DEPARTMENT OF MECHATRONIC ENGINEERING
COURSE SYLLABUS

Course Details				
Code		**Academic Year**		**Semester**
MEC421		4		Winter
Title		**T**	**A**	**L**	**ECTS**
Industrielle Robotik II		2	1	2	6

Language	German					
Level	**Undergraduate**	✓	**Graduate**		**Postgraduate**	
Department / Program	Mechatronics Engineering					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**		**Elective**	✓		
Objectives	After successfully completing the course, the students have extensive knowledge in the field of industrial robotics. Knowledge in detail: • Basics and technical terms • Differentiation between kinematics and their properties • Components and structure of robot cells • Control and regulation of industrial robots • Robotics safety technology • Modern trends in industrial robotics The students have skills in: • Use of industrial robotics in factory operations • Choice of a robot model according to the application • Conception of robot cells and robot workplaces • Execution of simulations and simulation-based path planning • Online and offline programming of industrial robots. Through intensive group exercises, the students have the following skills: • Basic ability to select, assess and design robots and their workplaces • Safe ability to program (teach-in) modern industrial robots online • Assessment ability of robot-assisted automation solutions					
Content	The "Industrial Robotics" event offers a comprehensive theoretical and practical insight into industrial robotics. • Basics • Kinematics and Transformations • Industrial applications of robotics • Control, regulation • Accuracies and other parameters • Path planning • Programming methods • Simulation of robot cells • Visual servoing • Security • Robot-human interaction					
Prerequisites	• "Mathematics I: Analysis and Linear Algebra I" • "Computer Science I: Introduction to Information Technology and Programming"					
Coordinator	-					

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Lecturer(s)	Prof. Dr.-Ing. Jens Lambrecht, Dr.-Ing. Soner Emec Assoc. Prof. Tuba Çonka Yıldız
Assistant(s)	M.Sc. Ali Ömer Baykar, M.Sc. Onur Akgün
Work Placement	-
Recommended or Required Reading	
Books / Lecture Notes	• Siciliano, Khatib: Handbook of Robotics, Springer, 2008 • Hesse: Industrieroboterpraxis, Springer, 2008 Gevatter, • Grünhaupt: Handbuch der Mess- und Automatisierungstechnik in der Produktion, 2006
Other Sources	• G. Stark; Robotik mit Matlab • W. Weber; Industrieroboter: Methoden der Steuerung und Regelung. • M. Husty, A. Karger H. Sachs; Kinematik und Robotik: Maschinenbau Forschung und Entwicklung • H.-J. Gevatter, U. Grünhaupt; Handbuch der Mess- und Automatisierungstechnik in der Produktion • King, Systemtechnische Grunglagen der Mess- und Regelungstechnik
Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		50 %
Engineering		40 %
Engineering Design		10 %
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	20
Quiz		
Assignments	5	10
Attendance		
Recitations		
Projects	1	20
Final Exam	1	50
	Total	**100**

ECTS Points and Work Load

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Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study			
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1		10
Recitations	14	1	14
Laboratory	14	1	14
Projects			
Final Exam	1		10
		Total Work Load	**70**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes	
1	Independent familiarization with robot technology and programming.
2	Understanding of robot concepts, models and their applications as well as safety aspects, especially in human-machine interaction.

Weekly Content	
1	Introduction to robot components and planning
2	Industrial applications
3	Kinematic basic types and designs
4	Accuracies and position measuring systems
5	Robot selection parameters and cell layout

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6	Periphery and automation pyramid
7	Drives
8	Effector systems, sensor technology, peripherals
9	Kinematics and Dynamics I (coordinate transformation)
10	Kinematics and Dynamics II (modeling of kinematic chains)
11	Kinematics and Dynamics III (dynamic robot modeling)
12	Control and regulation
13	Programming and path planning
14	Visual servoing and human-machine cooperation
15	Current research projects

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

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
1	5	5	5	5	5	3	4	4	5	4	5	
2	5	5	5	5	5	3	4	4	5	4	5	
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

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:	M.Sc. Onur Akgün
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