COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	ELECTRICAL AND COMPUTER ENGINEERING DEPT.		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**ECE_ENE810**	**SEMESTER**	**8**
COURSE TITLE	ELECTRICAL ENERGY PRODUCTION		

INDEPENDENT TEACHING ACTIVITIES *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*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Seminars / Practice exercises	1	
Laboratory		
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (4).	4	5

COURSE TYPE *general background, special background, specialised, general knowledge, skills development*	Specialised, Skills Development
PREREQUISITE COURSES:	No. It is suggested that students have already attended: Electrical CircuitsI&II, Electrical Machines I
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No.
COURSE WEBSITE (URL)	https://www.ece.uop.gr/

(2) LEARNING OUTCOMES

Learning outcomes

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.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning*

and Appendix B

- *Guidelines for writing Learning Outcomes*

The main goal of the course is the specialized knowledge in the field of the electrical energy production.

Learning Outcomes

After the successful completion of the course, the students will:

At the knowledge level:

1. Understand the main principles of energy and power.
2. Be fully aware of the electrical energy production stations.

3. Understand the basic parameters of conventional and distributed energy production.
4. Be informed of the mathematical models for analyzing the power stations.
5. Apply specialized models for the definition of the produced energy from renewable energy schemes.
6. Be aware of the protection systems in the production stations.

At the skill level:

1. Use the mathematical models for the analysis of electrical energy production stations.
2. Calculate the parameters consisting the wind energy.
3. Design photovoltaic parks.
4. Define the nominal power of hydro power stations.

At the level of abilities:

1. Calculate all the parameters in wind turbines.
2. Apply the spatial and electrical design of photovoltaic parks.
3. Calculate all the parameters of a small hydro power station.
4. Calculate the produced energy from renewable energy stations.

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

1. Search for, analysis and synthesis of data and information, with the use of the necessary technology
2. Working independently
3. Team work
4. Decision – making

(3) SYLLABUS

Theory

1. Definition of energy and power.
2. Description of steam power plants.
3. Analysis of wind turbines.
4. Analysis of grid-connected solar parks.
5. Design of solar parks for the supply of autonomous systems.
6. Analysis and design of small hydro power stations.
7. Calculation of the produced energy from renewable energy stations.
8. Description of protection systems in generation units.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face in-class lecturing, Laboratory exercises</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Slides (ppt) of the presentation of the theoretical part of the course, which will be available from the beginning of semester through e-Class.
• Support of teaching procedure through the e-Class platform (notification of the teaching procedure, distribution of slides, supplementary material, announcements, relative links and literature, provision of test and the final examination)</td></tr>
<tr><td>TEACHING METHODS

The manner and methods of teaching are described in detail.

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.

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</td><td><table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>Practical examples and exercises – focusing on problem solving</td><td>13</td></tr><tr><td>Laboratory practice</td><td></td></tr><tr><td>Study for lectures</td><td>20</td></tr><tr><td>Study and analysis of bibliography</td><td>53</td></tr><tr><td>Course Total</td><td>125 hours (5 ECTS)</td></tr></table></td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

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

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>Evaluation language: Greek

Theory Grade
Final exams grade (short answer questions, problem solving): 100%
Intermediate exams grade (short answer questions, problem solving): 0%</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

1. Π. Μαλατέστας, Παραγωγή Ηλεκτρικής Ενέργειας, Εκδόσεις Τζιόλα, 2019.
2. A. Wood, B. Wollenberg, Power Generation Operation and Control, Willey-IEEE, 1996
3. Σ. Περδίος, Φωτοβολταϊκές Εγκαταστάσεις, ΣΕΛΚΑ-4Μ ΕΠΕ, 2005
4. Ν. Παπαγεωργίου, Ατμοπαραγωγοί Ι και ΙΙ, Εκδόσεις Συμεών, 1991.
5. Δ. Παπαντώνης, Μικρά Υδροηλεκτρικά Έργα, Εκδόσεις Συμεών, 2001
6. J. Timm, Εγχειρίδιο Υπολογισμών Υδραυλικής, Φούντας, 1970
7. Γ. Μπεργελές, Ανεμοκινητήρες, Εκδόσεις Συμεών, 2005

8. Δ. Ψωμιάδη, *Ηλεκτρικές μηχανές - ΤόμοςΙ*, Εκδόσεις Ίων, 2004.
9. Δ. Ψωμιάδη, *Εφαρμογές ηλεκτρικών μηχανών - Τόμος Ι*, Εκδόσεις Ίων, 2004.
10. P. Breeze, Power Generation Technologies, Newnes, 2014

- *Related academic journals:*

1. IEEE Transactions on Energy Conversion
2. IET Proceedings – Electric Power Applications
3. Electric Power Systems Research, Elsevier
4. Applied Energy, Elsevier
5. Energy Systems, Springer