


Discipline	ELECTRICAL APPARATUS part I code: 36 winter semester	
Specialty	RENEWABLE ENERGY SOURCES	
ECTS credits: 7	Form of assessment: Exam	
Lecturer	Assoc. prof. PhD Eng. / scientific title/ Tatyana Dimova /name/ Room 834E Phone: +359 898472772 E-mail: t.dimova@tu-varna.bg	
Department	ELECTRICAL ENGINEERING AND ELECTROTECHNOLOGIES	
Faculty	ELECTRICAL ENGINEERING	
<p>Learning objectives:</p> <p>Compulsory for the all full-time and part-time undergraduate students of specialty of Renewable energy sources - BEng programme of the Faculty of Electrical Engineering.</p> <p>The aim of the course is to give the knowledge to the students for the main systems and phenomena of the electrical apparatus as well as their constructions with respect to their selection, support, and maintenance as well as the methods for design, constructing and testing of electrical apparatus.</p> <p>The main topics concern: thermal processes, electrodynamic forces, magnetic circuit, theoretical models for analysis and investigations of electromagnetic systems. Principles of operation, functions and construction of different types of electrical apparatus. Methods for design, constructing and testing of electrical apparatus. Examples of inverse field source problems, material properties determination problems and constructive design optimization problems are introduced. Electromagnets, actuators and etc. Control electrical apparatus, electrical apparatus for distribution and protection, actuators.</p>		
CONTENTS:		

Training Area	Hours lectures	Hours exercises
Introduction to Electromagnetism. Electrodynamical forces in apparatus.	5	
Electromagnetic systems - classification, basic parameters, application.	5	
Magnetic flux distribution in different types of electromagnetic systems.	5	
Electromagnetic forces in alternating and direct current electromagnetic systems. Energy balance in electromagnetic.	10	
Contact systems in electrical apparatus.	5	
Laboratory exercises		
Principles of operation, functions and construction of different types of electrical apparatus.		2
Investigation of magnetic conductivities in air gaps.		2
Investigation of the distribution of magnetic fluxes in solenoid, clapper type, "E" type magnetic core and others.		2
Investigation of an electromagnet with alternating current power supply.		3
Investigation of branched magnetic circuits.		3
Investigation of an electromagnet with direct current power supply.		2
Investigation of combined electromagnetic systems with permanent magnets.		2
Investigation of static and dynamic characteristics of electromagnetic systems.		2
Investigation of a rotary armature electromagnet.		2
Comparative analysis of electromagnets with different configurations.		2
Investigation of heat losses in electromagnetic for alternating and direct current.		2
Investigation of electrodynamic forces between busbars.		2
Investigation of contact resistances in electrical devices.		2
Investigation of electromagnetic executive devices.		2
Course paper		
Mathematical calculation of electromagnetic systems with different types and values of power supplies.		5
Calculation of basic electromagnetic and geometric dimensions of driving electromagnetic systems		5
Calculation and construction of the characteristics of countervailing forces in electrical devices		5
TOTAL: 75 h	30	45.

