COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	EEE.1.3	SEMESTER	1
COURSE TITLE	Electric Circuits I		

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	5	
Laboratory exercise	1	
Total	6	6
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:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (official)
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (English)
COURSE WEBSITE (URL)	eee.uniwa.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*

This course is designed to introduce the student to the field of electro-science elements and DC Electrical Circuits analysis. It aims to provide the electrical engineer with the proper tools in order to provide solutions to electrical issues that will arise in his/her working life.

Upon successful completion of the course the student will be able to:

• understand the basic elements of electro-science, such as voltage, current, resistor-resistance, capacitor-capacitance, coil-self inductance-mutual inductance, power, etc.

• recognize the capabilities that electricity provides in order to understand and study various electrical engineering applications.

• describe the fundamental concepts and methods for the analysis of various electrical circuits and to interpret laws and rules of electrical engineering.

• solve electric circuits, using systematic methods and mathematical models.

• analyze and control electrical circuits applicable to electrical installations.

• design and construct electric circuits.

• propose solutions to technical issues associated with the application of electricity.

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

The course aims at fostering the following capabilities:

• Search for, analysis and synthesis of data and information, with the use of the necessary technology

• Adapting to new situations

• Teamwork

• Criticism and self-criticism

(3) SYLLABUS

A. THEORY

• Mathematical background. Electric charge, Coulomb's law – electric force, electric field, electric field intensity, electrostatic potential, voltage, theoretical basis of Kirchhoff's voltage law, dielectrics, capacitors, electric displacement, polarization, electric flux, electric field Gauss's law, capacitor & capacitance, energy and force of electric field, electric current, current density, theoretical basis of Kirchhoff's current law, Ohm's law, resistor & resistance, Joule losses, non linear resistors, resistors-conductors-insulators, electromotive force, magnetism, magnetic flux density, magnetic field of current, Lorentz force, Laplace force,

magnetic flux, magneto-motive force, Ampere law, coil, total magnetic flux, self-inductance, mutual inductance, Faraday law, Lenz law, energy and force of magnetic field, voltage production by rotating coil in magnetic field.
• Electric circuits modelling.
• Active and passive components.
• Components with fixed and variable parameters.
• Voltage & current Relations.
• Linearity.
• Elements of the topology of networks.
• KCL & KVL.
• Mesh current and node voltage methods for linear networks analysis.
• Electrical networks theorems (superposition, Thevenin, Norton, Kennelly, Millman, maximum power on load resistance).
• Simple network time-domain analysis (RC & RL, transient and steady state).

B. LABORATORY

• Laboratory safety regulations.
• Basic concepts. Laboratory equipment.
• Ohm's law. Nonlinear Resistors.
• KCL & KVL.
• Thevenin's theorem.
• Norton's theorem.
• Maximum power transfer theorem
• Transient and steady state for RC circuit.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Lectures, laboratory practice
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of digital repositories of learning objects (e.g. https // Phet.colorado. Edu) • Use of software (e.g. Matlab, Spice, Mathematica, Mathcad)
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	65
Personal study	65
Laboratory exercises	13
Laboratory Technical Reports	13
Exercises	26
Tutorial & interactive teaching	13
Exams preparation	15
Course total	*210*

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*	I. Final written exam of theoretical part includes (80% of the total score): - Solving theoretical problems relating to the subject of the course - Description / evidence theory data - Interim written assessments during the semester.

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.	II. Examination laboratory part comprising (20% of the total score): - Weekly individual written exam - Weekly group technical reports - Written final exam - Practical final examination

(5) ATTACHED BIBLIOGRAPHY

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9. Μάργαρης Ν. Ι. (2010). ΑΝΑΛΥΣΗ ΗΛΕΚΤΡΙΚΩΝ ΚΥΚΛΩΜΑΤΩΝ. Θεσσαλονίκη: ΤΖΙΟΛΑΣ
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Fowler R. J. (1999). ΗΛΕΚΤΡΟΤΕΧΝΙΑ AC-DC. 4η Έκδοση. Θεσσαλονίκη: ΤΖΙΟΛΑΣ
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14. Στυλ. Ν. Φραγκόπουλος (1993). Ηλεκτρικά κυκλώματα και το ηλεκτρομαγνητικό πέδιο. Τόμος Ι. Αθήνα. Εκδόσεις ΙΩΝ.
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