DESCRIPTION OF THE COURSE

Name of the course: **Theoretical electrical engineering**	Code: Mp**EEA21**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 45 hours S – 30 hours LW – 15 hours	Number of credits: **7**

LECTURER(S):
Assoc. Prof. Eng. Nikola Georgiev PhD (FEA), tel.:659581, e-mail:nikola.georgiev@tu-plovdiv.bg
Principal Assistant Eng. Vasilina Zlatanova PhD (FEA), tel.: 659535, e-mail: w_zlatanova@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Mandatory course from the curricula for the training of students preparatory training two-year master's course in the specialty Electrical Engineering, scientific direction 5.2 "Electrical Engineering, Electronics Automation", area 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Electrical Engineering is a fundamental subject and introduces the basic laws and phenomena of electromagnetism and the approaches applied to describe the processes in linear and nonlinear electric and magnetic circuits and with the methods of analysis on these processes in constant, stationary and unfixed modes.

DESCRIPTION OF THE COURSE: The subject aims at introducing students to the electromagnetic theory; the laws applied in analysis on electric and magnetic circuits, and investigation of sinusoid fixed modes, equivalent transformations; methods and theorems of analysis on linear electric circuits; resonance phenomena; linear electric circuits with inductive connections; research on periodic non-sinusoid modes in linear electric circuits; passive and active quadripolars; circuits with distributed parameters, transient processes and three-phase circuits .

PREREQUISITES: The course of lectures and seminars is based on students' knowledge of Mathematics and Physics.

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

METHOD OF ASSESSMENT: Current assessment (70%) and two assignments (30%)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1.Генов Л., Теоретични основи на електротехниката, София, Техника, 1991; 2. Фархи С., С. Папазов. Теоретична електротехника, ч.1, Техника, С., 1990; 3. Георгиев Н.,Теоретична електротехника, Пловдив, Макрос, 2015; 4.Георгиев Н., В. Кирчев, Ръководство за семинарни упражнения по теоретична електротехника. ТУ София, филиал Пловдив, 2012; 5.Георгиев Н., В. Кирчев, Ръководство за лабораторни упражнения по теоретична електротехника. ТУ София, филиал Пловдив, 2008.

DESCRIPTION OF THE COURSE

Name of the course: **Electrical measurements**	Code: **MpEEA22**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 30 hours S – 0 hours LW – 30 hours	Number of credits: 6

LECTURER(S):
Assoc. Prof. Eng. Misho Matsankov, PhD (FEA), tel.: 032 659 686 e-mail: mishel@tu-plovdiv.bg
Asist. Prof. Eng. Nikolay Paunkov PhD(ΦЕА), tel.: 0896 847 308, e-mail: nick123@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory course from the curricula for training students for Master's degree, specialty, "Electrical Engineering", "Design and Programming of Electronic Systems" and "Automation information and control technology" in the professional field 5.2 Electrical Engineering, Electronics and Automation, field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course students will acquire knowledge and skills about the basic technical means and methods for measuring electrical, magnetic and non-electrical quantities, as well as questions about processing and metrological evaluation of measurement results in the presence of systematic, gross and random errors. In accordance with their personal interests, students should know how to find the necessary information in this field.

DESCRIPTION OF THE COURSE: The main topics covered in the teaching of the discipline are: Measuring instruments. Measures and standards, Processing of measurement results, Measuring transducers, Measuring amplifiers, Measuring electrical quantities and expanding the range of measuring instruments. Measurement of some non-electric quantities.

PREREQUISITES: Knowledge and skills in the disciplines Mathematics, Physics, Theoretical Electrical Engineering.

TEACHING METHODS: Lectures using slides and demo programs, laboratory exercises with protocols.

METHOD OF ASSESSMENT: Written exam. The final grade is formed according to a point system. Average over 60 points; good over 70 points; very good over 80 points; excellent over 90 points. The main part of the points are formed by the test during the exam, lasting two hours, maximum 90, and the remaining 10 based on the student's work during the semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1 Основна литература 1. Колев Н.,Лазаров и др. - Електрически измервания, ТУ,2000; 2. Колев Н. и колектив, Електрически измервания, ТУ-София 1993г; 3. Рангелова В, Записки лекции по Елелктрически измервания, Пловдив 2018, 5. Божков Ст., М. Мацанков, Ръководство за ЛУ по електрически измервания, ТУ-София 2015г.; 7. Рангелова В., Н. Паунков, М. Мацанков, Ръководство за ЛУ по електрически измервания, Пловдив 2019г., 8. Мацанков М. Ст. Божков, Ръководство за ЛУ по измерване на неелектрически величини, ТУ-София 2017г. Допълнителна литература 1. P. Mlakovati “Misure elettriche” 2014г; 2. Mlakovati “Misure indistriali con strumenti analogici ” Iniversita di Pavia 2019

DESCRIPTION OF THE COURSE

Name of the course: **Electrical apparatus**	Code: **MpEE23**	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):
Assoc. Prof. Eng. Ivan Hadzhiev, PhD (FEA), tel.: 032 659-686, e-mail: hadzhiev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject for Preparatory training students in the Electrical Engineering specialty for BSc and / or MSc graduates in other specialties in professional fields: 5.1, 5.3, 5.4, 5.5, 5.13 and 9, Field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course the students acquire knowledge of: the essence of thermal, electrodynamic and electromagnetic processes and phenomena; the physical processes and dependencies, concerning the switching processes of electrical circuits; arc extinguishing systems; contact systems and insulation structures of electrical apparatus; characteristics, constructions and types of low voltage electrical apparatus.

DESCRIPTION OF THE COURSE: Main topics: Electrodynamic forces in electrical apparatus; Thermal processes in electrical apparatus; Electrical contact; Electric arc and arc-extinguishing devices for direct and alternating current; Electrical insulation; Electromagnets – magnetic circuits for direct and alternating current, magnetic circuits with permanent magnets; Low voltage electrical apparatus – control apparatus, distribution and protection apparatus etc.

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, Sofia, 1999, ISBN 954-438-236-4 (in Bulgarian); 2. Tzeneva R., Electrical contact, Sofia, 2004, ISBN 954-9782-97-2 (in Bulgarian); 3. Maslarov I., S. Shishkova-Panaiotova, Manual for laboratory exercises on electrical machines and apparatus, Plovdiv, 2000 (in Bulgarian); 4. Alexandrov A., H. Gergova, V. Piperov, Manual for seminars on electrical apparatus, Sofia, 2000, ISBN 954-438-293-3 (in Bulgarian); 5. 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); 6. Pisarev A., A. Lichev, Design guide for low voltage switchgear, Sofia, Technica, 1987 (in Bulgarian); 7. Taev I., Fundamentals of the theory of electrical apparatus, Moscow, 1987 (in Russian).

DESCRIPTION OF THE COURSE

Name of the course: **Electrical Power Engineering**	Code: **MpEE24**	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):
Assoc. Prof. Eng. Stanimir Stefanov, PhD (FEA), tel.: 032659512, e-mail: glasst@tu-plovdiv.bg
Technical University of Sofia

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 "Bachelor" and/or "Master" in specialties from Higher Education Areas 5.1, 5.3, 5.4, 5.5, 5.13 and 9.

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. Влъчков 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: **MpEE25**	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):
Assoc. Prof. Eng. Stanimir Stefanov, PhD (FEA), tel.: 032659512, e-mail: glasst@tu-plovdiv.bg
Technical University of Sofia

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 "Bachelor" and/or "Master" in specialties from Higher Education Areas 5.1, 5.3, 5.4, 5.5, 5.13 and 9.

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 диэлектриков, 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 высоких 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: **Electrical machines**	Code: **MpEE26**	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):
Assoc. Prof. Eng. Ivan Hadzhiev, PhD (FEA), tel.: 032 659-686,
e-mail: hadzhiev@tu-plovdiv.bg
Assist. Prof. Eng. Vasil Drambalov, PhD (FEA), tel.: 032 659-687,
e-mail: v_drambalov@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject for Preparatory training students in the Electrical Engineering specialty for BSc and / or MSc graduates in other specialties in professional fields: 5.1, 5.3, 5.4, 5.5, 5.13 and 9, 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, synchronous machines and d.c. machines. 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. Schemes and groups of connection of transformers. Parallel operation. Voltage control in transformers. Theory of a.c. machines. Windings of a.c. machines. Voltage equations and equivalent diagrams of induction machines. Operation of induction machine as motor, generator and counterswitching mode – power relationships and vector diagrams. Starting of three-phase induction motors and speed control. Single-phase and capacitor induction motors. Synchronous machines – design and principle of operation. Armature reaction at resistive, resistive-inductive, inductive and capacitive load. Characteristics of synchronous generators. Parallel operation of synchronous machines. Modes of operation of synchronous machines at parallel operation. Synchronous motors – vector diagram, operational characteristics and starting. Synchronous compensators. Design, principle of operation and modes of operation of d.c. electrical machines. Windings of d.c. machines. Commutation in d.c. machines. D.c. generators. Characteristics of independent excitement generator. Parallel excitement generators – conditions for self-excitement and characteristics. Characteristics of series and compound generators. Parallel operation of d.c. generators. D.c. motors – types and characteristics. Starting and speed control of d.c. motors. Braking modes of d.c. motors.

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. Ангелов А., Д. Димитров. Електрически машини, част втора, София, Техника, 1988. 3. Волдек А. Електрически машини, София, Техника, 1978. 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 materials**	Code: **MpEE27**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW), Seminaries (S)	Hours per semester: L – 30 hours S – 0 hours LW – 30 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof., PhD. Marin Genchev, tel.: 032 659 512, email: marin2g@tu-plovdiv.bg;
Assoc. Prof., PhD Stanimir Stefanov, tel.: 032 659 512, e-mail: glasst@tu-plovdiv.com,
Technical University of Sofia, Branch Plovdiv, Faculty of Electronics and Automation,
Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory course from the curriculum for training students for Magister's degree, specialty "Electrical Engineering", professional field 5.2 General Engineering, field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to introduce students to the methods and tools for measuring the characteristics of the types of electrical materials in accordance with the requirements of BDS and relevant international standards. Methods for quality control and reliability of insulation systems.

DESCRIPTION OF THE COURSE: The subject Electrical materials presents the behavior of the various types electrical engineering materials in the electrical and magnetic field and the processes taking place within them.

PREREQUISITES: The subject is based on knowledge of Physics, Chemistry and Mathematics.

TEACHING METHODS: Lectures held by the lecturer and aided by presentations. Laboratory exercises are performed under the guidance of an assistant professor. The students should compile protocols as a result of their activities during the exercises.

METHOD OF ASSESSMENT: Written exam at the end of the second semester (90%) and summarized assessment from laboratory exercises (10%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
Генчев М., "Електротехнически материали " , електронен учебник, ISBN 978-954-2937-07-4, e-book, http://elrn.tu-plovdiv.bg/microsoftclasserver, 2010; 2. Генчев М. "Електроматериалознание , учебник , ISBN 978-954-8779-99-9, Дъга принт ООД, Пловдив, 2011; 3. Генчев М. "Ръководство за лабораторни упражнения по електроматериалознание " , ISBN 978-954-8779-98-2, Дъга принт ООД, Пловдив, 2011; 4. Тодорова А., Г.Д юстабанов, М. Генчев, "Ръководство по материалознание ", ISBN 954-438-102-3 , Издателство на ТУ София, 1994. 5. Генчев М., "Ръководство за лабораторни упражнения по електротехнически материали", електронен учебник , ISBN 978-954-2937-06-7, e-book , http://elrn.tu-plovdiv.bg/microsoftclasserver, 2009.

DESCRIPTION OF THE COURSE

Name of the course: **Electrical nnetworks and systems**	Code: M**pEE28**	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):
Assoc. Prof. Eng. Stanimir Stefanov, PhD (FEA), tel.: 032659512, e-mail: glasst@tu-plovdiv.bg
Technical University of Sofia

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 "Bachelor" and/or "Master" in specialties from Higher Education Areas 5.1, 5.3, 5.4, 5.5, 5.13 and 9.

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 whit isolated star center; Exchange networks; Grids whit 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 conducts – on heating, on permissible loses of voltage, on minimal outgo of metal; Mechanical measure of open - air distribution line - retable climatic circumstance, mechanical loads on conduct and safer lightning line, determination place at pols 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 whit 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. Влъчков 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: **MpEE29**	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):
Assoc. Prof. Eng. Ivan Hadzhiev, PhD (FEA), tel.: 032 659-686,
e-mail: hadzhiev@tu-plovdiv.bg
Assoc. Prof. Eng. Vasil Spasov, PhD (FEA), tel.: 032 659-535,
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Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject for Preparatory training students in the Electrical Engineering specialty for BSc and / or MSc graduates in other specialties in professional fields: 5.1, 5.3, 5.4, 5.5, 5.13 and 9, 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. CAD системи в електромагнетизма, София, Сиела, 2002; 5. Кулон Ж. Л., Ж. Сабоннадьер. САПР в электротехнике, 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: **MpEE30**	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: 5

LECTURER(S):
Assoc. Prof. Eng. Misho Matsankov, PhD (FEA), tel.: 032 659 686 e-mail: mishel@tu-plovdiv.bg
Assoc. Prof. Eng. Georgi Ganev, PhD (FEA), тел.: 032 659 560, email: gganev@tu-plovdiv.bg
Technical University of Sofia

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. Преобразувателна 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.

DESCRIPTION OF THE COURSE

Name of the course: **Electromagnetic compatibility**	Code: **MpEE31**	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: 4

LECTURER(S):
Assoc. Prof. Eng. Misho Matsankov, PhD (FEA), tel.: 032 659 686 e-mail: mishel@tu-plovdiv.bg
Assoc. Prof. Eng. Georgi Ganev, PhD (FEA), тел.: 032 659 560, email: gganev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for the education of students for the "master's", majors "Electrical engineering, professional direction 5.2 Electrical engineering, electronics and automation, area 5.Technical sciences.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course, students should know the problems arising from the electromagnetic compatibility of electrotechnical devices and equipment used in various branches of industry and energy, the reasons that give rise to them, the methods and means of solving them.

DESCRIPTION OF THE COURSE: Main topics: Introduction to electromagnetic compatibility and its regulatory provision; Power quality; reasons for its deterioration; Methods and means for reducing susceptibility to electromagnetic influences; Methods and means for improving the quality of electricity for individual consumers and in distribution networks.

PREREQUISITES: The discipline is based on knowledge acquired in the courses in Mathematics, Theoretical Electrical Engineering, Electrical Measurements, Electrical Machines, Electrical Apparatus, Electrical Converters and Energy Efficiency, Power Electricity

TEACHING METHODS: Lectures using multimedia. Laboratory exercises are conducted in subgroups. Students prepare a written thesis on an assignment related to solving a technical problem to improve the quality of electricity.

METHOD OF ASSESSMENT: The two tests - in the middle and at the end of the semester form 66% of the final grade; the grade from the laboratory exercises forms 33% of the final grade.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1.Baggini A., Handbook of Power Quality, J.Wiley, 2008; 2.Bollen M., Understanding power quality problems, 2000; 3.Dugan R., M. McGranaghan, S. Santoso, H. Beaty, Electrical Power System Quality, 2004; 4. Grigsby L. Power Systems, CRC Press, 2006; 5.Kusko A., M. Thompson, Power Quality in Electrical Systems, 2007; 6. Sankaran C., Power quality, 2002; 7. Schlabbach J., D.Blume, Voltage Quality in Electrical Power Systems, IET Power and Energy Series no.36, 2001; 8.Shenkman A.L., Transient Analysis of Electric Power Circuits Handbook, Springer, 2005; 9.Van der Sluis L., Transients in Power Systems, J.Wiley, 2001; 10.Watson N., J.Arrillaga, Power Systems Electromagnetic Transients Simulation, IET Power and Energy Series, vol.39.