COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	ELECTRICAL AND COMPUTER ENGINEERING DEPT.		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**ECE_ENE760**	**SEMESTER**	**7**
COURSE TITLE	HIGH POWER ELECTRICAL INSTALLATIONS		

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		
Laboratory	1	
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:	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 extra knowledge in the field of the electrical installations both at low voltage and at medium voltage and substations.

Learning Outcomes

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

At the knowledge level:

1. Understand the main principles of specialized circuits being constructed in an electrical installation in a building.
2. Be fully aware of the materials used in a medium voltage electrical installation.
3. Be informed of the regulations that rule the electrical installations and the substations.
4. Know the main principles for heating and cooling methods in industry
5. Be aware of the problems due to voltage drops in electrical grids.
6. Apply properly the basic knowledge of the electrical machines for their proper supply with electrical power.

At the skill level:

1. Calculate the necessary electrical parameters which are used in the study of an electrical installation which supplies cooling and heating circuits.
2. Calculate and define all the necessary materials of a medium voltage electrical installation such as protection devices, materials used for mechanical protection etc.
3. Work safely with electrical circuits and switchboards located in a medium voltage substation.
4. Define cables size and protection devices in medium voltage lines.

At the level of abilities:

1. Define all the parameters in high power electrical installations.
2. Construct real electrical circuits for industrial use.
3. Construct real high power electrical switchboards.
4. Work safely with substations switchboards.

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. Medium and low voltage networks.
2. Different kinds of medium voltage connections for high power consumers.
3. Materials andspecifications in medium voltage electrical installations.
4. Medium voltage protection devices. Definition of nominal values.
5. Calculation of line current. Definition of a cable size according to regulations.
6. Analysis and design of electrical substations.
7. Heating and cooling methods in industry.
8. Reactive power compensation.
9. Voltage drop calculation in industrial circuits.
10. Definition of cable sizing due to fault capability.
11. Definition of the mechanical power nominal value of an electric motor .

Laboratory

1. Presentation of materials and the way of constructing a medium voltage electrical installation.
2. Construction of power and automation circuits in industry.
3. Construction of a 3ph electrical switchboards.
4. Working with large medium voltage switchboards

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face in-class lecturing, Laboratory exercises
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Slides (ppt) of the presentation of the theoretical part of the course, which will be available from the beginning of semester through e-Class. • Guidelines for the laboratory exercises (one per exercise), which will be available from the beginning of the 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)
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*	

Activity	***Semester workload***
Lectures	39
Practical examples and exercises – focusing on problem solving	
Laboratory practice	13
Laboratory reports	20
Study and analysis of bibliography	53
Course Total	***125 hours (5 ECTS)***

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.*	Evaluation language: Greek **Theory Grade** Final exams grade (short answer questions, problem solving): 100% Intermediate exams grade (short answer questions, problem solving): 0% **Laboratory Grade** Final laboratory exam grade: 60% Laboratory oral examination grade: 40% The final grade is the weighted result of the grades of theory and Laboratory. Minimum pass grade 5/10.

(5) ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

1. Π. Ντοκόπουλος, Ηλεκτρικές Εγκαταστάσεις Καταναλωτών, Εκδόσεις Ζήτη, 2009.
2. Σ. Τουλόγλου, Β.Στεργίου, Ηλεκτρικές Εγκαταστάσεις, Εκδόσεις Ιων, 2008
3. Σ. Τουλόγλου, Ειδικές Εγκαταστάσεις Μεγάλων Κτιρίων, Εκδόσεις Ιων, 2003
4. Σ. Τουλόγλου, Ηλεκτρικές Βιομηχανικές Εγκαταστάσεις & Υποσταθμοί, Εκδόσεις Ιων, 2001
5. Α .Μαχιά, Ηλεκτρομηχανολογικές Εγκαταστάσεις, Εκδόσεις Ζαμπάρα
6. G.Seip, Ηλεκτρικές Εγκαταστάσεις, Εκδόσεις Τζιόλα, 2004
7. IET, Electrical Installation Design Guide, IET Publications, 4th edition, 2019.
8. S. Khan, Industrial Power Systems, CRC Press, 2008
9. D. Beeman, Industrial Power Systems Handbook, McGraw-Hill,1955.
10. R. Fehr, Industrial Power Distribution, Willey-IEEE press, 2016
11. Σ. Τουλόγλου, *Ηλεκτρικές μηχανές συνεχούς και εναλλασσόμενου ρεύματος*, Εκδόσεις Ίων, 1999.
12. Σ. Ν. Βασιλακόπουλου, *Ηλεκτρικές μηχανές*, Ίδρυμα Ευγενίδου, 2006.
13. Ι. Ξυπτερά, *Ηλεκτρικές μηχανές*, Εκδόσεις Ζήτη, 1997.

- *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