COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	ELECTRICAL AND COMPUTER ENGINEERING DEPT.		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**ECE_K660**	**SEMESTER**	**6**
COURSE TITLE	Electrical Drawing		

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	1	
Laboratory	1	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (4).	2	4

COURSE TYPE ***general background, special background, specialised, general knowledge, skills development***	General Background, Skills development
PREREQUISITE COURSES:	There are no prerequisite courses. It is, however, recommended that students should have at least a basic knowledge on the electrical domestic installations and automations, the analysis of electrical circuits I & II.
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 course aims to educate the student on the use of the technical drawing as a basic means of communication with other engineers, manufacturers, entrepreneurs or services for the construction, repair and maintenance of a device or installation, to understand and to interpret electrical and mechanical drawings, to get acquainted in practice with the design of electrical installations and simple engineering constructions and equipment.

The basic principles and rules of design are initially presented in conjunction with the learning of an electronic design environment.

This is followed by the presentation/design of basic electrical symbols, analysis/design of documentary, functional, single-line and multi-line technical drawings of a series of basic wiring connections and automation of domestic electrical installations and circuits, as well as the presentation of basic installation rules and practices of domestic electrical circuits.

Then, the basic principles of the mechanical design, necessary for the clear display of mechanical components and especially for the recognition & reading of a mechanical design, are presented.

Finally, a basic design of electronic circuits is presented, with the help of an electronic design environment.

At the end of this course, the student who will attend It, will have further developed the following skills and competences:

- Check proper implementation of circuits, correct (trace errors) or modify existing circuits.
- Get acquainted with subjects connected with his study and the "language" of engineering drawing.
- Skills connected with the methodology of implementing studies, which are prerequisites for the development of the professional career of an electrical engineer.
- Capability of cooperating with other engineers/scientists for the solution of problems.
- Skills needed for completing studies for electrical installations and systems, which are reliable and safe for people and the environment.

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…*
	……..

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

(3) SYLLABUS

Short Course Description

- Description and familiarity with the electronic design environment.
- Basic knowledge and principles of Architectural Drawing such as, perspective design, floor plan, section, face design.
- Electrical Drawing, Introduction, Standardization, Types of Drawings.
- Single-line and multi-line diagrams of basic symbols or components of an Electrical Circuit.
- Single-line and multi-line diagrams of basic circuits for domestic electrical installation (low and high voltage circuits).
- Single-line and multi-line diagrams of basic automation circuits.
- Drawing of a complete single-line domestic electrical installation (low and high voltage circuits).
- Drawing of a complete electrical single -line panel for domestic electrical installation.
- Mechanical Drawing, Introduction.
- Basic knowledge and principles of Mechanical Drawing such as drawing instructions, Multiview Drawing, Section or semi-section Drawing and Dimensions.
- Electronic Drawing, Design of basic electronic components and circuits.

Theory units – lectures:

Lecture 1: Description and familiarity with the electronic design environment. Basic knowledge and principles of Architectural Design such as, perspective design, floor plan design, section, face.

• Lecture 2: Single-line and multi-line diagrams of basic symbols or components of electrical circuits.

• Lecture 3: Single-line and multi-line diagrams of main circuits of high voltage circuits for domestic electrical installation (part 1).

• Lecture 4: Single-line and multi-line diagrams of main circuits of high voltage circuits for domestic electrical installation (part 2).

• Lecture 5: Single-line and multi-line diagrams of main circuits of low voltage circuits for domestic electrical installation (part 1).

• Lecture 6: Single-line and multi-line diagrams of main circuits of low voltage circuits for domestic electrical installation (part 2).

• Lecture 7: Single-line and multi-line diagrams of basic automation circuits.

• Lecture 8: Drawing of a complete single-line domestic electrical installation, high and low voltage circuits (part 1).

• Lecture 9: Drawing of a complete single-line domestic electrical installation, high and low voltage circuits (part 2).

• Lecture 10: Drawing of a complete single-line electrical panel for domestic electrical installation.

• Lecture 11: Principles of Mechanical Drawing, Multiview Drawing.

• Lecture 12: Drawing sections or semi-sections and sizing mechanical components.

• Lecture 13: Electronic Drawing, drawing of basic electronic components and circuits.

Short Laboratory Description

The laboratory part of the course aims to train students in the basic principles of Technical Drawing. The aim is to get acquainted with the design rules in the Electrical and Mechanical Drawing. Computer Aided Design (CAD) software is installed to run the lab, which is installed on all the computers in the laboratory and individual for each student. Supportive material for preparing students before each exercise is in e-class.

Laboratory Experiments

Lab 1: Introduction to drawing with PC. Familiarity with CAD environment. Drawing with absolute precision. Exploitation of patterns and design tools to increase productivity in drawing. Different layers. Define type and line thickness. Design of basic geometric shapes.

Lab 2: Drawing of geometric shapes. Accelerate drawing by exploiting characteristic design points. Introduction to Electrical drawing with CAD. General design of symbols in electrical drawing. Single-line and multi-line diagrams. Design techniques for capturing a multi-line diagram based on the single-line diagram. Rules for drawing symbols (thickness and types of lines) and understanding the design of Multi-line and single-line circuit diagrams. Methodology for numbering the pipes in the single-line diagram.

Lab 3: Multi-line and single-line diagrams of a simple switch as well as a socket power supply. Design of the multi-line and single-line diagrams of a simple electrical installation, which includes simple switches, power supplies and luminaires. Methodology for numbering the pipes in the single-line diagram. The necessary symbols of the elements for the single-line and multi-line diagram are given.

Lab 4: Multi-line and single-line diagrams of komitatter switch and group selection switch. Lighting circuits design. Methodology for numbering the pipes in the single-line diagram. The necessary symbols of the elements for the single-line and multi-line diagram are given.

Lab 5: Multi-line and single-line diagrams of alternate switches. Advanced lighting circuits design. Methodology for numbering the pipes in the single-line diagram. The necessary symbols of the elements for the single-line and multi-line diagram are given.

Lab 6: Multi-line and single-line low voltage diagrams of Bells and Locks in a domestic electrical installation. The necessary symbols of the elements for the single-line and multi-line diagram are given.

Lab 7: Multi-line and single-line high & low voltage diagrams of stair lighting Locks in a domestic electrical installation. The necessary symbols of the elements for the single-line and multi-line diagram are given.

Lab 8: Single-line diagram of a complete domestic electrical installation. Design of a single-line electrical installation diagram on the floor plan of a house, which can include various electrical appliances, all types of switches, lamps, power supplies, etc. The necessary symbols of the elements for the single-line diagram are given. (part 1)

Lab 9: Single-line diagram of a complete domestic electrical installation. Design of a single-line electrical installation diagram on the floor plan of a house, which can include various electrical appliances, all types of switches, lamps, power supplies, etc. Numbering of pipes in the single-line diagram of a complete domestic electrical installation. The necessary symbols of the elements for the single-line diagram are given. (part 2)
Lab 10: Single-line diagram of a complete electrical table (panel) diagram for domestic electrical installation. The necessary symbols of the elements for the single-line diagram are given. The single-line diagram of a complete domestic electrical installation is given.
Lab 11: Mechanical Drawing, Multiview drawing, Sections and semi-sections drawing, Dimensions.
Lab 12: Repetition of an exercise for students that missed no more than two exercises.

(4) TEACHING and LEARNING METHODS-EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face in classroom and lab</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Course notes for theory lectures at e-Class.
• Support of the learning process with e-Class platform (for announcements, note distribution, additional material, resources, bibliography, etc.)
• Specialized software for electronic design, Computer Aided Design (CAD) software (available free educational version).
• There is also study material in eClass of the theory and technicalities of drawing.</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>Activities</th><th>Semester course load</th></tr>
<tr><td>Theory lectures</td><td>13</td></tr>
<tr><td>Laboratory exercises</td><td>13</td></tr>
<tr><td>Study of the relevant theory covered by the laboratory exercises. Study of the electric diagrams and connections requested by the laboratory exercises.</td><td>20</td></tr>
<tr><td>Completion of projects on the subjects, problems and comments introduced during the lectures.</td><td>14</td></tr>
<tr><td>Preparation of laboratory exercises.</td><td>20</td></tr>
<tr><td>Independent study of lectures and bibliography.</td><td>20</td></tr>
<tr><td>Total
(25 hours course load per credit)</td><td>100 hours (4 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><u>A. Evaluation of Theory part:</u>
• Final written exam (in computer, CAD program) that includes combinational exercises from the whole study material at the end of the Semester.

<u>B. Evaluation of Lab part:</u>
• Correction and assessment of written exercises/drawings (electronic files) submitted at the end of each laboratory exercise.</td></tr>
</table>

	Remarks: • Final grade is derived from weighted average of theory grade and lab grade with coefficients 70% and 30% respectively. • Evaluation is done in the greek language. • Evaluation process and criteria are posted on the course webpage at e-Class.

(5) RECOMMENDED BIBLIOGRAPHY

- *Suggested bibliography:*

- Vovos Panagis, Topalis Evangelos, Technical Drawing for Electrical Engineers, 2nd edition, Ziti Publications, 2015, ISBN: 978-960-456-462-0.
- MouroutsosS, Malliaris G., Technical drawing, 3rd edition. Tsotras Publications, 2014, ISBN: 978-618-5066-53-6.
- Gouti A., Electrical Drawing II, Ion Publications, 2008.
- Karatrasoglou I.B., Electrical Drawing.Ηλεκτρολογικό σχέδιο, Ion Publications, 1998.
- Papamitoukas Vasileios, Mechanical Drawing, University Studio Press Publications, 1982.

- *Related academic journals:*