DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT313	2			4
Title	**T**	**A**	**L**	**ECTS**
Optimization in Energy Systems	2	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	The course aims to equip students with the competence to mathematically model and solve engineering problems encountered in the design, operation, and planning of energy systems. Students will gain the ability to develop sustainable, economical, and technically efficient energy systems using linear, nonlinear, integer, and multi-criteria optimization methods.							
Content	The course covers fundamental concepts related to the modeling and optimization of energy systems, as well as techniques in linear, nonlinear, and multi-objective optimization. Computational solutions and software-assisted analyses related to application areas such as renewable energy, energy storage, and microgrid planning are also key components of the course.							
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	Nagel, Janet. *Optimierung Von Energieversorgungssystemen*. 2023. Schellong, Wolfgang. *Analyse und Optimierung von Energieverbundsystemen*. Springer-Verlag, 2016.
Other Sources	-

Additional Course Material	
Documents	-
Assignments	2
Exams	2

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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	Selects and applies appropriate optimization methods to analyze the technical and economic performance of energy systems.
2	Adapts linear and nonlinear optimization models to energy systems and generates solutions.

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3	Develops strategies to improve the efficiency of energy systems and evaluates these strategies using quantitative data.
4	Communicates optimization results through technical reports and presents them verbally/non-verbally in relation to engineering applications.

Weekly Content	
1	Introduction: Overview of Energy Systems
2	Optimization of Energy Systems: Basic Concepts
3	Mathematical Foundations and Introduction to Optimization Techniques
4	Linear Optimization in Energy Systems
5	Nonlinear Optimization in Energy Systems
6	Multi-Objective Optimization
7	Optimization of Renewable Energy Systems
8	Midterm Exam
9	Energy Efficiency and Sustainability
10	Optimization Applications: Energy Distribution Network
11	Optimization Software and Tools in Energy Systems
12	Energy Markets and Optimization
13	Decision Support Systems in Energy System Optimization
14	Advanced Energy Optimization Techniques
15	Student Assignment Presentations
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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