DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT310	3			6
Title	**T**	**A**	**L**	**ECTS**
Renewable Energy – Material, Structure, Function	3	1	0	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technology					
Forms of Teaching and Learning	Face-to-face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	This course aims to introduce students to the structural, functional, and performance-related properties of materials used in renewable energy systems. The course will equip students with basic engineering knowledge required for the design, selection, and evaluation of materials in these systems.					
Content	The course will cover the fundamental materials used in photovoltaic cells, solar collectors, wind turbines, biomass systems, and energy storage technologies. Students will study the structural and functional properties of these materials and evaluate how material performance affects energy efficiency and system lifetime. Key topics also include sustainability, recyclability, and lifecycle performance of materials.					
Prerequisites	-					
Coordinator	Asst. Prof. Dr. Gülsüm GÜNDOĞDU					
Lecturer(s)	Asst. Prof. Dr. Gülsüm GÜNDOĞDU					
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Harald Bolt, Isolde Arzberger, Christina Berger; (2017). Werkstoffe und Materialien für die Energiewende.
Other Sources	-

Additional Course Material	
Documents	-
Assignments	1
Exams	2

Course Composition

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Mathematics und Basic Sciences		%
Engineering	60	%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences	40	%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	40
Quiz	0	0
Assignments	1	20
Attendance	0	0
Recitations	0	0
Projects	0	0
Final Exam	1	40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	14	2	28
Assignments	2	25	50
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	14	4	56
Laboratory			
Projects			
Final Exam	1	3	3
		Total Work Load	**168**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	Students can describe the structure, function, and performance characteristics of materials used in renewable energy technologies.
2	Students can compare materials used in various renewable systems (solar, wind, biomass, etc.) based on technical and environmental criteria and make appropriate selections.

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

3	Students can analyze how material properties influence the efficiency and durability of energy systems and develop improvement suggestions.
4	Students can assess material use from the perspective of sustainability, recyclability, and life-cycle analysis, and prepare technical reports and presentations.

Weekly Content	
1	Introduction to Renewable Energy Sources
2	Introduction to Materials Science: Structure, Properties, Function
3	Materials Used in Solar Energy Systems
4	Photovoltaic Cell Materials: Silicon, Thin Film, Perovskites
5	Structural Materials in Wind Turbines
6	Materials and Components in Biomass Energy Systems
7	Material Selection in Energy Storage Technologies
8	Midterm Exam
9	Materials in Fuel Cells and Hydrogen Technologies
10	Surface Coatings and Insulation Materials in Thermal Systems
11	Sustainability and Recycling Properties of Materials
12	Life-Cycle Analysis and Material Performance
13	Next-Generation Materials in Renewable Energy
14	Material Failures and Durability in Energy Systems
15	Decision-Making Processes for Material Selection (economic, environmental, technical)
16	Final Exam

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

	P1	**P2**	**P3**	**P4**					
1	5	3	3	5					
2	4	3	4	3					
3	3	4	4	5					
4	5	4	4	4					

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=5706

Compiled by:	Res. Assist. Dr. Kaan Deveci
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