TÜRK-ALMAN ÜNİVERSİTESİ
TÜRKISCH-DEUTSCHE UNIVERSITÄT

DEPARTMENT OF MECHATRONIC ENGINEERING
COURSE SYLLABUS

Course Details			
Code		**Academic Year**	**Semester**
MEC423		3	Spring
Title	**T**	**A** **L**	**ECTS**
Robotics Project I	1	_ 4	6

Language	German					
Level	**Undergraduate**	✓	**Graduate**		**Postgraduate**	
Department / Program	Mechatronic Engineering					
Forms of Teaching and Learning	Face-to-face lecture, group work, personal study.					
Course Type	**Compulsory**	✓	**Elective**			

Objectives	The "Production Automation" project deals with the possible uses of sensor-based control of industrial robots, production systems and equipment. The aim is to design and implement a system for status recognition and object tracking in group work. Here, the students will work in groups on an experimental robot controlled by a camera, a production plant or equipment to work out the basics of connecting camera systems, image processing, object recognition and control. It is also important that the knowledge acquired is competently incorporated into the group performance. In addition, the importance of content-related and organizational interfaces within the framework of the work on the overall topic of the project should be deepened. The students acquire knowledge of: - Use cases of industrial automation technology - Programming of PLC, Arduino, Raspberry PI - Basics of signal analysis, image and pattern recognition - Solution-oriented thinking and acting in group work Field Education: 20% Method Education: 20% Integrated system training: 30% Social Skills Training: 30%

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Content	Lecture:
	- Project planning from the offer phase to the complete commissioning of the control in a complex industrial automation system
	- Application of engineering methods to a specific system of automation technology
	- Sensor technology, controls, measurement data acquisition and analysis in the field of industrial robotics, production systems and equipment
	- Basics of GUI and human-machine interfaces laboratory:
	- Selection and integration of sensors
	- Interface programming / adaptation and system integration
	- Signal analysis, image and pattern recognition with Python, C / C ++
	- PLC, Arduino and Raspberry PI programming
	-Design and programming of human-machine interfaces
	-MATLAB applications
Prerequisites	-
Coordinator	Doç. Dr. Tuba Çonka YILDIZ, Dr.-Ing Soner Emeç, Dr. Öğr. Üyesi Ali Can Kaya, Prof. Anatoli Makarov, Dr. Öğr. Üyesi Abdulkadir Şanlı
Lecturer(s)	Doç. Dr. Tuba Çonka YILDIZ, Dr.-Ing Soner Emeç, Dr. Öğr. Üyesi Ali Can Kaya, Prof. Anatoli Makarov, Dr. Öğr. Üyesi Abdulkadir Şanlı
Assistant(s)	MSc. Fatih ÇÖGEN, MSc. Mustafa Hakan SANDIK, MSc. Ali KORUCU, MSc. Merve Teke Budaklı, MSc. Onur Akgün, BSc. Oğuzhan Memişoğlu, BSc. Bilge Kağan Dönmez
Work Placement	None

Recommended or Required Reading	
Books / Lecture Notes	- Physik: Lehr- und Übungsbuch, Douglas C. Giancoli, 2019 - Halliday Physik, David Halliday, Robert Resnick, Jearl Walker, 2017
Other Sources	"Basics of automation" sensors, regulation, control Author: Berthold Heinrich, Petra Linke, Michael Glöckler - "Mechatronics" basics and applications of technical systems Author: Horst Czichos - "PLC programming in instruction list according to IEC 61131-3" A systematic and action-oriented introduction to structured programming Author: Hans-Joachim Adam, Mathias Adam - Paul Alpar, Heinz Lothar Grob, Peter Weimann, Robert Winter: application-oriented business informatics. Strategic planning, development and use of information and communication systems. 5th revised and updated edition. Vieweg + Teubner, Wiesbaden 2008,

Additional Course Material	
Documents	„Leitfaden zum Projektmanagement" ISO 21500 „Entwicklungsmethodik für mechatronische Systeme" nach VDI 2206:2004-06

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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	0	0
Quiz	0	0
Assignments	1	20
Attendance	0	0
Recitations	0	0
Projects	1	20
Final Exam	1	60
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			

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Projects	1	50	50
Final Exam	1	10	10
		Total Work Load	**168**
		ECTS Points (Total Work Load / 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 printing
9	MATLAB applications
10	Robot Operating System (ROS) applications
11	
12	

Weekly Content	
1	Determination of project subjects
2	Technical research
3	Research materials
4	Research methods
5	Research methods
6	Application
7	Application
8	Application
9	Building prototypes
10	Building prototypes
11	Modifications
12	Presentations
13	Presentations

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14	Presentations
15	

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

	P1	P2	P3	P4	P5	P6	P7
1	5	5	5				
2	5	5	5				
3	5	5	5				
4							
5							
6							
7							
8							
9							
10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
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Date of Compilation:	22.10.2021