

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCIENCES		
ACADEMIC UNIT	PHYSICS		
LEVEL OF STUDIES	POSTGRADUATE		
COURSE CODE	M226	SEMESTER	2
COURSE TITLE	RENEWABLE ENERGY SOURCES		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	WEEKLY TEACHING HOURS	CREDITS	
	3	6	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	General background, specialised general knowledge		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)			

(2) LEARNING OUTCOMES

<p>Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>
<p>The course provides the student the opportunity to familiarize with the renewable energy sources and also to understand their main advantages, disadvantages and applications. In order to support the theoretical background of this course, mathematical techniques which were taught in a pre-graduate level are also implemented. More specifically, after the successful completion of the course, the student will:</p> <ul style="list-style-type: none"> • be informed for the global energy and environmental problems • have understood the main renewable energy sources, their advantages and disadvantages and also the modern evolutions and international technological breakthroughs in this field • have understood wind power (history, wind turbines, types of wind turbines, advantages and disadvantages, energy production from wind turbines, wind farms) • be familiar with solar energy (theoretical and experimental determination of solar radiation, solar collectors, applications of solar thermal systems, photovoltaic effect and energy production) • know the ways to use biomass for energy production and biofuel (bioethanol and

biodiesel) production

- have understood methods to determine the hydropower potential (small and large hydropower plants)
- have gained knowledge related to geothermal energy and will also be familiar to other renewable energy sources such as wave energy, tidal energy and ocean thermal energy conversion
- have been informed regarding the environmental and social consequences induced by the exploitation of renewable energy sources

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas

Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
.....
Others...
.....

Search for, analysis and synthesis of data and information, with the use of the necessary technology
 Working independently
 Team work
 Production of free, creative and inductive thinking
 Working in an interdisciplinary environment
 Respect for the natural environment

(3) SYLLABUS

Renewable energy sources

Solar energy - Systems which use solar energy - Solar energy in Greece

Wind power - Exploitation of wind power - Environmental impacts of wind power - Wind power in Greece

Geothermal energy - Types of geothermal fields - Use of geothermal fields – Environmental impacts from the exploitation of geothermal energy - Geothermal energy in Greece

Biomass - Transforming biomass to energy - Exploitation of biomass in Greece

Hydroelectric power - Exploitation of hydroelectric power in Greece

Ocean energy - Wave energy and tidal energy - Ocean thermal energy conversion

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Students are referred to websites of related literature for information.

<p style="text-align: center;">TEACHING METHODS</p> <p><i>The manner and methods of teaching are described in detail.</i></p> <p><i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i></p>	<p style="text-align: center;"><i>Activity</i></p>	<p style="text-align: center;"><i>Semester workload</i></p>
	Lectures	75
	Tutorials	22
	Study of bibliography	25
	Exams	3
	Course total	125
<p style="text-align: center;">STUDENT PERFORMANCE EVALUATION</p> <p><i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>Written examinations at the end of the semester</p>	

(5) ATTACHED BIBLIOGRAPHY

<ul style="list-style-type: none"> • Renewable Energy Sources Technologies and Environment T.D. Tsoutsos, I.N. Kanakis Papasotiriou Publications ISBN: 978-960-491-067-0 • Energy Sources G. Pantis Publications of the University of Ioannina ISBN: 960-233-020-1 • Photovoltaic systems I. Fragiadakis Ziti Publications ISBN: 960-456-007-7
