DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT301	3			5
Title	**T**	**A**	**L**	**ECTS**
Solar Energy Systems	2	1	1	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 provide students with fundamental knowledge on the design, operation, and optimization of solar energy systems. Students will gain the ability to understand the working principles of photovoltaic (PV) and solar thermal technologies, conduct energy production and efficiency analyses, and evaluate the performance of these systems. Furthermore, students will acquire knowledge on the economic evaluation of solar energy systems, cost analysis, and sustainable energy production							
Content	The course will cover the fundamental principles and technologies of solar energy. The design principles, efficiency analysis, and performance evaluation of photovoltaic (PV) and solar thermal systems will be thoroughly explored. Students will become familiar with the components used in the installation of solar energy systems (e.g., panels, inverters, batteries, heaters, etc.) and learn the criteria for selecting these components effectively. In addition, the course will address the economic and environmental impacts of solar energy systems, including cost analysis, return on investment (payback period), and other economic parameters. Topics such as system optimization, the role of solar energy in integrated energy systems, and system design based on local climate conditions will also be discussed in depth.							
Prerequisites	-							
Coordinator	Assist. Prof. Dr. Osman Sinan SÜSLÜ							
Lecturer(s)	Assist. Prof. Dr. Osman Sinan SÜSLÜ							
Assistant(s)								
Work Placement	None							

Recommended or Required Reading	
Books / Lecture Notes	Markvart, T., Castaner, L., 2003, Practical Handbook of Photovoltaics: Fundamentals and Applications, Elsevier, Oxford, Uk. Meissner, D. 2013, Solarzellen: Physikalische Grundlagen und Anwendungen in der Photovoltaic, Springer-Verlag,
Other Sources	-

Additional Course Material	
Documents	-
Assignments	2

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Exams	2	
Course Composition		
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	2	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	4	56
Assignments	2	25	50
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	14	2	28
Laboratory			
Projects			
Final Exam	1	3	3
		Total Work Load	**168**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	Students can explain the basic principles of solar energy technologies (photovoltaic, solar thermal systems) and define their role in energy production and application areas.

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2	Students can design solar energy systems according to different use scenarios and develop optimization strategies to improve their efficiency.
3	Students can evaluate the economic and environmental impacts of solar energy systems by calculating cost-benefit analyses and investment payback periods.
4	Students can plan, implement, and communicate the installation of solar energy systems through technical reports and presentations, demonstrating professional engineering communication.

Weekly Content	
1	Introduction to Solar Energy Systems
2	Characteristics of Solar Radiation
3	Photovoltaic Cells and Working Principle
4	Photovoltaic System Design - Basic Concepts
5	Solar Thermal Systems
6	Performance Evaluation of Solar Energy Systems
7	Economic Evaluation of Solar Energy Systems
8	Midterm Exam
9	Installation and Assembly of Solar Energy Systems
10	Efficiency Analyses in Solar Energy Systems
11	Solar Energy Applications: Residential and Industrial Systems
12	Storage Technologies in Solar Energy Systems
13	Environmental Impacts of Solar Energy Systems
14	Solar Energy and Energy Policies
15	The Future of Solar Energy Systems
16	Final Exam

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

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**
1	4	5	3	5	3	5	4	3	5
2	4	5	4	5	4	5	3	4	5
3	3	4	4	5	4	4	4	4	5
4	3	4	4	4	3	5	5	3	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

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