EEE.8-1.1 Electric power generation stations

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**EEE.8-1.1**	**SEMESTER**	8
COURSE TITLE	Electric power generation stations		

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	4	5
Laboratory	0	
Total	4	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special background course
PREREQUISITE COURSES:	Introduction to electric power systems, Principles of Thermodynamics
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (official)
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	www.eee.uniwa.gr

1. 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 objective of the course is to familiarize the student with the production of electrical energy with regard to the needs of specific consumer areas in order to be able to appreciate the relative procedures on a technical, economic and social basis. The acquisition of knowledge during the period of studies should make the student and future graduate able to understand the specialized knowledge concerning any aspect of production procedures thus working efficiently in relative positions.
Upon completion of the course, students should be able to:
1. describe and use, on a technical basis, the various methods of electrical energy production and classify and use them 0n an economic and operational basis
2. understand the relationship between electric loads and the respective power production installations on the base of economic and technological criteria.

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 *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*

1. Search for, analysis and synthesis of data and information, with the use of the necessary technology
2. Adapting to new situations
3. Decision-making
4. Working independently
5. Team work
6. Production of free, creative and inductive thinking
7. Criticism and self-criticism

2. SYLLABUS

1. Greek interconnected power system elements. Categories of electrical power generating stations.
2. Thermodynamic basic background
3. Steam powered electric plants. Thermodynamic cycles and technical issues. Environmental effects.
4. Gas turbines power plants. Thermodynamic cycles and technical issues. Environmental effects.
5. Internal combustion power plants. Thermodynamic cycles and technical issues. Environmental effects.
6. Heat & electric co-generation.
7. Combined power plants.
8. Three- and poly-co-generation systems. Basic co-generation plant structures with combustion internal engines, gas-turbines, fuel cells etc. for heat, cool, electricity, bio-fuels, waste-water treatment etc.
9. Hydroelectric plants. Flow curve, basic introduction to fluid mechanics and hydro-machines, hydraulic losses, categories of hydro-turbines, small and large plants, dams, pump hydroelectric power plants.
10. Thermal nuclear power plants.
11. Fuel cell power plants.
12. Renewable power plants. Particularities against classical power plants.
13. Energy storage systems.
14. Automatic voltage regulator and frequency regulator.

3. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	• Lectures
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Teaching using ICT Communication and Electronic Submission (supplementary teaching data, exercises, etc.) • Use computer programs for load forecasting, reliability analysis, economic dispatch, etc. based on Matlab
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.*	Teaching uses lectures, exercises / projects and study.

Activity	*Semester workload*
Lectures	52
Personal study for lectures	89
Exercises /projects	13

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	Personal study for exams: 24 Visit: 2 Course total: **180**
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.*	Final written exam of theoretical part (100% of the total score): - Solving theoretical problems relating to the subject of the course - Description / evidence theory data - Interim written assessments during the semester. Weekly individual written exams - Individual technical reports - Grouping technical reports

4. ATTACHED BIBLIOGRAPHY

-Proposed bibliography

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2. «Παραγωγή ηλεκτρικής ενέργειας», Π. Μαλατέστας, 1η έκδοση, Εκδόσεις Τζιόλα, 2019, ISBN: 978-960-418-409-5, [*ΚΩΔ. EUDOXUS:* 86054385].
3. «Σταθμοί Παραγωγής Ηλεκτρικής Ισχύος», Απ. Πολυζάκης, 1η έκδοση, Εκδόσεις Heat Cool Power, 2017, ISBN: 978-960-98311-8-5, [*ΚΩΔ. EUDOXUS:* 68378829].
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6. «Συμπαραγωγή θερμότητας και ηλεκτρισμού», Χ. Φραγκόπουλος, Η. Καρυδογιάννης, Γ. Καραλής, ΕΛΚΕΠΑ, 1996.
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8. «Αιολική και άλλες μορφές ενέργειας Βιομάζα - Γεωθερμία - Υδατοπτώσεις», Η. Λιώκη-Λειβαδά, Μ. Ασημακοπούλου, Εκδόσεις Συμμετρία, 2008.
9. «Ανεμοκινητήρες». Γ. Μπεργελές, Εκδόσεις Συμμετρία, 2005.
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11. «Παραγωγή, Μεταφορά, Διανομή Μέτρηση και Εξοικονόμηση Ηλεκτρικής Ενέργειας», Ξάνθος Β., εκδόσεις Ζήτη, 2006.
12. «Εισαγωγή στα συστήματα ηλεκτρικής ενέργειας», Γ. Γιαννακόπουλος, Ν. Βοβός, εκδόσεις Ζήτη, 2008, ISBN: 978-960-456-105-6, [*ΚΩΔ. EUDOXUS:* 11248].
13. «Εισαγωγή στα συστήματα ηλεκτρικής ενέργειας», Τόμος 1, , Π. Ντοκόπουλος, εκδόσεις Παρατηρητής,1986.
14. «Εισαγωγή στα συστήματα ηλεκτρικής ενέργειας», Τόμος 2 , Π. Ντοκόπουλος, εκδόσεις Παρατηρητής,1986.
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39. «Power generation operation and control», A. Wood , B. Wolenberg , John Wiley,1996.
40. «Computer methods in power systems analysis», G.W. Stagg , A.H. El-Abiad, McGraw-Hill,1986.
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