DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details						
Code				**Academic Year**		**Semester**
EBT326				4		Spring
Title				**T**	**A**	**L**	**ECTS**
Smart Grids				3	2	0	6
Language	English					
Level	**Undergraduate**	**x**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technology					
Forms of Teaching and Learning	Face-to-face					
Course Type	**Compulsory**		**Elective**	✓		
Objectives	The objective of this course is to provide students with fundamental and advanced knowledge about smart grids. It aims to equip students with the necessary skills to address critical issues in modern energy systems, such as renewable energy integration, demand-side management, energy storage systems, and energy management. By exploring the economic, environmental, and technological aspects of smart grid technologies, the course seeks to develop students' abilities to design and manage sustainable energy systems.					
Content	The course begins with an introduction to smart grids and their historical development, covering topics such as smart meters, demand-side management, distributed generation, renewable energy integration, and energy storage systems. Advanced topics include energy trading, grid security, the integration of electric vehicles into the grid, and the application of artificial intelligence and big data. Within the context of energy management, the course addresses carbon emission reduction, cost analysis, and market dynamics, focusing on strategies for sustainable energy. The course combines theoretical knowledge with applied projects and case studies.					
Prerequisites	-					
Coordinator	Dr. Anıl Can Duman					
Lecturer(s)	Dr. Anıl Can Duman					
Assistant(s)	-					
Work Placement	-					

Recommended or Required Reading	
Books / Lecture Notes	Borlase, S., 2017. Smart Grids: Infrastructure, Technology, and Solutions, Taylor&Francis ISBN: 1439829055.
Other Sources	-

Additional Course Material	
Documents	Lecture notes
Assignments	-
Exams	1 Midterm, 1 Final Exam

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Course Composition		
Mathematics und Basic Sciences		%
Engineering	35	%
Engineering Design		%
Social Sciences	5	%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge	60	%

Assessment		
Activity	**Count**	**Percentage (%)**
Midterm Exam	1	40
Quiz		
Assignments		
Lab Reports		
Attendance		
Recitations		
Projects		
Final Exam	1	60
	Total	**100**

ECTS Points and Work Load			
Activity	**Count**	**Duration**	**Work Load (Hours)**
Lectures	14	3	42
Self-Study	32	3	96
Assignments	-	-	-
Presentation / Seminar Preparation	-	-	-
Midterm Exam			
Recitations	14	2	28
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**168**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes	
1	Explain the fundamental components and technologies of smart grids.

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2	Analyze smart grid applications such as smart meters and demand-side management.
3	Evaluate the integration of renewable energy sources and electric vehicles into the grid.
4	Interpret the economic and environmental benefits of smart grid projects.
Weekly Content	
1	Introduction to smart grids
2	Smart meters and energy consumption analysis
3	Energy generation, transmission, and distribution in smart grids
4	Electric power quality
5	Communication and cybersecurity
6	Distributed generation and microgrids
7	Energy storage systems
8	Midterm exam
9	Electric vehicles and grid integration
10	Smart buildings and energy management systems
11	Demand-side management and energy efficiency
12	Demand response planning
13	Global smart grid applications
14	Energy trading in smart grids
15	Energy cost analysis and economic management in smart grids
16	Final exam

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

Compiled by:	Dr. Anıl Can Duman
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