TÜRK-ALMAN ÜNİVERSİTESİ
TÜRKISCH-DEUTSCHE UNIVERSITÄT

DEPARTMENT OF MECHATRONICS ENGINEERING
COURSE SYLLABUS

Course Details				
Code		**Academic Year**		**Semester**
MEC347		3		5
Title		**T**	**A**	**L**	**ECTS**
Smart Materials Project 1		1	0	5	6

Language	German					
Level	**Undergraduate**	✓	**Graduate**		**Postgraduate**	
Department / Program	Mechatronics Engineering					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**		**Elective**	✓		
Objectives	Smart materials can notice environmental alterations and react against them with a prespecified response. They can change shape or behavior under water, pressure, heat, and light. Examples include 4D-printed shape-memory polymer grippers and polymers that can recover their shape at a high temperature. In 4D printing, the new dimension is time, and the 3D prints change behavior with time. 4D technology uses programmable and advanced materials. Therefore, students should learn novel technologies equipped with advanced materials. The objectives of this lecture can be given as follows: 1. Investigate the Properties of Smart Materials 2. Design and Synthesize Smart Materials 3. Enhance the Performance of Smart Materials 4. Test the Materials in Real-World Applications					
Content	In this module, students can learn about smart materials and their production and applications in intelligent systems. The workload of this Project lecture is divided into three semesters as follows: Semester 1: Learning the basics of smart materials and planning the Project Semester 2: Synthesize the smart materials via 4D printing Semester 3: Characterization of the smart materials properties					
Prerequisites	MEC207 Material Technology 1					
Coordinator	Asst. Prof. Dr. Ali Can KAYA					
Lecturer(s)	Asst. Prof. Dr. Ali Can KAYA					
Assistant(s)	M.Sc. Mustafa Hakan Sandık					
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	• Suong V. Hoa, 4D Printing of Composites, de Gruyter, 2024
Other Sources	• Lecture Slides

Additional Course Material	

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Documents	
Assignments	1
Exams	1 Midterm exam, 1 final exam

Course Composition		
Mathematics und Basic Sciences	10	%
Engineering	50	%
Engineering Design	10	%
Social Sciences		%
Educational Sciences		%
Natural Sciences	30	%
Health Sciences		%
Expert Knowledge		%

Assessment		
Activity	Count	Percentage (%)
Midterm Exam	1	30
Quiz		
Assignments		
Attendance		
Recitations		
Projects	1	30
Final Exam	1	40
Total		100

ECTS Points and Work Load			
Activity	Count	Duration	Work Load (Hours)
Lectures	14	6	84
Self-Study			
Assignments			
Presentation / Seminar Preparation	2	12	24
Midterm Exam			
Recitations			
Laboratory			
Projects	1	100	100
Final Exam			
Total Work Load			208
ECTS Points (Total Work Load / Hour)			6

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Learning Outcomes	
1	The students know the smart materials.
2	They know the production method of smart materials
3	They can characterize the smart materials
4	They can apply smart materials to intelligent systems.
5	The entirety of management tasks, organization, techniques, and resources for initiating, defining, planning, controlling, and completing projects.
6	
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12	

Weekly Content	
1	Introduction to smart materials and 4D printing
2	Basics of project management and group division
3	Creation of project plan with work packages and milestones
4	Creation of stimuli and functions helps for the intelligent materials project
5	Project documentation, presentation of the project content through presentations, posters and short videos
6	1. Intermediate presentation of the results: construction model and solution sketches
7	Specification of materials, additives, production planning
8	Prototype implementation. 4D printing of the materials
9	2. Intermediate presentation of the results: Prework on 4d printed materials
10	Characterization of the smart materials
11	Applicaitons of the smart materials in intelligent systems
12	3. Intermediate presentation of the results: characterization results
13	Discussion of the results
14	Methods of project validation and evaluation of intelligent materials
15	Final presentation of the projects: prototypical demonstration of the project results

Contribution of Learning Outcomes to Program Objectives (1-5)							
	P1	P2	P3	P4	P5	P6	P7
1	5	5	5	5	4		

DEPARTMENT OF MECHATRONICS ENGINEERING
COURSE SYLLABUS

2	5	5	5	5	4		
3	5	5	5	5	4		
4	5	5	5	5	4		
5	5	5	5	5	4		
6							
7							
8							
9							
10							
11							
12							

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

Compiled by:	Ali Can Kaya
Date of Compilation:	24.11.2024