COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	EEE.2.3	SEMESTER	2
COURSE TITLE	Electric Circuits II		

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 in the field of AC Electrical Circuits analysis. It aims to provide in the electrical engineer the proper tools in order to provide solutions to electrical issues that will arise in his/her life working.
Upon successful completion of the course the student will be able to:
• recognize the possibilities that electricity providing 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 electrical 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	*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…*
	…….

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

• Alternative current sinusoidal theory in steady state: voltage, current, phasor representation – effective values, impedance for resistor, inductor, capacitor-Ohm law. Phasor Kirchhoff current law, Phasor Kirchhoff voltage law, active power, reactive power, apparent power, power factor.
• Alternative current sinusoidal applications: Power factor correction, filters, resonance – quality factor.
• Electro-science theorems: superposition, Thevenin, Norton, Millman, Kennelly, Blondel, maximum power theory on load impedance – load adjustment, maximum power in ac transmission line. Circuit analysis using matrices, Mesh current and node voltage methods.
• Multi-phase systems with emphasis in three-phase: Three phase signals, symmetrical and no-symmetrical three phase system, positive-negative-zero sequence system, Three phase

systems – structure / number of wires, phase to ground, phase to phase voltage, line current, phase current, source and load connections (delta & Wye). Electrical circuits with symmetrical and asymmetrical loads. AC power and compensation calculations. Short-circuits, open-circuits calculations, no-symmetrical power systems analysis with sequence components. Poly-phase systems and circuits.
• Quadripole-equivalent descriptions & connections.
• Magnetic circuits, transformers, introduction to electric machines.

B. **LABORATORY**
• Laboratory safety regulations.
• Basic concepts. Laboratory equipment.
• Ohm's law & Kirchhoff in single phase circuits.
• Resonance in R-L-C filter.
• Mesh current method.
• Power factor measurement.
• Thevenin & Norton theorem.
• Active, re-active and apparent power measurement in three phase (symmetrical and no-symmetrical) systems.

(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*	
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.*	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. II. Examination laboratory part comprising (20% of the total score): - Weekly individual written exam - Weekly group technical reports - Written final exam - Practical final examination

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

(5) ATTACHED BIBLIOGRAPHY

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