RENEWABLE ENERGY SOURCES

1	Course Title:	RENEWABLE ENERGY SOURCES	
2	Course Code:	MKNS224	
3	Type of Course:	Optional	
4	Level of Course:	Short Cycle	
5	Year of Study:	2	
6	Semester:	4	
7	ECTS Credits Allocated:	3.00	
8	Theoretical (hour/week):	2.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	None	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Öğr. Gör. Oğuzhan ÇANKAYA	
15	Course Lecturers:	Meslek Yüksekokulları Yönetim Kurullarının görevlendirdiği öğretim elemanları.	
16	Contact information of the Course Coordinator:	Öğr. Gör. Oğuzhan ÇANKAYA (oguzhanc@uludag.edu.tr) tel: 0 224 294 23 38	
17	Website:		
18	Objective of the Course:	This course aims at teaching students in detail about renewable energy, the most important energy sources for a sustainable future of humankind. During the course, students will not only gain the technical/engineering information about formation and exploitation of renewable energy but also information about the importance of renewable energy for global economy, politics, and environment. At the end, the reasons why renewable energy should be preferred over fossil fuels will be examined.	
19	Contribution of the Course to Professional Development:	Following a brief introduction on renewable energy, important concepts and classifications will be examined historically fossil fuels will be compared with renewables and the details of Green Energy Revolution will be scrutinized. During the second part, solar heat, solar photovoltaic, biomass, hydroelectricity, wind, ocean, waves and currents, and alternative renewable energy sources, such as gas hydrate and hydrogen will be covered in detail.	
20	Learning Outcomes:		
		1	Acquiring knowledge on various aspects of renewable energy sources and ability to use them for analyses and design
		2	Being acquainted with contemporary problems and an understanding of the economic, political, social, and environmental impacts of renewable energy production, transportation, and use at national and global levels
		3	Ability to gather data related with renewable energy and interpret them to evaluate and search for problems and their solutions.
		4	Ability to effectively participate in multi-disciplinary teamwork and to communicate in English in written and oral form on various issues of renewable energy.
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21	Course Content:

Course Content:

Week	Theoretical	Practice
1	Introduction and Overview of Renewable Energy: Introduction Syllabus and logistics Force, energy, power Definition and type of energy Primary and secondary energy Energy conversion Units and conversion factors Renewable energy Advantageous and disadvantageous of renewable energy Energy storage systems	
2	History, Concepts, and Classification: Historical development of renewable energy Classical and neoclassical economists Conservationists Carrying capacity and nvironmentalists Global climate change International Policies and mechanisms Sustainable energy development Definition and classification of renewable energy	
3	Fossil Fuels and Renewable Energy: Definition and classification of fossil fuels Formation of coal, oil and natural gas Carbon and renewability World's reserves and R/P ratios Climate change and environmental	
4	Green Energy Revolution: History of energy Substitution/shift of energy sources Major Peak Oil Theory World hegemony and energy sources Transitional period: Natural Gas Era fuels Better choices for transportation, buildings, industry, electricity	
5	Production and Consumption: Students will work on world's renewable energy reserve various aspects by using softwares such as excel.	
6	system History of solar energy Nature and availability of solar radiation Solar technology Low temperature solar energy applications Active and passive solar heating Solar thermal engines and electricity generation Economics and R&D in solar technology Environmental aspects	
7	Solar Photovoltaic: PV in silicon Crystalline PV Thin film PV Photovoltaic modules and collectors Use of solar PV energy World applications Cost and economics of solar energy R&D in solar technology Environmental impact PV integration and future prospects	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	10	1.00	10.00
Homeworks	6	1.00	6.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	50.00	50.00
Others	0	0.00	0.00
Final Exams	1	1.00	1.00
Total Work Load			145.00
Total work load/ 30 hr			3.17
ECTS Credit of the Course			3.00

8	Biomass Energy: Heat And Thermal Electricity: Origin of biomass Definition and classification of biomass energy History of biomass energy and Wood Era Biomass potential and energy content Combustion of biomass Biomass conversion technologies Biogas and landfill gas Biofuels: Transportation fuels Economics of biomass energy Environmental impacts	
9	Geothermal Energy: Heat and Thermal Electricity: Definition and history Origin of geothermal energy Geothermal systems Exploration, development, and production Geothermal technology and applications Thermal use of geothermal energy Electricity generation World potential Geothermal use and economics Environmental implications	
10	Hydropower: Mechanical Electricity: Definitions and hydrologic cycle History of hydropower use Hydropower technology and economics Pumped storage systems SHP: Small Hydropower Plants Hydropower potential World's use of hydropower Environmental considerations Future prospects	
11	Wind Energy: Mechanical Electricity: Formation of Earth's wind system History of windpower use Physical characteristics and potential estimation Windpower technologies Wind turbine types Aerodynamics of wind turbines Offshore wind energy Economics of windpower Wind energy use of the world International wind policies	
12	Ocean, Tidal and Wave Energy: Introduction Definition and classification Technical factors Technology and turbines Environmental factors World potential Barriers and future considerations Currents and waves Physical principles of wave energy World resources Wave energy technology Economics and environmental aspects	
13	Alternative Renewable Energy: Gas Hydrates: Introduction and definitions Formation of gas hydrates Research and development on gas hydrates Exploration and production Gas hydrates and the Black Sea Hydrogen: An Important Energy Carrier Introduction to hydrogen energy History of hydrogen energy Hydrogen technologies Fuel cells Research and development on hydrogen energy	
14	Term Paper Presentations	
22	Textbooks, References and/or Other Materials:	
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	20.00
Quiz	0	0.00
Home work-project	1	20.00
Final Exam	1	60.00
Total	3	100.00

Contribution of Term (Year) Learning Activities to Success Grade	40.00
Contribution of Final Exam to Success Grade	60.00
Total	100.00
Measurement and Evaluation Techniques Used in the Course	Measurement and evaluation is carried out according to the priciples of Bursa uludag University Associate and Undergraduate Education Regulation.

24 ECTS / WORK LOAD TABLE

25 CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS

	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	1	3	2	1	0	0	0	2	0	0	0	0	0	0	0	0
ÖK2	1	1	1	0	0	0	0	0	2	2	0	0	0	0	0	0
ÖK3	3	3	1	1	1	0	0	0	2	1	0	0	0	0	0	0
ÖK4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LO: Learning Objectives PQ: Program Qualifications

Contribution Level:	**1 very low**	**2 low**	**3 Medium**	**4 High**	**5 Very High**