



COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Technology		
ACADEMIC UNIT	Department of Environmental Sciences		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	AY505	SEMESTER	5th
COURSE TITLE	RENEWABLE ENERGY SOURCES		
INDEPENDENT TEACHING ACTIVITIES	WEEKLY TEACHING HOURS		CREDITS
Teaching Hours		5	5
COURSE TYPE	Special background		
PREREQUISITE COURSES	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.uth.gr/courses/ENV_U_161/		

(2) LEARNING OUTCOMES

Learning outcomes
The aim of the course is to provide students with knowledge on the different forms of renewable energy sources used and the analysis of their advantages and disadvantages.
General Competences
<ul style="list-style-type: none">• Search for, analysis and synthesis of data and information, with the use of the necessary technology• Decision-making• Working independently• Team work• Production of new research ideas• Project planning and management• Respect for the natural environment• Production of free, creative and inductive thinking

(3) SYLLABUS

<ul style="list-style-type: none">• Overview of sources of air pollution, effects on the biosphere.• Carbon balance, analysis of the concepts: Carbon Positive, Carbon Neutral and Carbon Negative.• Natural resources and fossil fuels (coal, lignite, petroleum products and natural gas) and advantages disadvantages of energy production from non-renewable energy sources.• Introduction to renewable energy sources.• Earth's energy balance. Solar radiation and its characteristics. Calculations of solar energy from solar radiation.• Active (photovoltaic) and passive solar energy production systems. Production of hot water from flat solar panels. Production of electricity from photovoltaic systems. Dimensioning of autonomous photovoltaic systems.• Wind energy and basic characteristics of wind turbines. Power curve and electrical grids of wind farms.• Energy efficiency of photovoltaic systems and wind farms.• Biomass and energy production from biomass. Types of biofuels and their production from biomass: biogas, biohydrogen, bioethanol and biodiesel. Advantages and disadvantages. The concept of Carbon Negative in relation to biofuels and biochar production.• Geothermal, geothermal heat pumps, heating and cooling buildings with geothermal heat pumps. Electricity production from geothermal energy.• Hydroelectric power generation (dam power or hydraulic power).• Tidal energy, energy from sea waves. Harnessing ocean thermal energy.• The possibility of reversing the accumulation of greenhouse gases by using renewable energy sources.
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(4) TEACHING and LEARNING METHODS – EVALUATION

DELIVERY	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	<ul style="list-style-type: none">• Use of PowerPoint slides• View material in video• Visiting and using material from websites• Communication with students via e-mail• Use of asynchronous distance learning (e-class)	
TEACHING METHODS	Activity	Semester workload
	Lectures	39
	Study and analysis of bibliography	40
	Essay writing	20
	Practice exercises	26
	Course total (25 hours workload per credit)	125
STUDENT PERFORMANCE EVALUATION	<p>Students' performance is evaluated in the Greek language. The final grade is determined by:</p> <ul style="list-style-type: none">• A written exam (at the end of the semester) that contributes 70% to the final grade, applying one or more of the following evaluation methods: Multiple choice questions, short-answer questions, problem solving.• Elaboration of an individual written assignment (in the 2nd half of the semester) that contributes 30% to the final grade. The assignment may be presented by students in class. <p style="text-align: center;">Final Grade = 70% Exam Grade + 30% Assignment Grade</p>	

(5) ATTACHED BIBLIOGRAPHY

- Johansson, T.B., Kelly, H., Reddy, A. K. N., Williams, R. H., Burnham, L. (Eds) (1993) *Renewable Energy: Sources for Fuels and Electricity*. Washington, DC: Island Press.
- Kaplanis, S. (2003) *Environment and Renewable Energy Sources*. Athens: ION Publishing Group. (in Greek)
- Malevitis, E. (2013) *Energy Management and Renewable Energy Sources*. Athens: Pedio Publications. (in Greek)