

DESCRIPTION OF THE COURSE

Name of the course: Electric Drives	Code: BpEE14	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 45 hours S – 0 hours LW – 25 hours	Number of credits: 6

LECTURER(S):

Assoc. Prof. Ivan Kostov, PhD, Phone: 032 659 526, e-mail: ijk@tu-plovdiv.bg,
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Mandatory subject for full-time students of the Electrical Engineering specialty at FEA TU-Sofia, Plovdiv Branch, Bachelor's degree, Professional orientation 5.2 Electrical Engineering, Electronics and Automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The training objective is to prepare students for the processes of design and operation for electric drive systems requiring knowledge of the specifics and characteristics of electric motors as objects of control.

DESCRIPTION OF THE COURSE: The course subject introduces students to the modern general theory of electric drive. Structurally, the program is made of electrical drive mechanics, electromechanical energy conversion, electro-mechanical and regulating properties of motors and electric drives. Students are introduced to the general physical laws of electric drives and the processes of electro-mechanical energy conversion for various types of electric motors as a major part of the electrical drive systems' structure. Based on the mathematical description of the various types of electric motors, the dynamic and static properties of the "electric engine/machine" system are determined for the various operation regimes and control methods.

PREREQUISITES: The subject builds upon knowledge from courses in Mathematics, Mechanics and Electrical machines.

TEACHING METHODS: Lectures, including multimedia methods, and laboratory exercises with assessed presentation of experiment protocols. These include the computer-assisted calculation and experimental determination of investigated characteristics.

METHOD OF ASSESSMENT: Written exam/test during the examinations session following the semester.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1. Kostov I., Electric Drives, education handbook, Technical University - Plovdiv Branch, 2007, p.200; 2. Kostov I., Electric Drives with DC motors, Asynchronous and Synchronous Motors, Plovdiv, 2016, ISBN 978-619-90128-0-2; 3. Daskalov G., I. Kostov, K. Koutrianski, Electric Drives, Laboratory Exercises Manual, Technical University - Plovdiv Branch, 2002, p. 136.

DESCRIPTION OF THE COURSE

Name of the course: Electrical Power Engineering	Code: BpEE15	Semester: 7
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.

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. Генев 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: Switching technique	Code: BpEE16	Semester: 7
Type of teaching: Lectures(L) Laboratory work (LW)	Hours per semester: L – 45 hours LW – 25 hours	Number of credits: 6
Course project (CP)	Code: BpEE19	Number of credits: 2

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 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.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to allow the students to acquire knowledge, related to the equipment, facilities, methods and means of switching and protecting during the process of using electrical energy in high and low voltage circuits.

DESCRIPTION OF THE COURSE: The following issues are considered: basic concepts, variables, characteristics, requirements toward switching equipment, modes of switching, switching of components in main circuits, choice of devices depending on the application, on the switching frequency and wear-resistance, various types of protecting equipment, basic use of switching devices in main circuits, electronic compatibility (interface) between switching devices and electronic equipment, constructive components and design of switching devices and complex switching equipment, basic electric circuits for implementation, for testing, mounting, exploitation and repair of switching devices.

PREREQUISITES: Theoretical electrical engineering, Electrical measurements, Electro-technical materials, High voltage techniques, Electrical apparatus and Electrical machines.

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

METHOD OF ASSESSMENT: Written examination at the end of the semester (75%), laboratory work (25%), course assignment ending with a separate grade (after development and defense in front of the supervising lecturer).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Alexandrov A., Electrical apparatus, Sofia, 2004 (Bulgarian); 2. Pisarev A., A. Lichev, Guide the design of switchgear for low voltage, Sofia, Technics 1987 (Bulgarian); 3. Switchng Protection and Distribution in Low-Voltage Networks , SIEMENS, Berlin 1994, ISBN 3-89578-000-6; 4. Robert T. Smeaton, Wiliam H. Ubert, Switchgear and Control Handbook, Third Edition, McGraw- Hill Company, 1998 ISBN 0-07-058451-6; 5. Frank W.Kissy, Jack L. Waren, Design Fundamentals fo Low-Voltage Distribution and Control MARCEL DEKKER INS, 1987, ISBN 0-8247-7515-5; 6. Circuit Interruption Theory and Techniques, en Thomas E. Browne, Jr. MARSEL DEKKER INC.1984, ISBN 0-8247-7177-X; 7. Electrical Instsllation Handbook: Protection and Control Devices, ABB, Vol. 1, 5th edition.

DESCRIPTION OF THE COURSE

Name of the course: Technologies in electrical engineering and electronic	Code: BpEE17	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 45 hours S – 0 hours LW – 25 hours	Number of credits: 6

LECTURER(S):

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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.

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., Технология 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. Филипов, 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: Ecology and Renewable Energy Sources	Code: BpEE18	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 40 hours S – 0 hours LW – 20 hours	Number of credits: 5

LECTURER(S):

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Assoc. Prof., PhD. Eng. Marin Genchev, tel.: 032659512, email: marin2g@tu-plovdiv.bg

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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.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to introduce students to the topics of using renewable energy sources to generate electricity, environmental problems and technical possibilities for their solution, giving basic knowledge needed to perform engineering tasks.

DESCRIPTION OF THE COURSE: The course "Ecology and Renewable Energy Sources" studies the environmental problems associated with natural disasters and major industrial accidents, as well as the features and technical capabilities for the utilization of energy from renewable sources and the conversion into electricity.

PREREQUISITES: Mathematics, Physics, Chemistry, Basic Electrical Engineering.

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

METHOD OF ASSESSMENT: Current written control in the middle and end of the semester whit a duration of 1 hour (70%), laboratory work (20%) end the participation in lectures (10%) .

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Кирчев В., М. Генчев, Възобновяеми енергийни източници, Дъга принт ООД, Пловдив, 2012; 2. Макавеев, Хр. И др., Проблеми на инженерната екология, ВМЕИ-Филиал Пловдив, 1994; 3. Киров Д., Инженерна екология, Техника, София, 2011; 4. Кискинов Н., Възобновяеми енергийни източници, Сиела, 2012; 5. Байков Б., Екология, Нов български университет, 2012; 6. Димитров Д. и др., Възобновяеми източници на енергия, ТУ-София, 1999; 7. www.sunnydesignweb.com; 8. www.pvsyst.com; 9. www.soldim.de.

DESCRIPTION OF THE COURSE

Name of the course: CAD systems in Electrical Engineering	Code: BpEE20.1	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: 5

LECTURER(S):

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e-mail: vasilspasov@tu-plovdiv.bg

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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.

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 testing during the semester (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 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: Systems with guaranteed and uninterruptible power supply	Code: BpEE20.2	Semester: 8
Type of teaching: Lectures(L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 30hours S – 0 hours LW – 20 hours	Number of credits: 5

LECTURER(S):

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Assist. Prof. Eng. Vasil Drambalov PhD (FEA), e-mail: v_drambalov@tu-plovdiv.bg, тел.:

032 659535, Technical University of Sofia, Dep. of Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course for full-time students in the specialty "Electrical Engineering" of FEA at TU-Sofia, Plovdiv Branch, educational qualification degree "Bachelor" professional field 5.2 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Introducing students to the systems for guaranteed and uninterruptible power supply. These are devices that protect against interruptions and harmful interference in the power supply of computers, telecommunications devices, hospitals and more. "Sensitive" consumers. The lecture material includes basic mathematical dependencies related to the principle of operation of UPS and their application in practice. .

DESCRIPTION OF THE COURSE: Main topics: Main directions in the development of the systems for guaranteed and uninterruptible power supply / UPS /. Requirements for power supply of "sensitive" consumers. Types of static systems for guaranteed and uninterruptible power supply. Basic technical requirements for guaranteed and uninterruptible power supply systems. Electricity storage. Rechargeable batteries and other electrical energy storage devices. Active and passive filters. Guaranteed and uninterruptible power supply system / UPS /.

PREREQUISITES: Mathematics, Physics, Electrical engineering, Electronics, Conversion technology, , Power supply Industrial production systems.

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

METHOD OF ASSESSMENT: Two one-hour written current assessments in the middle and end of the semester (62% in total), laboratory work (38%). .

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Anchev M., M. Minchev, Uninterruptible power supply systems . Technical University of Sofia, Sofia, 2005, ISBN 954-323-098-6; 2. MATLAB with SIMULINK, User's Guide. The Math Works Inc., 2012; American Power Conversion-APC, Solution, www.apc.com

DESCRIPTION OF THE COURSE

Name of the course: Electrical networks and systems	Code: BpEE21.1	Semester: 8
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.

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 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 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: Electrical equipment of industrial enterprises	Code: BpEE21.2	Semester: 8
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.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the training is after the course students to have knowledge of the statics and dynamics of electrical drive, the management of electrical equipment, frequently used electrical equipment in industrial enterprises, the modes of operation and the choice of drives, as well as and be able to apply the acquired knowledge to solve engineering problems.

DESCRIPTION OF THE COURSE: The main topics concern: Mechanics of electric drive; Basic equation of motion of the electric drive; Bringing resistance, inertia and swing moments to the motor shaft; Speed control of the electric drive; Mechanical characteristics of electric motors; Braking modes of electric motors; Dynamics of electric drive; Mechanical and electromagnetic transients processes; Choice of electric motors; Relay-contactor control of the electric drive; Automatic control systems; Electrical equipment for continuous transport, for metal-cutting machines, for lifting machines and for industrial robots.

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

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. Стоянов С., Ц. Цанев, Електрообзавеждане на производствени агрегати, София, Техника, 1990; 2. Петрунова Н., Ц. Цанев, С. Стоянов, Електрообзавеждане на промишлени предприятия, СИЕЛА, София, 1998; 3. Цанев Ц., С. Стоянов, Ръководство за електрообзавеждане на промишлени предприятия, София Техника, 1992; 4. Стоянов С., Ц. Цанев, Ръководство за проектиране на електрообзавеждане, Техника, София, 1983; 5. Божинов Б., Електрозадвижване на подземно-транспортни машини. АВС Техника, София, 1997; 6. Маринов М., Кертиков Н., Петков П., Електрообзавеждане и автоматизация на производствени агрегати - записки, ТУ – Варна.

DESCRIPTION OF THE COURSE

Name of the course: Measurements in energy	Code: BpEE22.1	Semester: 8
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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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.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the training is after completing the course, students should have knowledge of the methods and means of carrying out specialized measurements in the field of energy. They will acquire knowledge about the technical features of measuring instruments. Will have the necessary knowledge and skills to assess the suitability of measuring and power equipment in the field of electrical energy, as well as be able to apply the knowledge gained to solve engineering tasks.

DESCRIPTION OF THE COURSE: The main topics concern: Basic concepts, definitions and means of measurement. Measurement of current and voltage in networks and equipment with increased voltage. Direct, reverse and zero sequence currents and voltages. Assessment of the suitability of facilities in the energy sector. Measurement of insulation resistances. Suitability testing of insulators and valve taps. Examination of cable lines, tracing and fault detection. Dielectric losses. Testing of personal protective equipment, voltage indicators and insulating bars. Power surges. Measurement of wind speed and solar radiation. Thermal energy measurement. Measuring carbon emissions. Data collection, monitoring and control systems.

PREREQUISITES: Theoretical Electrical Engineering, Physics, Electrical Materials, Electrical machines, Electrical measurements, High voltage technique, 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 (80%), laboratories (20%)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Zivanovic R., High-voltage measurements, Technikon Pretoria, South Africa, 2003 2. Wadhwa C. L., Electrical Power Systems, New Academic Science, 2012. 3. Матраков и колектив, Електрически измервания, Техника 1990 4. Неделчев Н. Ст. Неделчева, Техника на високите напрежения, ТУ-София 2016г. 5. Нотов П., Ст. Неделчева, Електроенергетика, ТУ- София 2014г. 6. Божков Ст., М. Мацанков, Ръководство за лабораторни упражнения по електрически измервания, Издателство на ТУ-София 2014г.

DESCRIPTION OF THE COURSE

Name of the course: Quality control	Code: BpEE22.2	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW –15hours	Number of credits: 5

LECTURER(S):

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Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Optional 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.

AIMS AND OBJECTIVES OF THE COURSE: The aim is to examine methods for managing the quality of mechanical engineering products in the production process, as a solution for controlling impacts.

DESCRIPTION OF THE COURSE The necessary elements of the apparatus of probability theory and mathematical statistics for statistical analysis are presented. Methods for statistical assessment of the stability, accuracy and tuning of technological processes and standard procedures for statistical quality control with control charts are considered. Various approaches for implementing statistical acceptance control and analysis of technological processes are considered.

PREREQUISITES: It is necessary to study in advance or in parallel the following disciplines: Mathematics, Electric measurements.

TEACHING METHODS: Lectures, using slides, case studies, seminars, protocols.

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (82%), seminars (18%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Koriykov T. Quality management. RU "A. Kanchev". Ruse 1998, 2. Danov T. Statistical methods for quality management. Technique. Sofia, 1987, 3. Korsakov V.S. Fundamentals of designing fixtures in mechanical engineering, M., Mashinostroenie, 1983.; 4. Anserov M.A. Fixtures for metal-cutting machines, St. Petersburg, Mashinostroenie, 1975.; 5. Zamfirov I., Rachev R.Kh., Georgiev V.G. Manual for exercises on technological equipment, VTU "A. Kanchev" - Ruse, 1985, 1992.; 6. Gorozhkin A.K. Fixtures for metal-cutting machines, S., Technique, 1982.

DESCRIPTION OF THE COURSE

Name of the course: Management information systems	Code: BpEE23.1	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 30 hours S – 0 hours LW – 15 hours	Number of credits: 5

LECTURER(S):

Assoc. Prof. Radoslav Hrishev, PhD, (FEA), tel: 032 659 527, e-mail: hrishev@tu-plovdiv.bg
Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Mandatory elective course 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.

AIMS AND OBJECTIVES OF THE COURSE: To introduce knowledge of modern information management systems in the industry and basic knowledge of the organization and operation of resource management systems / ERP systems /. Students acquire basic skills for working with ERP systems, mainly with the most common ERP system SAP (Systems, Applications & Products in Data Processing), using specialized simulators and demo systems. The course is the first step and prerequisite for additional training and acquisition of specific skills for working with SAP.

DESCRIPTION OF THE COURSE: The main topics include: Management information systems in industry, definition, classification; Models of management information systems. Production information systems - CRM, ERP, MES; Overview and description of resource management systems, their place in management automation systems; Consideration of the structure of resource management systems and the main modules of the system, their interconnection and purpose; Description of SAP (Systems, Applications & Products in Data Processing) as the number one ERP system worldwide; Detailed overview of the most important modules; Introduction to ERP systems using demo systems; Acquisition of practical skills for working with ERP systems based on exercises in demonstration and test systems; Using simulators to acquire basic practical skills.

PREREQUISITES: Computing, Control Theory

TEACHING METHODS: Lectures, using slides, case studies, demo systems and simulators, laboratory and course work, protocols and course work description preparation and defense.

METHOD OF ASSESSMENT: One-hour written test at the end of the semester (70%), laboratory work (20%), abstract with research orientation (10%).

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1. Tudjarov H, Information Systems, 2007: <http://tuj.asenevtsi.com/>, 2. SAP University Alliances, Global Bike (GBI) curricula. 3. Open online courses and certification: <https://open.sap.com/>, 4. Business management system bgERP: <https://bgerp.com/>, 5. R.Hrishev, Planning and implementation of the ERP system in packaging production, TECHSYS 2018, Plovdiv, ISSN Online: 2535-0048.

DESCRIPTION OF THE COURSE

Name of the course: Electromagnetic compatibility	Code: BpEE23.2	Semester: 8
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. 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 optional subject from the curricula for the education of students for the "Bachelor's College", 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. Baghini 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.

DESCRIPTION OF THE COURSE

Name of the course: Sport	Code: FaSPR07	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Self-Study (SS)	Hours per semester: L – 0 hours S – 0 hours SS – 30 hours	Number of credits: 1

LECTURER(S):

Sen. Lect. Daniel Vladimirov, PhD (FEA), tel.: 032 659 646, e-mail: danielv@tu-plovdiv.bg

Sen. Lect. Petar Doganov, PhD (FEA), tel.: 032 659 648, e-mail: pdoganov@tu-plovdiv.bg

Sen. Lect. Boris Spasov, PhD (FEA), tel.: 032 659 647, e-mail: boris_spasov@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialty “Automation, Information and Control Systems”, “Electrical Engineering”, “Design and programming of electronic systems” Professional orientation 5.2 Electrical Engineering, Electronics and Automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Targeted at further developing of students’ physical activities, skills and hygiene habits through effective methods of physical education, improving their mental and physical performance.

DESCRIPTION OF THE COURSE: The knowledge and skills in Physical Education and Sports develop a wide range of motor skills and habits, help the hardening of the body and contribute to the moral development of students. The enhancement of physical skills is carried out through:

1. General Physical Preparedness (GPP) – in these seminars the students develop a wide range of motor skill and habits; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.
2. Sports-Specific Physical Preparedness (SPP) – students improve their sport skills and habits in a specific sport and gain experience through participation in competitions; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

PREREQUISITES: The curricula presume the minimum of knowledge and skills acquired at secondary school.

TEACHING METHODS: Seminars in accordance with the curriculum in PE and Sport.

METHOD OF ASSESSMENT: Evaluation is based on functional tests at the end of semester. Lecturer’s signature is required at the end of semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Владимиров В. Туризм и ориентиране. Методическо ръководство за студентите от ТУ София, филиал Пловдив. Издателство на ТУ - София. 2010.

DESCRIPTION OF THE COURSE

Name of the course Power supply systems for laser devices	Code: FaBpEE02	Semester: 7
Type of teaching: Lectures and laboratory work	Hours for the semester: L– 30 hours; LW – 30 hours	Number of credits: 4

LECTURER:

Assoc. Prof. Eng. Margarita Deneva, Department of Electrical Engineering (FEA) tel.: (032) 659 759; email: deneva@tu-plovdiv.bg, Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Optional course from the curriculum for students of Bachelor's degree, specialty "Electrical Engineering", professional field 5.2. Electrical Engineering, Electronics and Automatics, 5. "Technical Sciences".

AIMS AND OBJECTIVES OF THE COURSE: Basic introduction of students to the essential electrical part of laser devices so that they will be competent specialists in the construction, repair and maintenance of this essential part of widely used in practice laser devices and systems.

DESCRIPTION OF THE COURSE: Laser devices and systems have become most widely used in industry, medicine, surveying, and in the control of atmospheric pollution. Essentially, all devices of the type are based on the conversion of electrical energy into specialized laser radiation. One of the two main parts of laser devices is the electrical power supply of the laser, which is a typical object of electrical engineering. It also includes electronic control. The discipline deals with the electrical power supply of lasers, which includes competence in specialized transformer devices mainly of high (kilovolt) voltage and high currents. These devices must be designed and constructed with the appropriate most serious electrical protection for operation in clinical, practical or industrial settings, primarily by non-specialist electrical engineers. The engineer must have specialized competence in the design of these high-voltage, high-power, and compact power supplies and in adapting the protection when handling them. Also, he must know this type of power supplies very well to be capable of their design, maintenance and quick repairs.

PREREQUISITES: University courses in Physics, Mathematics, Electrical and Electronics Engineering.

TEACHING METHODS: Lectures presented with multimedia projector. Laboratory exercises with prepared appropriate models, ending with protocols.

METHOD OF ASSESSMENT: Ongoing evaluation at the end of the semester (total 60%), the evaluation of laboratory exercises (40%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: The literature is provided by the lecturer in the form of lecture notes in electronic or printed format, appropriately selected for the topics of the lectures and exercises.

1. М. Денева, М. Ненчев, „Лазерното лъчение в представяне за инженери и приложници“, изд. „Интелексперт-94“, ISBN 978-954-8835-76-3, (2013)
2. М. Ненчев, С. Салтиел, „Лазерна техника“, изд. „Наука и изкуство“ и изд. на СУ „Св. Климент Охридски“, (2016)
3. Д. Димов Юдов, В. Вълчев, „Токозахранващи суртройства“, Варна (2008)
4. W. Koechner, “Solid-State Laser Engineering”, Springer, (2006)

DESCRIPTION OF THE COURSE

Name of the course: Sport	Code: FaSPR08	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Self-Study (SS)	Hours per semester: L – 0 hours S – 0 hours SS – 30 hours	Number of credits: 1

LECTURER(S):

Sen. Lect. Daniel Vladimirov, PhD (FEA), tel.: 032 659 646, e-mail: danielv@tu-plovdiv.bg

Sen. Lect. Petar Doganov, PhD (FEA), tel.: 032 659 648, e-mail: pdoganov@tu-plovdiv.bg

Sen. Lect. Boris Spasov, PhD (FEA), tel.: 032 659 647, e-mail: boris_spasov@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialty “Automation, Information and Control Systems”, “Electrical Engineering”, “Design and programming of electronic systems” Professional orientation 5.2 Electrical Engineering, Electronics and Automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Targeted at further developing of students' physical activities, skills and hygiene habits through effective methods of physical education, improving their mental and physical performance.

DESCRIPTION OF THE COURSE: The knowledge and skills in Physical Education and Sports develop a wide range of motor skills and habits, help the hardening of the body and contribute to the moral development of students. The enhancement of physical skills is carried out through:

1. General Physical Preparedness (GPP) – in these seminars the students develop a wide range of motor skill and habits; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.
2. Sports-Specific Physical Preparedness (SPP) – students improve their sport skills and habits in a specific sport and gain experience through participation in competitions; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

PREREQUISITES: The curricula presume the minimum of knowledge and skills acquired at secondary school.

TEACHING METHODS: Seminars in accordance with the curriculum in PE and Sport.

METHOD OF ASSESSMENT: Evaluation is based on functional tests at the end of semester. Lecturer's signature is required at the end of semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Владимиров В. Туризм и ориентиране. Методическо ръководство за студентите от ТУ София, филиал Пловдив. Издателство на ТУ - София. 2010.