	
Additional Course Material		
Documents		
Assignments		
Exams		
Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design	40	%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge	60	%
Assessment		
Activity	Count	Percentage (%)
Midterm Exam		
Quiz		
Assignments	1	20
Attendance		
Recitations		
Projects	1	20
Final Exam	1	60

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Total			100
ECTS Points and Work Load			
Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	14	4	56
Assignments	4	4	16
Presentation / Seminar Preparation	4	2	8
Midterm Exam			
Recitations			
Laboratory			
Projects	1	50	50
Final Exam	1	10	10
Total Workload			168
ECTS Points (Total Workload / Hour)			6
Learning Outcomes			
1	Design of industrial automation system		
2	System design, optimization, integration, verification and risk analysis		
3	Image and pattern recognition with Python and C / C ++		
4	PLC, Arduino and Raspberry PI programming		
5	Consolidation of practical knowledge of control engineering		
6	Basics of industrial production systems and equipment		
7	PCB Design		
8	3D Printer Design		
9	MATLAB Applications		
10	Robotic Operating System (Robot Operating System, ROS)		
Weekly Content			
1	Determination of Subject of Project		
2	Technical Research		
3	Research Materials / Components		
4	Research Techniques		
5	Research Techniques		
6	Application		
7	Application		

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8	Application
9	Prototypes
10	Prototypes
11	Changes / Challenges
12	Presentation of Results
13	Presentation of Results
14	Presentation of Results

**Contribution of Learning Outcomes to Program Objectives (1-5)**

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
1	5	4	4	3	5	3	3	4	5	4	4
2	5	4	4	3	5	3	3	4	5	4	4
3	5	4	4	3	5	3	3	4	5	4	4
4	4	5	4	5	5	3	4	4	5	5	5
5	5	4	4	3	5	3	3	4	5	4	4
6	5	4	4	3	5	3	3	4	5	4	4
7	4	5	4	5	5	3	4	4	5	5	5
8	5	4	4	3	5	3	3	4	5	4	4
9	5	4	4	3	5	3	3	4	5	4	4
10	4	5	4	5	5	3	4	4	5	5	5

**Contribution Level** 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

<https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=196>

**Compiled by:** R. A. Oğuzhan Memişoğlu

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