

COURSE DESCRIPTION

Course Title: Internal power supply networks of industrial objects	Cod: MpIElec01	Semester: 1
Type of teaching: Lectures; Laboratory work; Semester project.	Lessons per week: L - 1 hours; LW - 1 hours; Optionally.	Credits: 5

LECTURERS: Assoc. prof. PhD. Stanimir Stefanov, (FEA), tel: +35932659512, e-mail: glasst@abv.bg, Technical University - branch Plovdiv;

COURSE STATUS IN THE CURRICULUM: Compulsory discipline for part-time students in the qualification Master's degree in "Industrial Electronics".

AIMS AND OBJECTIVES OF THE COURSE: Upon successful completion of the course, students must be able to apply approaches, methods and technical means to the analysis, design, construction, maintenance and repair of power supply systems used in the territories of industrial objects. They must also have the knowledge and skills to analyze electrical loads, short-circuit currents and to operate power supply networks in industrial objects.

DESCRIPTION OF THE COURSE: Main topics: Types of electrical power substations; Internal and external power supply networks of industrial objects for low and medium voltage; Constructive implementation of power supply networks in industrial objects; Short circuits in the medium and low voltage lines; Selection and adjustment of switching and protection equipment; Smart grids.

PREREQUISITES: The course is conducted on the basis of knowledge from the bachelor courses - BpEE30, BpEE31, BpEE32, BpEE36, BpEE37, BpEE42 and BpEE48.1.

TEACHING METHODS: Lectures. Labs are conducted in accordance with the lab books and reports prepared by the students and checked by the supervisor. Individual students' project made through design manual and specialized PC programs for calculation and data processing; Project defence.

METHOD OF ASSESSMENT: Written exam with two syllabus questions and solving a problem or case at the end of the semester (70%), laboratories (10%) and individual course project (20%). Individual course project 15th weeks with assessment.

INSTRUKTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:

1. Справочник на енергетика, Том 2, 3 и 4, ABC Техника.
2. Практика. Проектиране и строителство в енергетиката, ABC Техника
3. Нотов П., Неделчева С. Електроенергетика, Част 2 и 3, ТУ - София, София, 2014
4. Василев Н. С. Сидеров, Ръководство за проектиране на електроснабдителни системи на промишлени предприятия, София, Техника, 1991.
5. Сидеров С., Н. Матанов, Ръководство за лабораторни упражнения по електроснабдяване, ТУ – София, 2009.
6. Кирчев В., К. Янев и М. Георгиев, Електрически мрежи средно и високо напрежение, Летера, 2006.
7. Електропроводна техника, трансформаторна техника, кабелна техника, ЕВН България.

DESCRIPTION OF THE COURSE

Name of the course: Power supply of production mechanisms and equipment	Code: MpIElec02	Semester: 1
Type of teaching: Lectures, laboratory work	Lessons per week: L – 1 hours; LW – 1 hour	Number of credits: 5

LECTURER:

As. Ph.D. Ilko Tarpov, e-mail: stsb_plovdiv@abv.bg, TU-Sofia, Branch Plovdiv, Faculty of Electronics and Automation, Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory subject for the major of "Industrial Electronics", of the Faculty of Electronics and Automation, Bachelor of Science degree.

AIMS AND OBJECTIVES OF THE COURSE: Upon successful completion of the course, students should be able to apply the approaches, methods and techniques to power the machinery and equipment of the industry. They will acquire theoretical knowledge and practical skills in the structure, principles of operation and functional operation and maintenance of electrical machinery and equipment.

DESCRIPTION OF THE COURSE:

Power supply of production mechanisms and equipment is one of the main disciplines that form the special theoretical training of students in "Industrial Electronics". Includes topics on structural features and maintenance of electrical inland transportation equipment, spot welding machines, induction furnaces, electroplating baths, boilers, heat pumps and radiators. Methods for balancing load schedules and electricity consumption of production mechanisms and systems are considered in order to optimize them and reduce energy losses.

PREREQUISITES: The course of lectures and seminars is based on knowledge students have acquired in Physics and electrical engineering, mathematics, materials science, energy engineering and more are required.

TEACHING METHODS: Lectures and laboratory work.

METHOD OF ASSESSMENT:

Test it is written. Check with developed tests that include analysis, design and build tasks. Use this rating system..

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:

1. Кирчев В., К. Янев и М. Георгиев, Електрически мрежи средно и ниско напрежение, Летера, 2006.
2. Василев Н., С. Сидеров, Електроснабдяване на промишлени предприятия, София, Техника, 1991;
3. М. Медникарова, Б. Рогев, И. Иванов, Електрообзавеждане на промишлени предприятия, Техника, София, 1982.

DESCRIPTION OF THE COURSE

Name of the course: Microprocessor systems	Code: MpIElec03	Semester: 1
Type of teaching: Lectures, laboratory work, Course work	Lessons per week: L – 1 hour; LW – 1 hour	Number of credits: 5

LECTURER:

Assoc. prof. Boyko Petrov, PhD, lecturer in TU-Sofia, Plovdiv branch, Faculty of Electronics and Automatics, tel.: 032-650-760 e-mail: bpetrov@tu-plovdiv.bg

COURSE STATUS IN THE CURRICULUM: Compulsory discipline for graduates of Bachelor of Engineering in a specialty in the professional field 5.2. "Electrical Engineering, Electronics and Automation" for part-time Master's degree in Industrial Electronics.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to update the knowledge of students with representatives of modern microprocessors and microcontrollers intended for the implementation of electronic devices with microprocessor control for industrial use and application. Upon successful completion of the course, students will be able to draw up circuit diagrams of single-processor systems, provide the necessary operating modes of the components used, design and configure programs for initialization of system and peripheral devices from the architecture of a microcontroller. as well as use external non-volatile memory circuits, ADCs, interfaces and command protocols.

DESCRIPTION OF THE COURSE: Microprocessor systems are one of the major disciplines that determine the industrial and industrial applications of electronics. Learning about single-processor microprocessor systems and working with software code for initializing peripherals, interrupt service, recognizing and executing program commands are basic skills for implementing new and programming existing microprocessor systems that, along with updated knowledge of peripherals and interface devices shape new professional opportunities.

PREREQUISITES: Basic knowledge of mathematics, electrical engineering, analog and digital circuits, and programming are required.

TEACHING METHODS: The lectures use multimedia presentations, a projector, chalk and a blackboard. Students have access to the presentations in advance and can supplement them with the teacher's explanations. Laboratory exercises are conducted on specially designed models of single-processor microprocessor systems with appropriate peripheral and interface capabilities.

METHOD OF ASSESSMENT: The exam is written. It is carried out with developed tests including tasks for analysis, design and construction. A point scoring system is used.

INSTRUCTION LANGUAGE: Bulgarian and English language opportunity

BIBLIOGRAPHY:

(1) PIC32 Family Reference Manual – 2011; (2) (1) PIC24 Family Reference Manual – 2006;(1) dsPIC33 Family Reference Manual – 2012;

COURSE DESCRIPTION

Name of the course Programing Industrial Controllers	Code: MpIElec04	Semester: 1
Type of teaching: Lectons (L), Laboratory work (LW)	Lessons for semester: L– 15 hours, LW – 15 hours	Credits: 5

LECTURERS:

assoc. prof. Albena Taneva, Ph.D., phone: 659 585, e-mail: altaneva@tu-plovdiv.bg
FEA, Control Systems Department, Technical University - Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory for the M.Eng level students, speciality Industrial Electronics of the Faculty of Electronics and Automation.

AIMS AND OBJECTIVES OF THE COURSE: After studying this course the students should be able to understand the principles of operation, to design and write programs for industrial control systems using Programmable Logic Controllers connected to laboratory sets up.

DESCRIPTION OF THE COURSE: The main topics concern: Discrete (relay) control. Axioms and laws of Boole's algebra used in the Logical Control. Logical Functions. Functional fully systems. Logical elements and devices in the control systems. History of the Programmable Logic Controllers (PLCs). Applications of PLCs. Structure and principles of operation. Connection of PLCs – supply, sensors, actuators. Programming for PLCs, structure of the programme, methods of representation. Design of small control systems. Practical work with Programmable Logic Controllers.

PREREQUISITES: Programming, Electronics.

TEACHING METHODS: Lectures, using slides, laboratory and course work (optional), work in teams, protocols and course work description preparation and defence. Guided practical work using controllers manufactured by SIEMENS, OMRON, Schneider and Panasonic.

METHOD OF ASSESSMENT: Exam at the end of the semester (72%), course work and individual assignments on laboratory developing practical task (28%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

- 1.Petruzella F., Programmable Logic Controllers, Fifth Edition, Publisher: McGraw-Hill Education, 2017
- 2.Тодоров А., С. Йорданова, С. Джиев, В. Сгурев. Логическо управление на процеси. С.,Технически Университет, 2001
- 3.SIMATIC S7-300 CPU 31xC: Specifications Manual, Technical data of the integrated I/O, 2010
4. SIMATIC Programming with STEP 7, (Manual), Siemens, 2010
5. Melsec FX Family, Programmable Logic Controllers, Beginner's Manual, Mitsubishi Electric, Art.no.:166388, Version B, 2007
- 6.FPWIN Pro, Ръководство за програмиране на Panasonic, 2012

Web links for PLC:

- 1.Omron, with registration: <https://www.myomron.com>, manuals: <https://www.myomron.com/index.php?action=downloads>
- 2.Siemens, <https://new.siemens.com/global/en/products/automation/systems/industrial/plc/s7-1200.html>
- 3.Mitsubishi with registration: <https://bg3a.mitsubishielectric.com/fa/bg/mymitsubishi>
Manuals, flash and programming examples

COURSE DESCRIPTION

Name of the course: Industrial legislation	Code: MpIElec05.1	Semester: 2
Type of teaching: Lectures, Seminar exercises, CP	Lessons per semester: L – 15, SE – 10, CP	Number of credits: 5

LECTURER: Assoc. Prof. Jur. engineer Ivan Nikolov Shopov, PhD, tel. 0885537762, e-mail: ivan_chopov@abv.bg, Sofia Technical University – Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective course for part-time students in the Master's degree in Industrial Electronics.

AIMS AND OBJECTIVES OF THE COURSE: Upon completion of the course, students must acquire basic legal knowledge and skills to enable them to successfully choose strategies for behavior in resolving various cases that arise in practice.

COURSE DESCRIPTION: Industrial law is one of the main courses that shapes the general theoretical preparation of students. It includes topics on: theory of law, legal norms, sources of law, legal acts, subject, system and sources of civil law, representation, property regulation, administrative law, industrial property, competition law, unfair competition, legal protection regime of environmental law, bond law.

PREREQUISITES: Basic knowledge of general theory of law is required and is taught by the teacher during the lectures.

TEACHING METHODS: The lectures use multimedia presentations, a projector, a marker and a whiteboard. Students have access to the presentations in advance and can supplement them with the teacher's explanations. In the seminars, students solve cases or prepare papers for discussion with the teacher and other group members.

METHODS OF ASSESSMENT: The exam is written. It is carried out with developed tests. A point scoring system is used. The course project includes developing of a case.

LANGUAGE OF INSTRUCTION: Bulgarian

BIBLIOGRAPHY:

(1) **Prof. Dr. Emil Zlatarev and staff.** Fundamentals of Law - Part I and Part II, Ciela Publishing House, latest edition; (2) **Dimitar Radev.** General Theory of Law, ed. LIK, Sofia 1997; (3) **Sources of Law:** Constitution of the Republic of Bulgaria, Commercial Law, Law on Obligations and Contracts, Law on Protection of Competition, Law on Marks and Geographical Indications, Patents Act, Copyright and Related Rights Act.

no. 81/1999, (3) Intellectual property - patents, trademarks, copyright (textbook), edition of INRA, Sofia, 1991, (4) Benbasat N., Scientific and technical expertise of the invention, TU-Sofia , 1987, (5) S. Dzhelepov, S. Stefanov, Patent Licensing Exercise Manual, TU-Sofia, 1990.

SUMMARY:

The aim of the course is to provide students with knowledge about the nature of the patent system and its importance for the development of the industry, so that they can use it pragmatically in their future work.

The emergence and stages of development of the patent system are discussed in the lecture course. The main categories of industrial property - inventions, utility models, industrial designs, and procedures for their protection - are explained in detail. The concepts of patent information and documentation, patent information studies and patent purity are given.

Attention is paid to the modern development of intellectual property, such as computer software protection, integrated circuits, biotechnology, audio and video.

Laboratory exercises include pragmatic questions and case studies on the lecture material.

COURSE CHARACTERISTICS

Course Title: Project Management	Code: MpIElec05.4	Semester: 2
Type of Teaching: Lecturers, Seminar exercises	Contact hours per week: L - 1 hour, S – 1 hour	Number of credits: 5

LECTURERS: Associate Professor Toni Mihova tel.0893 69 06 55; email: expert2009@abv.bg; Georgi Georgiev tel. 0888 22 72 82, email: ekip_pd@abv.bg Technical University – Sofia, Plovdiv Branch

COURSE STATUS IN THE SYLLABUS: Compulsory for the part-time Industrial Electronics Master Degree students in the FEA.

COURSE OBJECTIVES: Upon completion students will have basic knowledge of the Project Management processes and will acquire skills for identifying project ideas and turning them into project proposals within the area of motor transport business.

COURSE DESCRIPTION: The course is focused on identifying project ideas and turning them into project proposals. The main topics are: Definitions of Project management, Projects and types of projects; The project as an instrument for meeting organizational needs and attracting funding; Methods and techniques for project development; Project teambuilding; Main elements of the project cycle and the project proposal; Developing project activities and identifying necessary resources; Project budgeting; Project implementation and management; National and EU programmes supporting Bulgarian Motor Transport business within the period 2014-2020.

PREREQUISITES: none.

TEACHING METHOD: Lectures with slides and topic discussions; lab work including group case study discussions and an individual term assignment with a powerpoint presentation defence.

METHODS OF TESTING AND EVALUATION: Control test (50%) and term assignment defence (50%).

LANGUAGE OF INSTRUCTION: Bulgarian

LITERATURE RECOMMENDED:

1. Сборник материали на Програма „Партньори за проекти“ на Център по предприемачество към Технически университет – София, филиал Пловдив, 2005
2. Наръчник „Управление на цикъла на проекта“, София 2005
3. Апостолов, А., „Основи на проекта“, Projecta, София, 2004
4. Матеева, М., „Разработване и управление на проекти по програми на Европейския съюз“, Евроконсулт 06, 2007
5. Kemp, Sid “Project management- made easy” 2006.

COURSE DESCRIPTION

Name of the course: Labor law	Code: MpIElec05.3	Semester: 2
Type of teaching: Lectures, Seminar exercises	Lessons per semester: L – 15, SE – 10	Number of credits: 5

LECTURER: Assoc. Prof. Jur. engineer Ivan Nikolov Shopov, PhD, tel. 0885537762, e-mail: ivan_chopov@abv.bg, Sofia Technical University – Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective course for part-time students in the Master's degree in Industrial Electronics.

AIMS AND OBJECTIVES OF THE COURSE: Upon successful completion of the course, students should be familiar with the basic principles and methods of Labor law. They must have knowledge of the specifics of the legal sector, as well as the legal institutes and the most applicable labor law rules.

COURSE DESCRIPTION: Labor law is one of the disciplines that shapes students' skills in dealing with problematic legal situations in a real work environment. Includes topics on the characteristics of LL as an independent legal branch, method of legal regulation, sources, principles, types of labor norms, general characteristics of the employment relationship, parties to the employment relationship, grounds for the occurrence of employment, types and content of the employment contract, changes in employment, working hours, vacations and holidays, salary, penalties, liability of employer and employee, termination of employment, etc.

PREREQUISITES: Basic knowledge of general theory of law is required in the course.

TEACHING METHODS: Multimedia presentations are used when delivering the lectures. Students will have access to the presentations and will be able to supplement them with the teacher's explanations. The seminars are conducted in a discussion atmosphere. Students solve cases in relation to the theoretical statements discussed in the lectures.

METHODS OF ASSESSMENT: The exam is written. It is carried out with developed tests. A point scoring system is used. A written practical case is developed and solved in the course project.

LANGUAGE OF INSTRUCTION: Bulgarian

BIBLIOGRAPHY:

(1) Mrchkov, V., Labor Law - Sibi, 2008; (2) Labor Code - current edition; (3) Mrchkov, V.,.. comment on the Labor Code. S., Sibi, 2001;

COURSE DESCRIPTION

Name of the course: Patent Law	Code: MpIElec05.2	Semester: 2
Type of teaching: Lectures, Seminar exercises	Lessons per semester: L – 15, SE – 10	Number of credits: 5

LECTURER: Assoc. Prof. Jur. engineer Ivan Nikolov Shopov, PhD, tel. 0885537762, e-mail: ivan_chopov@abv.bg, Sofia Technical University – Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective course for part-time students in the Master's degree in Industrial Electronics.

AIMS AND OBJECTIVES OF THE COURSE: Upon successful completion of the course, students should be able to distinguish between the main objects of industrial property: inventions, utility models, trademarks, industrial designs, etc., ways to protect them, and the rights arising therefrom. Students will gain theoretical knowledge and practical skills in patent information and documentation, conducting patent research, analyzing and using data thus obtained.

COURSE DESCRIPTION: Patent law is one of the core courses that shape the general engineering training of industrial electronics students. It includes patents and technological development topics, inventions, patentability features, novelty, inventive step, industrial applicability, patentable objects, procedure and patent office, patent claim, content of application, use of patent rights, production, use, sale and import, existing rights in respect of patented methods, term of protection, infringement, infringement and revocation protection, compulsory licenses, international protection of inventions, utility models, industrial designs, nature of industrial design, design protection objectives, patent information and documentation.

PREREQUISITES: Knowledge of the basics of law, applied mechanics, electrical engineering is required.

TEACHING METHODS: Multimedia presentations, a spotlight, chalk and a blackboard are used when delivering the lectures. Students have access to the presentations in advance and can supplement them with the teacher's explanations. Laboratory exercises include pragmatic questions and cases on the lecture material.

METHODS OF ASSESSMENT: The exam is written. It is carried out with developed tests involving analysis, design and construction tasks. A point scoring system is used.

LANGUAGE OF INSTRUCTION: Bulgarian

BIBLIOGRAPHY:

(1) The Patents Act in force since 1.11.1996, Edit No. 17 / 21.02.2003, (2) Law on Trademarks and Industrial Designs promulgated in the State Gazette no. 95 / 5.12.1967. Last Edit And Supplement

no. 81/1999, (3) Intellectual property - patents, trademarks, copyright (textbook), edition of INRA, Sofia, 1991, (4) Benbasat N., Scientific and technical expertise of the invention, TU-Sofia , 1987, (5) S. Dzhelepov, S. Stefanov, Patent Licensing Exercise Manual, TU-Sofia, 1990.

SUMMARY:

The aim of the course is to provide students with knowledge about the nature of the patent system and its importance for the development of the industry, so that they can use it pragmatically in their future work.

The emergence and stages of development of the patent system are discussed in the lecture course. The main categories of industrial property - inventions, utility models, industrial designs, and procedures for their protection - are explained in detail. The concepts of patent information and documentation, patent information studies and patent purity are given.

Attention is paid to the modern development of intellectual property, such as computer software protection, integrated circuits, biotechnology, audio and video.

Laboratory exercises include pragmatic questions and case studies on the lecture material.

DESCRIPTION OF THE COURSE

Subject name: Automated production units	Code: MpIElec06.2	Semester: 2
Type of teaching: Lectures Laboratory Works Project	Lessons per semester: L – 15 hours; LW – 10 hours. optional	Number of credits: 5

LECTURERS:

1. Assoc. Prof. Ivan Kostov, Ph.D., (FEA), Control Systems Department
Phone: +35932659531, e-mail: ijk@tu-plovdiv.bg
Technical University - Sofia, Branch Plovdiv;
2. Assoc. Prof. Sevil Aptula Ahmed, Ph.D., (FEA), Technical University - branch Plovdiv,
Phone:+35932659585, sevil.ahmed@tu-plovdiv.bg.

COURSE STATUS IN THE CURRICULUM: Elective course for full-time students of the Industrial Electronics specialty at FEA TU-Sofia, Plovdiv Branch, Master's degree.

AIMS AND OBJECTIVES OF THE COURSE: The aim is delivering new knowledge and experience on motion control in mechanisms, units and equipments in automated systems. Mathematical and structural descriptions of specific problems are concerned as basics of design and exploitation of this kind of systems.

DESCRIPTION OF THE COURSE: Students get knowledge about: the structure, the mathematical description, the types of signals and the management of the coordinates of the movement of mechanisms, units and equipments in automated systems; the implementation of speed, position and trajectory control loops; linearized models and their respective structural schemes. Structure of the course: Elements and properties of control systems for automated mechanisms - technical realizations (of converters, motors, actuators). Concerned controllers: analog and digital implementation of conventional controllers; programmable logic controllers, intelligent control algorithms. The course project is optional.

PREREQUISITES: Knowledge of the following subjects is required: Mathematics, Physics, Control Theory; Electrical measurements; Electromechanical devices; Pulse and digital circuit engineering; Control of Electromechanical Systems.

TEACHING METHODS: Lectures, including multimedia methods, and laboratory exercises with assessed presentation of experiment reports.

METHOD OF ASSESSMENT: Written exam during at the end of the semester. The exam consists of test with announced grading according the gained points.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1. <https://dox.abv.bg/download?id=d15e82e0e33>; 2. Bimal K. Bose, Modern Power Electronics and AC drives, Prentice Hall, 2002, ISBN-0-13-016743-6; 3. Bose, B.K. Power Electronics and Motor Drives: Advances and Trends, Elsevier, 2006, ISBN 978-0-12-088405-6; 4. MUHAMMAD H. RASHID, Power electronics handbook, ACADEMIC PRESS, 2001; 5. Keith H. Sueker, Power Electronics Design: A Practitioner's Guide, 2005; 6. Личев Р.П., Проектиране на полупроводникови електрозадвижвания, Технически университет - София, 2005г., с.208, ISBN 954-438-527-4. 7. Костов И., Г. Даскалов, Проектиране на полупроводникови електрозадвижвания, ръководство за проектиране (решени примери и задачи), Технически университет – Пловдив, 2001г., с.106, ISBN 954-8779-27-7. 8. Йорданов Св., Автоматизация на производствените механизми, ДИ Техника, 1994г., 10. Бакърджиев Д. и др., Автоматизация на производствените агрегати, ТУ - София, 1990г. 11. Frank L. Lewis, Darren M. Dawson, Chaouki T. Abdallah, Robot Manipulator Control: Theory and Practice (Automation and Control Engineering), Edition: 2nd, CRC Press, ISBN-13: 978-0824740726.

COURSE DESCRIPTION

Name of the course: Industrial lighting	Code: MpIElec06.3	Semester: 2
Type of teaching: Lectures; Laboratory work; Semester project	Lessons per week: L - 1 hours; LW – 0,7 hours; CP – Optionally.	Number of credits 5

LECTURER: Assoc. Prof. PhD. Stanimir Stefanov (FEA), tel: +35932659512, e-mail: glasst@abv.bg, Technical University - branch Plovdiv.

COURSE STATUS IN THE CURRICULUM: A freely elective from List 2 course for part-time students in the Master of Engineering degree in Industrial Electronics.

AIMS AND OBJECTIVES OF THE COURSE: Upon successful completion of the course, students should be able to apply the approaches, methods and technical means for the design, construction, maintenance, repair and management of a variety of industrial lighting fixtures used in the territories of industrial objects.

DESCRIPTION OF THE COURSE: The subject of the course is directly connected with the Indoor lighting installations (LI) for industrial and service work places; LI for outdoor work places; LI infrastructure objects and facilities; LI of electrical substations and TP; LI in explosive environments and in environments with high fire risk; LI in high humidity and aquatic environments; LI with increased chemical resistance; Special-purpose projector systems; Lightings management; Electricity and economic efficiency of the LI.

PREREQUISITES: The course is conducted on the basis of knowledge from the courses by for Electrical engineering bachelor degree: FpBEE19, BpEE34 end pBEE48.1.

TEACHING METHODS: Lectures. Labs are conducted in accordance with the lab books and reports prepared by the students and checked by the supervisor.

METHOD OF ASSESSMENT: Written exam with two syllabus questions and solving a problem or case at the end of the semester (70%), laboratories (10%) and individual course project (20%). Individual course project 15th weeks with assessment.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:

8. БДС EN 12464, част 1 и 2. Светлина и осветление.
9. БДС EN 1838. Евакуационно осветление.
10. БДС EN 13201, част 1, 2, 3, 4. Улично осветление.
11. Пачаманов А., Б. Прегъов, Д. Бибев. Специални осветителни уредби - ръководство за лабораторни упражнения и самостоятелна подготовка, София, Авангард, 2003.
12. Андрейчин Р. и др., Наръчник по осветителна техника - том I и том II, Техника, София-1977.
13. Наредба №3 от 9.06.2004 за устройство на електрическите уредби и електропроводните линии.
14. Иванов З. Осветителна и инсталационна техника, София, Авангард Прима, 2010.

DESCRIPTION OF THE COURSE

Name of the course Industrial applications of electronic energy converters	Code: MpIElec07	Semester: 2
Type of teaching: Lectures, laboratory work Semester project - optionally	Lessons per week: L – 1 hours; LW – 1 hours	Number of credits: 5

LECTURER: Assoc. Prof. PhD Tsvetana Grigorova, (FEA), e-mail: c_gr@tu-plovdiv.bg,
Assoc. Prof. PhD Georgi Ganev (FEA), e-mail: ganev@tu-plovdiv.bg
Technical University of Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM:

Compulsory discipline for part-time students in the qualification Master's degree in "Industrial Electronics".

AIMS AND OBJECTIVES OF THE COURSE:

The aims and objectives of the course are to teach students on the types of power electronic converters, their basic power circuits and control systems and their applications. The students learn the power electronics circuits for motor speed regulation, as well as power electronics converters for renewable energy sources. By learning about the basic input /output characteristics of converters and the requirements for complete conversion devices, students acquire the skills necessary to select complete conversion devices. With *laboratory work* it is intended to provide the students with practical skills for designing, investigating, testing and evaluating the performance of power circuits and units. The purpose of the *course project* is to be created engineering design abilities and to be supplemented the knowledge about different subjects.

DESCRIPTION OF THE COURSE:

The main topics concern: The power devices classification; Methods for analysis; Buck, boost and buck-boost converters; Power devices control circuits; In view of the industrial applications and the related technical requirements of the different types of circuits, various algorithms for controlling power devices and generating output voltage and output current in voltage-source inverters. Electromagnetic processes are analyzed in all the converter circuits. Functional block-diagrams and principles of control systems are explained. Protection and start of the power devices. The general principles of the modeling of power electronic devices and their realization using computers are studied.

PREREQUISITES:

Knowledge on "Theory of electrical engineering", "Electronic and semiconductor devices", "Power supplies" and "Analogue circuits".

TEACHING METHODS:

The training is based on lectures, laboratory works and course design. The target of laboratory works is to expand the student knowledge from a practical point of view. The course design gives the opportunity for student's own decision and solving the specific practical problem.

METHOD OF ASSESSMENT:

Written exam at the end of the sixth semester. The final mark is formed 20% from the laboratory work and 80% from the written exam.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1. Бобчева, М., С.Табакон П.Горанов. Преобразувателна техника; 2. Бобчева, М., П.Горанов, Г.Кънов, Ц. Григорова, Ръководство за лабораторни упражнения по основи на преобразувателната техника; 3. Mohan, N. J.Undeland, W.Roobbins. Power Electronics. John Wiley&Sons. NY. 1995. 4. Бобчева, М., Г.Малеев, П.Горанов, Е.Попов. Ръководство за проектиране на силови електронни устройства; 5. INTERNET sites.

COURSE DESCRIPTION

Name of the course: Industrial robots	Code: MpIElec08	Semester: 2
Type of the education: Lectures, Laboratory exercises, Semester project - optionally	Hours during the week: Lectures – 1 hour, Lab. exercises – 1 hour	Credits: 5

INSTRUCTOR:

Assoc. Professor Nikola Shakev, Faculty of Electronics and Automatics (FEA), phone: 032 659 528,
email: shakev@tu-plovdiv.bg, Technical University – Sofia, Plovdiv branch

STATUTE OF THE COURSE IN THE CURRICULUM: Compulsory course for the students from the specialization “Industrial Electronics”, “Master” qualification degree.

GOALS OF THE COURSE: After the successful completion of the lecture course and the laboratory exercises in the discipline, students can successfully apply the acquired knowledge in modeling and control of manipulation robots in areas such as computer integrated manufacturing, design of flexible production cells and production automation. Students should be able to design and apply various control laws for the industrial manipulators.

COURSE DESCRIPTION: The knowledge and skills acquired in the course create preconditions for realization of students in the field of robotics, and its applications in automation of technological processes. Due to the interdisciplinary nature of robotics, the acquired engineering knowledge can also be useful in the study of many other disciplines related to mechatronics, electromotors, programming languages, simulation and modeling of processes and control systems, sensors and artificial intelligence.

PREREQUISITES: Required preliminary knowledge on linear algebra, differential and integral calculations, control theory.

TEACHNG METHOD: Lectures, laboratory exercises with written reports. The lectures use multimedia presentations and a whiteboard. Teaching includes the use of Milara Diamond H1, H3 and H4 robots, as well as a Mitsubishi Melfa RV-3SB robot with computer control and a portable control panel.

GRADING: The exam is written. It is carried out with developed tests including tasks for analysis and design. A point scoring system is used.

LANGUAGE OF TEACHING: Bulgarian

REFERENCE TEXTS:

- (1) J. J. Craig , Introduction to Robotics: Mechanics & Control, Addison-Wesley, Reading, Mass, 3rd edition, 2002.;
- (2) B. Siciliano, L. Sciavicco, L. Villani, G. Oriolo, Robotics: Modelling, Plannong and Control, Springer-Verlag London Limited, 2009;
- (3) M. W. Spong, S. Hutchinson, M. Vidyasagar. Robot Dynamics and Control. John Wiley & Sons, Inc. 2nd edition, 2004.