DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details

Code	Academic Year			Semester
EBT304	3			6
Title	**T**	**A**	**L**	**ECTS**
Wind Energy	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**		**Elective**	**X**		
Objectives	The students are taught how the wind occurs, its formation processes, and its effects. Information about the design, structure, production, and operation of wind turbines is given. It is aimed at teaching the power generation calculations of wind turbines, wind speed statistics, and the calculation of the loads on the turbine. The course aims to provide students with a basic understanding of wind energy economics, cost calculations, environmental impacts, and deployment examples by applying wind energy economics, cost calculations, environmental impact assessment, and deployment examples.					
Content	This wind energy course includes topics such as wind formation and sources, wind characteristics and wind potential, wind power calculation methods and statistics, turbine installation, structure, and aerodynamics, turbine structure and operational systems, turbine deployment, wind energy economics, and turbine environmental impact assessment.					
Prerequisites	None					
Coordinator	Dr. Aslı İşler Kaya					
Lecturer(s)	Dr. Aslı İşler Kaya					
Assistant(s)	Research Assistant Elvan Burcu Koşma					
Work Placement	None					

Recommended or Required Reading

Books / Lecture Notes	Burton, T., Jenkins, N., Sharpe, D., Bossanyi, E., 2011. Wind Energy Handbook, John Wiley & Sons. ISBN: 9780470699751. Jarass, L., Obermair, G.M., Voigt, W., 2009.Windenergie: Zuverlässige Integration in die Energieversorgung. Springer Science & Business Media. ISBN-10:3540852522. Tong, W., 2010. Wind Power Generation and Wind Turbine Design. WIT Press. ISBN:978-1-84564-205-1.
Other Sources	Mathew, S., 2006. Wind energy: Fundamentals, Resource Analysis and Economics. Springer. ISBN-10: 3-540-30905-5. Hau, E., 2013. Wind Turbines: Fundamentals, Technologies, Application, Economics. Springer. ISBN-10:3-540-24240-6. Hooft, E. L., Schaak, P., Engelen T.G., 2003. Wind Turbine Control Algorithms, DOWEC-

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	F1W1-EH-03-094/0; ECN-C-03-111.

Additional Course Material	
Documents	
Assignments	1 Project
Exams	1 Midterm + 1 Final

Course Composition		
Mathematics and Basic Sciences	20	%
Engineering	40	%
Engineering Design	40	%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	30
Quiz		
Assignments		
Attendance		
Recitations		
Projects	1	25
Final Exam	1	45
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	14	4	56
Assignments	0	0	0
Presentation / Seminar Preparation	1	25	25
Midterm Exam	1	3	3
Recitations	14	1	14
Laboratory	14	1	14
Projects	1	25	25
Final Exam	1	3	3

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Total Work Load	**168**
ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes	
1	The ability to explain the technology and theories used in wind energy systems, create mathematical models, and calculate wind energy will be gained to have basic knowledge about wind energy systems.
2	The ability to express the historical development of modern wind turbines will be gained.
3	Knowledge of wind energy terminology and turbine components will be provided.
4	Information about wind measurement methods and calculations will be provided.
5	Information will be provided about the dynamics that convert wind energy into mechanical energy.
6	The ability to interpret blade efficiency and flow characteristics over the blades will be provided.
7	Application skills will be gained in project planning, management, licensing, economics, and environmental impacts of wind turbines.
Weekly Content	
1	Presentation of course content. General introduction to wind energy
2	Definition of wind energy in terms of fluid mechanics, wind formation, wind types, and characteristics
3	Analysis of wind regimes, measurement methods, and evaluation
4	The basic concept of wind energy conversion, some theories, wind turbine types, and characteristics
5	Wind energy conversion systems and turbine components
6	Calculation of wind turbine energy production, interpretation of performance curves
7	Aerodynamics of wind turbines
8	Midterm
9	Aerodynamics of wind turbines
10	Project planning and management of wind power plants
11	Wind turbine installation and operation, wind power plant permit processes and licensing
12	WPP economy, comparison with other energy costs
13	WPP operation and maintenance problems
14	WPP environmental impacts
15	Project presentation

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

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

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6	4	4	5	4	5	4	4	4	4
7	5	5	5	4	4	5	5	5	5
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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Date of Compilation:	04.04.2024								