

DESCRIPTION OF THE COURSE

Name of the course: Electrical machines I	Code: MpEE41	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 45 hours LW – 30 hours	Number of credits: 7

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory subject for Additional training students for MSc Degree in Electrical Engineering intended for Vocational Bachelors who have graduated from the professional field of 5.2 Electrical Engineering, Electronics and Automation, Field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: To introduce students to the general issues concerning the design, principle of operation and characteristics of the following types of electrical machines – transformers, induction motors, special induction motors and induction micromotors. The physical nature of electromagnetic phenomena in electrical machines is discussed on the basis of the respective mathematical apparatus. The main relationships from electrical machines theory are derived. The lecture material is presented from both the viewpoint of design and practical application of electrical machines in electric power engineering and electric drives.

DESCRIPTION OF THE COURSE: Basic topics: Transformers – design and principle of operation. Voltage equations, equivalent diagrams and vector diagrams of single-phase two-winding transformer. Transformer operation at no-load, short circuit and loading. Calculation of the transformer magnetic circuit. Schemes and groups of connection of transformers. Parallel operation. Voltage control in transformers. Autotransformers – equations, equivalent diagrams and vector diagrams. Three-winding transformers - equations and equivalent diagrams. No-load, short-circuit and loading modes of three-winding transformers. Asymmetrical modes and transients in transformers. Theory of a.c. machines. Windings of a.c. machines. Electromotive force in a.c. windings. Magnetomotive force in a.c. windings. Induction machine at locked rotor. Referring the rotor winding to stator winding. Voltage equations and equivalent diagrams of induction machines. Operation of induction machine as motor, generator and counterswitching mode – power relationships and vector diagrams. Rotating torques, circular diagram and characteristics of induction machine. Starting of three-phase induction motors and speed control. Squirrel cage induction motors with current displacement in rotor winding. Operation of induction motors under non-rated conditions. Special induction machines. Single-phase and capacitor induction motors. Induction micromachines.

PREREQUISITES: Mathematics, Physics, Mechanics, Machine elements, Theoretical Electrical Engineering, Electrical measurements.

TEACHING METHODS: Lectures and Laboratory exercises. The lectures are delivered by multimedia. The exercises are provided with a manual and are conducted in a laboratory equipped with specialized stands. The students prepare an individual report for each exercise and defend it before the supervising lecturer.

METHOD OF ASSESSMENT: Laboratory exercises (20 %), course work with two tasks (20 %) and written exam (60 %).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Ангелов А., Д. Димитров. Електрически машини, част първа, София, Техника, 1988; 2. Волдек А. Електрически машини, София, Техника, 1978. 3. Динов В., Шишкова Ст. Електрически машини – първа част, Пловдив, Академично издателство на Аграрния университет, 2002. 4. Соколов Е. Изследване и изпитване на електрически машини, София, Техника, 1977. 5. Дончев Д., Митев Е., Божилов Г. Ръководство за семинарни упражнения по електрически машини, София, Техника, 1976. 6. Димитров Д., Ваклиев И., Сотиров Д., Стоянов М. Ръководство за изпитване на електрически машини, София, Техника, 1991.

DESCRIPTION OF THE COURSE

Name of the course: Electrical apparatus I	Code: MpEE42	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 45 hours LW – 30 hours	Number of credits: 7

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory course for full-time students, majoring in Electrical Engineering at the Faculty of Electronics and Automation, TU-Sofia, Plovdiv Branch, supplementary study for obtaining the qualification degree Master of Science after completing their Professional Bachelor's degree course in the professional field 5.2 Electrical Engineering, Electronics and Automation, Area 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: After completion of the course the students will be acquainted with the underlying essence of the thermal, electrodynamic and electromagnetic processes and phenomena, as well as with the application of the studied dependencies for calculation of the components of electrical apparatus.

DESCRIPTION OF THE COURSE: Main topics: Electrodynamic phenomena in electrical apparatus – methods for calculating the electrodynamic forces and moments at direct, alternating and short circuit currents; Heating and cooling in electrical apparatus – heat transfer, stable and transient processes at heating and cooling, at short circuit, thermal stability of the apparatus; Electromagnetic systems – magnetic circuits for direct and alternating current, electromagnets and magnetic circuits with permanent magnets, dynamics and time of triggering the electromagnets, calculation of their coils; Static electromagnetic devices – inductors, reactors etc.; Electromagnetic actuators, electromagnetic sensors and special transformers.

PREREQUISITES: Physics, Mathematics, Mechanics, Theoretical Electrical Engineering, Electrical materials, Electrical Measurements.

TEACHING METHODS: Lectures, prepared as multimedia presentations and laboratory work for conducting experiments on the topics of the lectures.

METHOD OF ASSESSMENT: Laboratory work (15%), course work (20%) and written examination (65%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Alexandrov A., Electrical apparatus – part I: Electromagnetic and thermal problems, Heron Press, Sofia, 2002, ISBN 954-580-117-4 (in Bulgarian); 2. Maslarov I., S. Shishkova-Panaiotova, Manual for laboratory exercises on electrical machines and apparatus, Plovdiv, 2000 (in Bulgarian); 3. Alexandrov A., H. Gergova, V. Piperov, Manual for seminars on electrical apparatus, Sofia, 2000, ISBN 954-438-293-3 (in Bulgarian); 4. Malamov D., Design of driving electromagnets: Part One: DC voltage electromagnets, Part Two: AC voltage electromagnets for power frequency, Plovdiv, MACROS, 2013, ISBN 978-954-561-329-6 (in Bulgarian); 5. Pisarev A., A. Lichev, Design guide for low voltage switchgear, Sofia, Technica, 1987 (in Bulgarian).

DESCRIPTION OF THE COURSE

Name of the course: Electrical Power Engineering	Code: MpEE43	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 45 hours S – 0 hours LW – 0 hours	Number of credits: 5

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Magister's degree, specialty Electrical Engineering, Professional orientation 5.2. Electrical Engineering, Electronics and Automation, Field 5. Technical Sciences, who graduated from "Professional Bachelor" in specialties from a professional field 5.2. Electrical engineering, electronics and automation.

AIMS AND OBJECTIVES OF THE COURSE: The subject aims of the course is to provide students with knowledge in the field of electrical power engineering, in particular on the structures of electrical systems, electrical equipment in electrical networks, electrical regimes, short-circuit currents and methods for their calculation, electrical and mechanical sizing of open power lines, stability of electrical systems, relay protection and emergency automation in electrical networks and systems, as well as to be able to apply the acquired knowledge to solve engineering problems.

DESCRIPTION OF THE COURSE: The main topics concern: Structure of the electric power system, electric plants; Quality of the electric power; Electrical equipments in electrical grids – open-air and cable electric transmission network, power generators and transformers, substitute schemes and parameters, working regimens on star centers of electrical grids; Currents of the a short circuit – three-phase short circuit, over transitional, transitional and stability currents of a short circuit, asymmetric short circuit, methods for calculation of short circuit; Adjustment of voltage in electrical grids – fall and waste of the voltage, schemes and means for adjustment; Estimate of electric transmission network – assessment of section conductor, isolation and isolation distance, mechanical load; Relay's defense and anti-failure automation – mode devices, current's and pointed out's modes, earth's and voltage's modes, mode defenses of electric transmission networks and transformers; Stability on electrical systems; Ecology influence.

PREREQUISITES: Theoretical Electrical Engineering, Physics, Electrical Materials, Electrical machines, Electrical devices, Safety Engineering.

TEACHING METHODS: Lectures, using slides, case studies.

METHOD OF ASSESSMENT: Written exam at the end of the semester (100%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Генов Л., Електроенергетика, София, ДИ "Техника", 1985; 2. Нотов П., С. Неделчева, Електроенергетика I, II, III и IV част, София, 2009, 2017; 3. Нотов П., Преходни процеси в електроенергийните системи, София, ДИ "Техника", 1985; 4. Вълчков П., Електрически мрежи и системи, София, ДИ "Техника", 1989; 5. Кирчев В. и С. Стефанов, Ръководство за курсова задача по Електроенергетика, Пловдив, Принтекс, 2013.

DESCRIPTION OF THE COURSE

Name of the course: High Voltage Engineering	Code: MpEE44	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 30 hours S – 0 hours LW – 30 hours	Number of credits: 5

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty Electrical Engineering, Professional orientation 5.2. Electrical Engineering, Electronics and Automation, Field 5. Technical Sciences, who graduated from "Professional Bachelor" in specialties from a professional field 5.2. Electrical engineering, electronics and automation.

AIMS AND OBJECTIVES OF THE COURSE: The subject aims at introducing students to new theoretical knowledge and practical skills in different fields: isolation characteristics of electric high voltage systems; over-voltages in electric networks and devices, over-voltage protection, selection of isolation levels in the high voltage systems.

DESCRIPTION OF THE COURSE: The main topics concern: Insulation characterizations of electric power equipment and grid – electrical break in air, variety test voltage of equipment, insulation characterizations of insulation, effect crown, skin discharges; Stability over-voltage, resonance over-voltages, commutation over-voltages – by turn off reactive loads, by turn on and turn off distribution lines; Lightning's over-voltages – electromagnetic processes, characterizations of lightning activity, valve down-leads, lightning's over-voltage in electrical outfits; Coordination of isolation, choice of isolation levels. Electromagnetic waves in power lines.

PREREQUISITES: Theoretical Electrical Engineering, Physics, Electrical Materials, Semiconductor Materials, Safety Engineering.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work whit protocols and defence.

METHOD OF ASSESSMENT: Written exam in the middle and end of the semester (80%), laboratory work (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Стефанов С., В. Русева, Д. Димов, Записки лекции по Техника на високите напрежения, Русе, 2003; 2. Влъчев М., М. Георгиев, А. Тодорова, Г. Дюстабанов, П. Тошев, Техника на високите напрежения. ДИ Техника, София, 1980; 3. Неделчев Н., С. Неделчева, Техника на високите напрежения, ТУ- София, 20015/2016; 4. Неделчева С., М., Мацанков, Техника на високите напрежения – Тестове, Технически университет – София, 2014; 5. Воробьев Г. А. и др., Физика диелектриков, ТПУ, Томск, 2003; 6. Генов Л., Техника на високите напрежения в електроенергийните системи, ДИ "Техника", София, 1992; 7. Нанчев Н., М. Георгиев, Техника на високите напрежения, ДИ "Техника", София, 1997; 8. Иванов Кр., П. Петров, Техника на високите напрежения, Ръководство за лабораторни упражнения. "Принт", Габрово, 2000; 9. Михалков А. В., Техника високих напрежений в примерах и задачах, Высшая школа, Москва, 1965; 10. Генчев М., С. Стефанов – презентационни записки по „Техника на високите напрежения“. xpsd.

DESCRIPTION OF THE COURSE

Name of the course: Technologies in electrical engineering and electronic	Code: MpEE45	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 30 hours S – 0 hours LW – 25 hours	Number of credits: 5

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Magister's degree, specialty Electrical Engineering, Professional orientation 5.2. Electrical Engineering, Electronics and Automation, Field 5. Technical Sciences, who graduated from "Professional Bachelor" in specialties from a professional field 5.2. Electrical engineering, electronics and automation.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is students to gain knowledge of specific technologies on conventional technologies for physical and chemical processing of materials, modern technologies for processing and production of parts and structural elements, and technologies for the production of electronic products, as well as to be able to apply the acquired knowledge to solve engineering problems.

DESCRIPTION OF THE COURSE: The main topics concern: Technological process – definition and features; Specific technologies and equipments for creation of electrotechnics and electronic manufactures; Specific technologies for changing inner and surface structure of materials; Technologies for details and node production in electrotechnics and electronic industry; Technologies for products of EEP; Assembling technologies; Estimation of the technological processes qualities; Quality assessment of technological processes.

PREREQUISITES: Theoretical Electrical Engineering, Chemistry, Physics, Electrical Materials, Electrical machines, Electrical devices, Semiconductor Materials, Theory of electronic circuits.

TEACHING METHODS: Lectures, using slides, case studies.

METHOD OF ASSESSMENT: Written exam at the end of the semester (80%) and laboratory work (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Даскалов В., Технологии на електрическите машини и апарати, София, ИПК на ТУ, 1997; 2. Масларов И, Й. Шопов, Технологии в електротехниката и електрониката, София, Авангард Прима, 2005; 3. Филипков, Ф., Конструкция и технология на полупроводникови прибори, Техника, София, 1987; 4. Даскалов, В., Ръководство за лабораторни упражнения по технология на електрическите машини и апарати, София, 1997; 5. Георгиев Н., Ръководство за лабораторни упражнения по технологии в електрониката, София, 1997; 6. К. Хинов, Ръководство за курсова работа по производствени технологии II, София, 2004.

DESCRIPTION OF THE COURSE

Name of the course: Electrical machines II	Code: MpEE46	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 45 hours LW – 30 hours	Number of credits: 8

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory subject for Additional training students for MSc Degree in Electrical Engineering intended for Vocational Bachelors who have graduated from the professional field of 5.2 Electrical Engineering, Electronics and Automation, Field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: To introduce students to the general issues concerning the design, principle of operation and characteristics of the following types of electrical machines – synchronous machines, d.c. machines, micromachines and electrical machines used in automation. The physical nature of electromagnetic phenomena in electrical machines is discussed on the basis of the respective mathematical apparatus. The main relationships from electrical machines theory are derived. The lecture material is presented from both the viewpoint of design and practical application of electrical machines in electric power engineering and electric drives.

DESCRIPTION OF THE COURSE: Basic topics: Synchronous machines – design and principle of operation. Armature reaction at resistive, resistive-inductive, inductive and capacitive load. Magnetic field and parameters of synchronous machines. Method of the two reactions for salient-pole synchronous machine. Voltage equations and vector diagrams of saturated and non-saturated synchronous machine. Characteristics of synchronous generators. Parallel operation of synchronous machines. Modes of operation of synchronous machines at parallel operation. V-shape characteristics. Angular characteristics. Synchronous motors – vector diagram, operational characteristics and starting. Synchronous compensators. Asymmetrical modes and transients in synchronous machines. Design, principle of operation and modes of operation of d.c. electrical machines. Windings of d.c. machines. Electromotive force in armature winding. Electromagnetic torque and electromagnetic power. Armature reaction and its influence on machine operation. Commutation in d.c. machines. D.c. generators. Characteristics of independent excitation generator. Parallel excitation generators – conditions for self-excitation and characteristics. Characteristics of series and compound generators. Parallel operation of d.c. generators. D.c. motors – types and characteristics. Steady operation. Starting and speed control of d.c. motors. Braking modes of d.c. motors. A.c. commutator motors. D.c. micromachines. Brushless d.c. motors. Main dimensions, volume and weight of electrical machines. Heating and cooling of electrical machines.

PREREQUISITES: Mathematics, Physics, Mechanics, Machine elements, Theoretical Electrical Engineering, Electrical measurements, Electrical machinery part 1.

TEACHING METHODS: Lectures and Laboratory exercises. The lectures are delivered by multimedia. The exercises are provided with a manual and are conducted in a laboratory equipped

with specialized stands. The students prepare an individual report for each exercise and defend it before the supervising lecturer.

METHOD OF ASSESSMENT: Laboratory exercises (25 %) and written exam (75 %).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Ангелов А., Д. Димитров. Електрически машини, част втора, София, Техника, 1988. 2. Волдек А. Електрически машини, София, Техника, 1978. 3. Динов В., Шишкова Ст. Електрически машини – втора част, Пловдив, Академично издателство на Аграрния университет, 2004. 4. Соколов Е. Изследване и изпитване на електрически машини, София, Техника, 1977. 5. Дончев Д., Митев Е., Божилов Г. Ръководство за семинарни упражнения по електрически машини, София, Техника, 1976. 6. Димитров Д., Ваклиев И., Сотиров Д., Стоянов М. Ръководство за изпитване на електрически машини, София, Техника, 1991.

DESCRIPTION OF THE COURSE

Name of the course: Electrical apparatus II	Code: MpEE47	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 45 hours LW – 30 hours	Number of credits: 7

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory course for full-time students, majoring in Electrical Engineering at the Faculty of Electronics and Automation, TU-Sofia, Plovdiv Branch, supplementary study for obtaining the qualification degree Master of Science after completing their Professional Bachelor's degree course in the professional field 5.2 Electrical Engineering, Electronics and Automation, Area 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: After completion of the course the students will have acquired knowledge of the physical processes and dependencies of the processes of switching in electrical circuits, arcing horns, contact systems and insulation structures of the electrical apparatus.

DESCRIPTION OF THE COURSE: Main topics: Characteristics and conditions for burning and extinguishing an electric arc; Arc extinguishers for direct and alternating current; Switching of electrical circuits, overvoltages at switching etc.; Physical phenomena in the contact area of the electrical connections; Constructions of switching and non-switching contact connections; Contact materials; Insulation construction of electrical apparatus – influencing factors, coordination and protection of the insulation, methods for improving voltage distribution.

PREREQUISITES: Mathematics, Physics, Chemistry, Mechanics, Theoretical electrical engineering, Electrical materials, Electrical measurements, Electrical apparatus – part I.

TEACHING METHODS: Lectures, prepared for multimedia presentation, seminars and laboratory exercises, during which problems are solved and experiments, related to the topics of the lectures are conducted.

METHOD OF ASSESSMENT: Laboratory work (15%), seminar exercises (20%) and written examination (65%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Alexandrov A., I. Yatchev, Electrical Apparatus - part II: Switching and insulation problems, Avangard Prima, Sofia, 2010, ISBN 978-954-323-670-1 (in Bulgarian); 2. Maslarov I., S. Shishkova-Panaiotova, Manual for laboratory exercises on electrical machines and apparatus, Plovdiv, 2000 (in Bulgarian); 3. Tzeneva R., Electrical contact, Sofia, 2004, ISBN 954-9782-97-2 (in Bulgarian); 4. Pisarev A., A. Lichev, Design guide for low voltage switchgear, Sofia, Technica, 1987 (in Bulgarian); 5. Taev I., Fundamentals of the theory of electrical apparatus, Moscow, 1987 (in Russian).

DESCRIPTION OF THE COURSE

Name of the course: Electrical networks and systems	Code: MpEE48	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 30 hours S – 0 hours LW – 15 hours	Number of credits: 5

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Electrical Engineering, Professional orientation 5.2. Electrical Engineering, Electronics and Automation, Field 5. Technical Sciences, who graduated from "Professional Bachelor" in specialties from a professional field 5.2. Electrical engineering, electronics and automation.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the training is after the course students to have knowledge of the structure of MV and LV electrical networks and their elements, the methods and ways of electrical and mechanical sizing of power lines, analysis of mode parameters and voltage and power losses, as well as and be able to apply the acquired knowledge to solve engineering problems.

DESCRIPTION OF THE COURSE: The main topics concern: Open-air networks; Cables; Substitutes schemes and parameters of distribution line; Schemes of open networks low and high voltage; Network with isolated star center; Exchange networks; Grids with effective and non-effective grounded star center; Losses of power; Working parameters of open grids; Working parameters of closed grids; Methods for analyses of established regime of closed grids; Choice of conductors – on heating, on permissible losses of voltage, on minimal outgo of metal; Mechanical measure of open - air distribution line - reliable climatic circumstance, mechanical loads on conduct and safer lightning line, determination place at poles on the trace of open-air electrical lines; Transformer posts in residential areas.

PREREQUISITES: Theoretical Electrical Engineering, Physics, Electrical Materials, Electrical machines, Electrical devices, Electrical Power Engineering, Safety Engineering.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work with protocols and course work description preparation and defence.

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (62%), laboratories (18%) and course work (20%)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Кирчев В., К. Янев и М. Георгиев, Електрически мрежи средно и високо напрежение, Летера, 2006; 2. Неделчева С., Електрически мрежи, Технически университет – София, 2005; 3. Нотов П., С. Неделчева, Електроенергетика I и IV част, София, 2009, 2017; 4. Стефанов С., Ръководство за курсово проектиране по електрически мрежи и системи, Пловдив, Арена Принт, 2021; 5. Николов Д., Електрически мрежи и системи, София, Техника, 1994; 6. Вълчков П., Електрически мрежи и системи, ч.1 и 2. София, Техника, 1989/99; 7. Генков Н., К. Янев, В. Захариев, Д. Николов, М. Боцов. Ръководство за проектирана на електрически мрежи, София, Техника, 1993.

DESCRIPTION OF THE COURSE

Name of the course: CAD systems in Electrical Engineering	Code: MpEE49	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: 4

LECTURER(S):

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Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject for Additional training students for MSc Degree in Electrical Engineering intended for Vocational Bachelors who have graduated from the professional field of 5.2 Electrical Engineering, Electronics and Automation, Field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to acquaint the students with the modern CAD of electrical devices and to provide the students with a basic knowledge for using the CAD systems.

DESCRIPTION OF THE COURSE: Main topics: Automated design and CAD system. Principles of the system approach to design. Structured, block-hierarchical, object-oriented approach and their peculiarities. Structure and components of CAD systems - technical, mathematical, program, information, linguistic, methodological and organizational provision. CAD systems based on Windows. CAD system architecture based on the Finite Element Method. Galerkin Formulation for the two-dimensional Finite Element Method. Analysis of the electromagnetic field of an induction motor. Introduction to the Finite Element Method Magnetics CAD system.

PREREQUISITES: Mathematics, Physics, Theoretical Electrical Engineering, Electrical Machines and Electrical Apparatuses.

TEACHING METHODS: Lectures and Laboratory exercises. The lectures are delivered by multimedia. The exercises are provided with a manual and are conducted in a computer room. The students prepare an individual report for each exercise and defend it before the supervising lecturer.

METHOD OF ASSESSMENT: Laboratory exercises (40%) and continuous assessment (60%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Ячев И., И. Маринова. Числени методи и моделиране на вериги и полета - I част, Технически университет - София, 2011, ISBN 978-954-438-652-8; 2. Ячев И., И. Маринова. Ръководство за лабораторни упражнения по числени методи и моделиране на вериги и полета - I част, Технически университет - София, 2007, ISBN 978-954-438-651-1; 3. Александров А. Компютърно проектиране на електрически апарати, София, Авангард Прима, 2004; 4. Брандиски К., И. Ячева. САД системи в електромагнетизма, София, Сиела, 2002; 5. Кулон Ж. Л., Ж. Сабоннадьер. САПР в електротехнике, Москва, Мир, 1988; 6. Salon S. Finite element analysis of electrical machines, Kluwer Academic Publishers, 1998; 7. Duggal V. CAD Primer, MailMax Publishing, New York, 2000; 8. Meeker D. Finite Element Method Magnetics v. 4.02 User's manual, 2015.

DESCRIPTION OF THE COURSE

Name of the course: Electrical converters and energy efficiency	Code: MpEE50	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 30 hours S – 0 hours LW – 25 hours	Number of credits: 6

LECTURER(S):

Assoc. Prof. Eng. Misho Matsankov, PhD (FEA), tel.: 032 659 686 e-mail: mishel@tu-plovdiv.bg

Assoc. Prof. Eng. Georgi Ganey, PhD (FEA), тел.: 032 659 560, email: gganey@tu-plovdiv.bg

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COURSE STATUS IN THE CURRICULUM: Mandatory discipline from the curricula for training students for the Master's degree program, majors "Electrical engineering, in the professional field 5.2 Electrical engineering, electronics and automation, area 5. Technical sciences.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course, students should be able to use various power converters - operate ready-made converters, develop new systems and objects in which converters are a component, select and supply ready-made converters.

DESCRIPTION OF THE COURSE: Main topics: Application of converters in the processes of generation, transmission and consumption of electricity; Classification of converters according to their main functions; Methods of converting electricity; Main characteristics of the converters in relation to the supply network and in relation to the load; Basic units of converters; Cooling of converters; Overview and comparison of classic and modern converter circuits (AC/DC; AC/AC; DC/AC and DC/DC converters); Methods of control of conversion devices; Selection of complete conversion devices; Regulatory requirements for complete conversion devices; Electromagnetic compatibility; Energy efficiency.

PREREQUISITES: Theoretical Electrical Engineering, Electrical Materials, Electrical Measurements, Electrical Machines, Semiconductor Elements, Digital Circuit Engineering..

TEACHING METHODS: Lectures are delivered as multimedia presentations. Laboratory exercises are conducted with laboratory benches and real devices and computer simulations; The results are systematized in protocols and defended to the leader of the exercise..

METHOD OF ASSESSMENT: Written exam at the end of the semester. The final grade is formed as an average grade of the written work (75%) and the participation in laboratory exercises (25%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Минчев М., Й.Шопов, М.Рац. Преобразователна техника. Сиела, София, 2006; 2. Rashid M. Power Electronics Handbook. Academic Press, London, UK, 2001; 3. Antchev M. Technologies for Electrical Power Conversion, Efficiency and Distribution: Methods and Processes. Hershey, NY, USA, 2010; 4. William B. Principles and Elements of Power Electronics, Glasgow, UK, 2006.