COURSE OUTLINE

1. GENERAL

SCHOOL			
DEPARTMENT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	ISCED level 6 – Bachelor's or equivalent level		
COURSE CODE	APE715-2023	**SEMESTER**	7th Semester
COURSE TITLE	Renewable Energy Sources		

TEACHING ACTIVITIES If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
	3	6.0

COURSETYPE Background, General Knowledge, Scientific Area, Skill Development	Skill Development
PREREQUISITES	Statistics
TEACHING & EXAMINATION LANGUAGE:	Greek
COURSE OFFERED TO ERASMUS STUDENTS:	NO
COURSE URL:	https://eclass.emt.duth.gr/

2. LEARNING OUTCOMES

Learning Outcomes
Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

The course aims to introduce students to the concept of Renewable Energy. Acquire skills on assessment conversion sizes RES in electricity and thermal energy. Conversion of solar, wind, hydraulic, geothermal and biomass energy into electricity and acquire skills on technologies. In particular it will be deepened to:

- Introduction to Renewable Energy Sources (RES).
- Solar power. Converting solar energy into electricity.
- Photovoltaic phenomenon. Characteristics Photovoltaic component.
- Performance PV components.
- Technologies PV systems.
- Wind power. Wind potential.
- Kinetic energy of wind.
- Curves duration, speed.
- Conversion of wind energy into electricity.

- Wind Analysis
- Wind farms
- Hydropower.
- Principle hydroelectric system.
- Small hydro projects.
- Features
- Hydroelectric power plant turbine, performance.
- Geothermal energy, geothermal features. Exploiting geothermal energy.
- Uses geothermal energy.
- Shallow Geothermal.
- Biomass, formation, origin, recovery.
- Methods of converting biomass, biomass conversion technologies into energy.
- Wave energy, characteristics, utilization.

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,	Project design and management
ICT Use,Adaptation to new situations,	Equity and Inclusion
Decision making,	Respect for the natural environment
Autonomous work,	Sustainability
Teamwork,	Demonstration of social, professional and moral responsibility
Working in an international environment,	and sensitivity to gender issues
Working in an interdisciplinary environment, Production of new research ideas	Critical thinking
	Promoting free, creative and inductive reasoning

Project design and management

3. COURSE CONTENT

1.Energeia flashback, Basic concepts, energy issue, power plants, energy mix, energy, design.
2. Renewable Energy, basic concepts, advantages, disadvantages RES, RES development Brief
3. RES and Environment, National targets RES contribution of RES in the Energy Balance, biofuels, cogeneration
4. Hydropower, history, advantages hydropower Authority hydraulic conversion into electricity.
5. Hydraulic stations, split into small (SHP) and large, main parts, operation principle.
6. Turbines, description, function, types, hydrological analysis Identification, selection turbine, power, energy produced turbine.
7. Biomass, basic concepts, creation, origin, biomass cycle Advantages Disadvantages Biomass utilization.
8. Methods of converting biomass into energy. Thermochemical, biochemical, methods, direct combustion, produced products.
9. Electricity - Cogeneration Biomass technology power plants from biomass.
10. Geothermal throwback, advantages, basic concepts, applications.
11. Geothermal fields, formation, readability exploitation.
12. Electricity from geothermal energy and use for other purposes.
13. Shallow geothermal energy, principle of operation, exploitation of shallow geothermal systems, pumps heat.
14. The wave energy, basic concepts, systems.
15. Wind energy, wind, characteristics
16. Wind Energy Conversion Systems
17. turbines, wind farms, planning, evaluation
18. Solar energy
19. Solar energy conversion systems
20. The photovoltaic effect, P / V systems, features, design

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD Face to face, Distance learning, etc.	Face to face
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) Use of ICT in Teaching, in Laboratory Education, in Communication with students	Use of ICT in Teaching
TEACHING ORGANIZATION The ways and methods of teaching are described in detail. Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research& analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc. The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards	<table><tr><th>Activity</th><th>Workload/semester</th></tr><tr><td>Lectures</td><td>80</td></tr><tr><td>Writing project</td><td>40</td></tr><tr><td>Bibliographic research & analysis</td><td>30</td></tr><tr><td>Total</td><td>150</td></tr></table>
STUDENT EVALUATION Description of the evaluation process Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others Please indicate all relevant information about the course assessment and how students are informed	**Student evaluation languages** Greek **Method (Formative or Concluding)** Formative **Student evaluation methods** — **Rate** Written Assignment — 20 Written exam with multiple choice test — 80

5. Suggested Bibliography

? Μ. Φυτίκας “Γεωθερμία”, Εκδόσεις ΤΖΙΟΛΑ, 2004
? Δ. Παπαντώνης, “Μικρά Υδροηλεκτρικά Έργα” Εκδόσεις ΣΥΜΕΩΝ 2001
? Γ. Παπαϊωάνου “Ήπιες Μορφές Ενέργειας”, Εκδόσεις ΙΩΝ 2009 B. Sorensen, “Renewable Energy Conversion, Transmission, and Storage”,Academic Press 2008
? B.Godfrey “Renewable Energy” Amazon, 2007

Eudoxus

Ενέργεια, Περιβάλλον και Αειφόρος Ανάπτυξη
Κωδικός Βιβλίου στον Εύδοξο: 94645312
Έκδοση: 1η/2020
Συγγραφείς: Πολυζάκης Απόστολος
ISBN: 9786188359062
Τύπος: Σύγγραμμα
Διαθέτης (Εκδότης): Πολυζάκης Απόστολος ΜΟΝ. ΙΚΕ

Ανανεώσιμες Πηγές Ενέργειας

Κωδικός Βιβλίου στον Εύδοξο: 22770910
Έκδοση: 1η Έκδ./2013
Συγγραφείς: Τσούτσος Θ., Κανάκης Ι.
ISBN: 9789604910670
Τύπος: Σύγγραμμα
Διαθέτης (Εκδότης): Α. ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ Ι.Κ.Ε.

ΑΝΑΝΕΩΣΙΜΕΣ ΠΗΓΕΣ ΕΝΕΡΓΕΙΑΣ Β' ΕΚΔΟΣΗ
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ISBN: 9789606330445
Τύπος: Σύγγραμμα
Διαθέτης (Εκδότης): "σοφία" Ανώνυμη Εκδοτική & Εμπορική Εταιρεία

Ανανεώσιμες Πηγές Ενέργειας
Κωδικός Βιβλίου στον Εύδοξο: 122079110
Έκδοση: 1η/2023
Συγγραφείς: Μπιτζιώνης Βασίλειος, Μπιτζιώνης Δημήτριος
ISBN: 9786182210345
Τύπος: Σύγγραμμα
Διαθέτης (Εκδότης): ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε.