



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Α.ΔΙ.Π.
ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ & ΠΙΣΤΟΠΟΙΗΣΗΣ
ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΣΤΗΝ ΑΝΩΤΑΤΗ
ΕΚΠΑΙΔΕΥΣΗ

HELLENIC REPUBLIC
H.Q.A.
HELLENIC QUALITY ASSURANCE
AND ACCREDITATION AGENCY

ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ ΑΝΑΤΟΛΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ ΚΑΙ ΘΡΑΚΗΣ
ΜΟΝΑΔΑ ΔΙΑΣΦΑΛΙΣΗΣ ΤΗΣ ΠΟΙΟΤΗΤΑΣ ΤΕΙ ΑΜΘ

Quality Assurance in Higher Education Course Data Collection Form

ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ
ΑΝΑΤΟΛΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ & ΘΡΑΚΗΣ
ΑΓΙΟΣ ΛΟΥΚΑΣ,
65404 ΚΑΒΑΛΑ

EASTERN MACEDONIA AND THRACE
INSTITUTE OF TECHNOLOGY
AGIOS LOUKAS
65404 KAVALA

COURSE OUTLINE

(1) GENERAL

NAME AND SURNAME OF LECTURER	KONSTANTINOS KARAKOULIDIS		
SCHOOL	of Technological Applications		
ACADEMIC UNIT	Department of Electrical Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	C3	SEMESTER	3 th
COURSE TITLE	Electrical Machines I		
INDEPENDENT TEACHING ACTIVITIES <i>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</i>	WEEKLY TEACHING HOURS	CREDITS	
Lectures and Exercises	3 Th. + 2 Lab.	6	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Specialised general Knowledge		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	http://eclass.teikav.edu.gr/ED128/		

(2) LEARNING OUTCOMES

<p>Learning outcomes <i>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.</i></p> <p>Consult Appendix A</p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i> 																			
<p>Aim of this course is to understand the students the structure and operation of Transformers and DC Electrical Machines. The objective of the course is to acquire the necessary theoretical background and especially the familiarization with mathematic analysis principles for the study of variables, parameters, behavior and control of these machines. The deepening in the different sections that will be presented will be achieved by solving selected exercises. The modules of the course relate to:</p> <p>Transformers: Construction, Theory, operation of open-circuit and short-circuit. Experimental determination transformer parameters. Parallel operation of transformers and autotransformers.</p> <p>DC Machines: Construction, operating principle, windings. DC generators and motors. Different types and applications of dc machines. Starting and speed control. Laboratory Exercises of Transformers and DC Machines.</p> <p>Upon successful completion of this course the student will be able to:</p> <ul style="list-style-type: none"> • Understand the operation of transformers and DC machines. • Understand the construction parts of transformers and DC electrical machines. • Be able to analyze the operation of transformers and dc electrical machines through the respective equivalent circuits. • Understand the basic design elements of transformers and dc electrical machines. • Be able to determine experimentally the parameters of equivalent circuits of transformers and dc electrical machines. • To carry out tests and measurements in laboratory applications. 																			
<p>General Competences <i>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?</i></p> <table border="0"> <tr> <td><i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i></td> <td><i>Project planning and management</i></td> </tr> <tr> <td><i>Adapting to new situations</i></td> <td><i>Respect for difference and multiculturalism</i></td> </tr> <tr> <td><i>Decision-making</i></td> <td><i>Respect for the natural environment</i></td> </tr> <tr> <td><i>Working independently</i></td> <td><i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i></td> </tr> <tr> <td><i>Team work</i></td> <td><i>Criticism and self-criticism</i></td> </tr> <tr> <td><i>Working in an international environment</i></td> <td><i>Production of free, creative and inductive thinking</i></td> </tr> <tr> <td><i>Working in an interdisciplinary environment</i></td> <td>.....</td> </tr> <tr> <td><i>Production of new research ideas</i></td> <td><i>Others...</i></td> </tr> <tr> <td></td> <td>.....</td> </tr> </table>		<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>	<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>	<i>Decision-making</i>	<i>Respect for the natural environment</i>	<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>	<i>Team work</i>	<i>Criticism and self-criticism</i>	<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>	<i>Working in an interdisciplinary environment</i>	<i>Production of new research ideas</i>	<i>Others...</i>	
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(3) SYLLABUS

I.	Types and construction of Transformers - The ideal Transformer - Theory of Operation of Real Single-Phase Transformers.
II.	The Equivalent Circuit of a Transformer - The Per-Unit System of Measurements - Transformer Voltage Regulation and Efficiency.
III.	Transformer Taps and Voltage Regulation - The Autotransformer - Three-Phase Transformers.
IV.	Three-Phase Transformation Using Two Transformers - Transformer Ratings and Related Problems - Instrument Transformers.
V.	A Simple Rotating Loop between Curved Pole Faces - Commutation in a Simple Four-Loop DC Machine - Commutation and Armature Construction in Real DC Machines - Problems with Commutation in Real Machines.
VI.	The Internal Generated Voltage and Induced Torque Equations of Real DC Machines - The Construction of DC Machines - Power Flow and Losses in DC Machines.
VII.	Introduction to DC Motors - The Equivalent Circuit of a DC Motor.
VIII.	The Magnetization Curve of a DC Machine - Separately Excited and Shunt DC Motors.
IX.	The Permanent-Magnet DC Motor - The Series DC Motor.
X.	The Compounded DC Motor - DC Motor Starters -The Ward-Leonard System and Solid-State Speed Controllers.
XI.	DC Motor Efficiency Calculations.
XII.	Introduction to DC Generators - The Separately Excited Generator - The Shunt DC Generator.
XIII.	The Series DC Generator - The Cumulatively Compounded DC Generator - The Differentially Compound DC Generator.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face (in the classroom)	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Presentation with the help of slides (Theory and Laboratory), Website of the course with supporting and auxiliary material. Simulation Software. Contact with e-mail.	
TEACHING METHODS <i>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</i>	Activity	Semester workload
	<i>Lectures</i>	39
	<i>Laboratory practice</i>	39
	<i>Independent study</i>	72
	Course total	150
	STUDENT PERFORMANCE EVALUATION <i>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>	<u>Theoretical Course</u> Final written examination (100%) which includes problems solving from different sections of the course. <u>Laboratory Course</u> I. Individual work (40%) II. Final Exam (60%) with development questions throughout the courses.

(5) ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

- *Related academic journals:*

- C. I. Hubert, "Electrical Machines", ION, 2008.
- S. J. Chapman, "Electrical Machines AC-DC", TZIOLAS, 2009.
- P. Malatestas, "ELECTRICAL MACHINES", TZIOLAS, 2011.
- S. Umans, "Fitzgerald and Kingsley's Electric Machinery", 7th Edition, McGraw-Hill Education - Europe, 2013.
- I. BOLDEA, L. TUTELEA, "Electric Machines", Taylor & Francis Inc, 2009.
- Gross, Charles Arthur, "Electric Machines", Taylor & Francis Inc, 2006.