COURSE DESCRIPTION

Name of the course **Quality Management**	Code: **MEE01**	Semester: **1**
Type of teaching: Lectures and Seminars Course work	Lessons per week: L – 2 hours S – 2 hour	Number of credits: **6**

LECTURER: Eng. Konstantin Chukalov, PhD.; e-mail: konstantin_chukalov@abv.bg ;
tel.: 0885 18 97 40

COURSE STATUS IN THE CURRICULUM: Compulsory discipline for students learning specialty "Electrical engineering" in the Faculty of "Electronic and Automation" for Master Degree.

AIMS AND OBJECTIVES OF THE COURSE: Upon completion of the class the students should acquire knowledge and skills in the field of quality management in the electrical engineering industry. Based on the principles of total quality management and quality management systems of the ISO 9000 series, they should be able to design and implement quality management systems, to lead quality departments.

DESCRIPTION OF THE COURSE: Basic topics: Quality as a complex category, quality and competitiveness, principles of Total quality management, quality management system, quality oriented marketing, economy of quality, quality assessment, principles of quality ensuring, relations with partners, principles of quality control. Organization of quality improvements, strategic quality planning, standardization, series standards ISO 9000, certification of quality management systems, ensuring quality and safety of electrical products, safety labels and marking for electrical products(CE mark).consumer protection, risk assessment in companies, ensuring work safety.

PREREQUISITES: Marketing, Enterprise economy

TEACHING METHOD Presentation of lectures, discussions with students following their preliminary preparation. Seminars including assignments and reports.

METHOD OF ASSESSMENT: Written exam (65%) and seminar assignments (35%).

INSTRUCTION LANGUAGE: Bulgarian

LITERATURE RECOMMENDED:

1. Ишикава, К., Тотално управление на качеството в Япония. С., "Хр.Ботев", 1994.
2. Джуран, Дж., Курс по управление на качеството. С., ЦС на НТС, 1983.
3. Хикман, К., Майкъл С. Съвършенството като цел. С., "Наука и култура", 1991.
4. Ръководство по контрол на качеството. С., Център по качеството и производителността. 1995.
5. Фукуда, Я., Интегрирано подобряване на производителността и качеството.
6. Стефанов, Н., Японски подход за управление на производството. Сравнителен анализ. Център по качество, производителност, мениджмънт, 1996.
7. Кузманов, Г., Управление на качеството, Пловдив, 2003.
8. Кузманов Г., Качество и безопасност, Пловдив, 2003.
9. Кузманов,, Г., Фирмата към промяна и подобрение, Пловдив,2002.
10. Кузманов, Г., Мениджмънт, Практически курс, Пловдив, 2004.

COURSE DESCRIPTION

Course Title: **Numerical methods and circuits modeling**	Code: **MEE02**	Semester: **1**
Type of Teaching: Lectures and laboratory work	Hours per week: L – 2 hours, LW – 2 hours	Credits: **6**

LECTURERS: Assoc. Prof. Vasil Spasov, Ph.D., e-mail: vasilspasov@yahoo.com; Principal Assistant Ivan Hadzhiev, Ph.D., e-mail: hadzhiev_tu@abv.bg; Phone: (032) 659535, Faculty of Electronics and Automation, TU-Sofia, Branch Plovdiv, Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory subject for full-time students in the major of Electrical Engineering of the Faculty of Electronics and Automation of TU-Sofia, Branch Plovdiv, Master of Science.

COURSE OBJECTIVES: To introduce students to the finite element method with nodal elements for modeling of electromagnetic fields and electrical circuits. Application of the finite element method to the analysis of two-dimensional, axis-symmetric and three-dimensional electromagnetic fields excited by current sources, voltage sources or permanent magnets. Coupling of the electric circuits equations with the equations of the electromagnetic field and movement. Demonstration of the practical application of the finite element method to modelling of electrical devices fed by current source or voltage source of arbitrary shape and frequency, at presence or absence of movement. Application of the finite element method to numerical modeling of devices of complex geometry of the magnetic circuits and coils, and non-linear characteristics of materials.

COURSE DESCRIPTION: Basic topics: Equations and problems for the analysis of electrical, magnetic and thermal fields. The finite element method – nature, main characteristics, element types and interpolation polynomials. Steps in the finite element method. Galerkin formulation. Forming of local and global matrix. Assembling. Example for forming the matrices of two-dimensional magnetic field. Non-linear problems. Two-dimensional analysis of permanent magnets by the finite element method. Solving time-dependent problems by the finite element method. Eddy currents. Skin effect. Coupling the electromagnetic field and electric circuits equations in the two-dimensional analysis of electric machines by the finite element method. Modeling of mixed quasy-stationary electromagnetic and thermal field by the two-dimensional finite element method. Three-dimensional problems fed by current source. Postprocessing the results from the three-dimensional finite element analysis. Modeling of electric circuits in the three-dimensional finite element analysis of electromagnetic devices. Coupling the electromagnetic field and electric circuits equations. Parametric, direct and indirect model for coupling the electromagnetic field and electric circuits equations. Software for two-dimensional and three-dimensional analysis of electromagnetic fields and electric circuits by the finite element method.

PREREQUISITES: Mathematics, Physics, Theoretical Electrical Engineering, Electrical Machines, Electrical Apparatuses, CAD systems in Electrical Engineering.

TEACHING METHOD: 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.

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

TEACHING 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. Соколов Е. Методът на крайните елементи в електротехниката. Юбилейна научна сесия "50 години ТУ – София", секция Електротехника, октомври 1995, 3-16.
4. Александров А. Компютърно проектиране на електрически апарати. Авангард Прима, София, 2004, ISBN 954-323-055-2.
5. Александров А. Специален курс по електрически апарати. София, Техника, 1983.
6. Брандиски К., И. Ячева. CAD системи в електромагнетизма, София, CIELA, 2002.
7. Кулон Ж. Л. САПР в электротехнике. Москва, Мир, 1988.
8. Демирчян К., В. Чечурин. Машинные расчеты электромагнитных полей. Москва, Высшая школа, 1986.
9. Jin J. The finite element method in electromagnetics, John Wiley & Sons, 1993.
10. Hoole S. Computer-aided analysis and design of electromagnetic devices, Elsevier Science Publishing Co., Inc., 1989.
11. Zienkewich O. The finite element method. London, Mc-Graw Hill, 1977.

DESCRIPTION OF THE COURSE

Name of the course **Practice of Informatics**	Code: **MEE03**	Semester: 1
Type of teaching: Laboratory work	Lessons per week: L –0; LW –2 hours	Number of credits: **3**

LECTURER: Assoc. Prof. Ph.D. Ivan Canchev (FEA) – tel.: +359 32 659 525, email: ganchev@tu-plovdiv.bg ,Technical University of Sofia, Branch in Plovdiv, Assoc. Prof. Ph.D. Albena Taneva (FEA) – tel.: +359 32 659 585, email: altaneva@tu-plovdiv.bg Technical University of Sofia, Branch in Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course for the students of specialty "Electrical Engineering", 'master' degree of qualification of the Faculty of Electronics and Automatics.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of the course is to introduce students to the industrial control systems basics and practice. The main focus is on the hardware and software related to the programmable logic controllers (PLC) and to the Input\Output devices.

DESCRIPTION OF THE COURSE: The course covers the basic information about Theoretical electronic. This is one of the modern trends in engineering practice.The subject is devoted to typical and widely used devices in practice. The various hardware and software are presented. Special attention is focused on configuration and programming of the PLC.

PREREQUISITES: The main prerequisites for the present course are the following courses: Electrical theory and Measurements from the Bachelor of Science plan.

TEACHING METHODS: Laboratory works and exercises. The laboratory work visualizes the practical solution of the control systems with programmable controllers and laboratory sets up. The exercises expand the knowledge and focuses on acquiring practical knowledge and skills.

METHOD OF ASSESSMENT: Ongoing evaluation

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Ганчев И., М.Петров, Промишлени приложения н амикропроцесорите, "Учебни записки", Технически Университет-София, Филиал Пловдив, 1999;
2. Michel C., Programmable Logic Controllers, 1990;
3. Berger H., Automating with SIMATIC S5 115U, Siemens AG;
4. SIMATIC S5-90U Programmable Controller, User's Guide, Siemens AG, 1991;
5. SIMATIC S5 Exercises, Siemens AG, 1990;
6. OMRON, "Operation Manual – Ethernet Units Construction of Applications for CJ Series", 2003;
7. OMRON, "Operation Manual – Ethernet Units for CJ Series", 2003;
8. OMRON, "Programming Manual – Programmable controllers for CS/CJ Series", 2003;
9. OMRON, "CX-Programmer Introduction Manual". 2003; OMRON, "CX-Programmer 6.1 Operation Manual", 2005

DESCRIPTION OF THE COURSE

Name of the course **Power Equipment Protection Devices**	Code: **MpEE04.1**	Semester: **1**
Type of teaching: Lectures and laboratory work Course work	Lessons per week: L – 2 hours; LW – 2 hour	Number of credits: **5**

LECTURER: Assoc.Prof. Ph.D. Georgi Ganev, tel.: 032 659 560,
Department of Electrical Engineering email: gganev@tu-plovdiv.bg
Technical University of Sofia, Plovdiv branch

COURSE STATUS IN THE CURRICULUM: Elective course for students specialty Electrical Engineering Master Engineering program of the Faculty of Electronics and Automation of Technical University of Sofia, Plovdiv branch.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to introduce the students to the principles of operation, characteristics and adjustment of protection devices concerning the main electrical equipment - electrical grids, busbars, power transformers, power motors and generators.

DESCRIPTION OF THE COURSE: The main types protection devices have been studied into the course: over-current relays, directional overcurrent relays, distance protection and differential protection devices and their application into the transmission and distribution grids. The protection devices of generators, transformers, motors and busses are considered in depends on the typical abnormal behaviours of power equipment. Along with protection relays and electromechanical protection devices applications a special attention is paid to the digital protection devices - structure, main mathematical algorithms, etc. In laboratories the students gain some knowledge and experience with protection devices testing and adjustment.

PREREQUISITES: Theory of Electrical Engineering, Electrical Machines, Electrical Apparatuses, Electrical Power Systems, Power Networks and Systems.

TEACHING METHODS: Lectures using multimedia presentations. Laboratory works are carry out in accordance with protection devices testing manuals. The laboratory results are checked by the supervisor. The reading materials are given to the students in advance.

METHOD OF ASSESSMENT: Written exam at the end of semester. The final mark is the aggregate of the written exam (80%) and the laboratory work (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Вичев С. Записки по релейна защита (CD);
2. Аврамов Н. Основи на релейната защита. С., Техника, 1984;
3. Horowitz S., A.Phadke. Power System Relaying, J.Wiley&Sons, Ltd, 2008
4. Networks protection and automation guide, Areva, 2005

COURSE DESCRIPTION

Name of the course: **Equipment for building automation**	Code: **MEE05.3**	Semester: **1**
Type of teaching: Lectures, laboratory work and self-study	Lessons per week: L – 2 hours, LW – 2 hours, Self-study – 5 hours.	Number of credits: **5**

LECTURERS: **Assoc. Prof. Dian Malamov, Ph.D.,** Faculty of Electronics and Automation (FEA), Department of Electrical Engineering, e-mail: deanmalamov@abv.bg, Phone: (032) 659687; **Principal Assistant Ivan Hadzhiev, Ph.D.,** Faculty of Electronics and Automation, Department of Electrical Engineering, Phone: (032) 659686, e-mail: hadzhiev_tu@abv.bg; Technical University of Sofia, Plovdiv Branch.

COURSE STATUS IN THE CURRICULUM: Optional course for full-time students, majoring in "Electrical Engineering" at the Faculty of Electronics and Automation, TU-Sofia, Plovdiv Branch, for receiving the Master of Science degree.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to allow the students to acquire extensive basic theoretical knowledge and practical skills for working with equipment for design and exploitation of modern integrated systems for building automation.

DESCRIPTION OT THE COURSE: Main topics: Basic information, aims, objectives and trends in building automation; Building automation and energy efficiency of buildings; Instrumentation for measurement and control of environmental parameters; Building automation system EIB/KNX - topology, functional structure and parameters of the bus devices and forming control signals; Addressing and organization of the communication between the bus devices in the system EIB/KNX; General information and application of the design software ETS 3; Requirements toward the design and implementation of building automation systems EIB/KNX. Equipment for control and automation of lighting, heating, ventilation, air conditioning, and more in building automation systems EIB/KNX; Characteristics and selection of equipment to protect people and property in buildings against damage from electric current.

PREREQUISITES: Physics, Electronics, Electrical apparatus, Lighting and installation techniques, Energetics, Switching equipment.

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: The final grade is formed from the written examination at the end of the semester (75%), and the performance during the laboratory exercises (25%).

LANGUAGE OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:

1. Ordinance № 4 of 14 August 2003 for the design, construction and operation of electrical systems in buildings (Bulgarian).
2. Homes, residential and special facilities, Schneider Electric - Electrical installation guide 2009 (Russian).
3. BERCER, Instabus KNX/EIB Technical Manual.
4. ABB i-bus KNX Application Manual Lighting.
5. ABB i-bus KNX Application Manual Shutter Control.
6. ABB i-bus KNX Application Manual Heating/Ventilation/Air Conditioning.
7. Elektronik Handbuch, JUNG, 4 Vollig Neubearbeitete, Auflage, 2003.
8. Dietmar Dietrich, Wolfgang Kastner, Thilo Sauter, EIB-building automation system, Hutigh (Russian).
9. Project Engineering for EIB, Installations-Basic Principles, 4th (revised) edition.

COURSE DESCRIPTION

Course Title: **Electrical supplying and Electrical equipment**	Cod: **MEE06.3**	Semester: **1**
Type of teaching: Lectures, Laboratory work, Course project.	Lessons per week: L - 2 hours; LW - 2 hours; Optionaly.	Credits: **5**

LECTURERS: Assoc. prof. PhD. Stanimir Stefanov, (FEA), tel: +35932659512, e-mail: glasst@abv.bg, Technical University - branch Plovdiv**;**
As. PhD. Ilko Turpov, (FEA), 032659583, e-mail: stsb_plovdiv@abv.bg, Technical University - branch Plovdiv**.**

COURSE STATUS IN THE CURRICULUM: Eligible subject for the major Electrical Engineering of the Faculty of Electrical Engineering and Automation, Mster of Science.

AIMS AND OBJECTIVES OF THE COURSE: The subject aims at introducing students to new theoretical knowledge and practical skills in field Electrical supplying and Electrical equipment, choice of electrical motors and their joint work with working machinery, electrical equipment of lifting, pumping and ventilation systems.

DESCRIPTION OF THE COURSE: Development of electrical power energy, energetic resources, structure of electrical power energy; Electrical loads and diagrams, quality of electrical power; Determination of basic computing loads, consumption of electrical power and compensate power; Electrical transmission network; Distributing outfit, machines and apparatuses for high voltage, transformers, switches , circuit breaker, measurement transformers; Choice of electromotors by rated performances and power; Elements of systems for control and conduct of electrical equipment, choice of apparatuses for control and defence, Schemes of second commutation; Electrical equipment of cranes; Electrical equipment of elevators; Electrical equipment of ventilators and pumps.

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 whit 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 at the end of the semester (70%), laboratories (10%) and individual cours projekt (20%). Individual course project 15th weeks with assessment.

INSTRUKTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:

1. Кирчев В., К. Янев и М. Георгиев, Електрически мрежи средно и високо напрежение, Летера, 2006.
2. Платиканов Ст. Електроснабдяване на промишлени предприятия - записки. ТУ – Габрово.
3. Стоянов Ст. Ц. Цанев, Електрообзавеждане на производствени агрегати, София Техника, 1990.
4. Василев Н. С. Сидеров, Ръководство за проектиране на електроснабдителни системи на промишлени предприятия, София, Техника, 1991.
5. Андреев Х., Електрически мрежи и системи – ръководство за курсово проектиране, Русе, РУ „Ангел Кънчев", 2000.

COURSE DESCRIPTION

Course Title: **Numerical methods and fields modeling**	Code: **MEE07**	Semester: 2
Type of Teaching: Lectures and laboratory work	Hours per week: L – 2 hours, LW – 2 hours	Credits: **7**

LECTURERS: Assoc. Prof. Vasil Spasov, Ph.D., e-mail: vasilspasov@yahoo.com; Principal Assistant Ivan Hadzhiev, Ph.D., å-mail: hadzhiev_tu@abv.bg; Phone: (032) 659535, Faculty of Electronics and Automation, TU-Sofia, Branch Plovdiv, Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory subject for full-time students in the major of Electrical Engineering of the Faculty of Electronics and Automation of TU-Sofia, Branch Plovdiv, Master of Science.

COURSE OBJECTIVES: To introduce students to the following methods for modelling of electromagnetic fields – the three-dimensional finite element method with vector elements and the three-dimensional multigrid method. Introduction to the theory and practice of the vector finite elements which are becoming increasing important. Derivation of three methods for computing electromagnetic force with vector elements – the virtual work method, Maxwell stress tensor method and the nodal force method. Presentation of the geometric multigrid method with vector elements. Introduction to a new accelerated multigrid method for electromagnetic fields analysis, that is manifold faster than the conventional multigrid method and the finite element method.

COURSE DESCRIPTION: Basic topics: Three-dimensional finite element method with vector elements. Shape functions of first-order vector hexahedra tetrahedra. Galerkin formulation. Coefficients of the set of equations when using vector tetrahedra and feeding by current source. Introducing the exciting current by the electric vector potential. Non-linear problems. Electromagnetic force computation when using vector finite elements. Three-dimensional non-stationary magnetic field with vector finite elements and voltage source supply. Geometric multigrid method - V- cycle, and F-cycle. Mesh generation in the geometric multigrid method. Selection of operators for restriction and prolongation. Multigrid method with symmetric Gauss-Seidel, accelerated by the conjugate gradient method. Comparison of the accelerated multigrid method with the conventional multigrid, using Gauss-Seidel, and with the finite element method.

PREREQUISITES: Mathematics, Physics, Theoretical Electrical Engineering, Electrical Machines, Electrical Apparatuses, CAD systems, Numerical methods and circuits modeling.

TEACHING METHOD: 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.

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

TEACHING 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. Соколов Е., Методът на крайните елементи в електротехниката, Юбилейна научна сесия "50 години ТУ – София", секция Електротехника, октомври 1995, 3-16.
4. Александров А., Компютърно проектиране на електрически апарати, София, Авангард Прима, 2004.
5. Брандиски К., Ячева И., CAD системи в електромагнетизма, София, CIELA, 2002.
6. Ризов П., Изследване на установени режими на асинхронни двигатели с метода на крайните елементи, Дисертация за получаване на научна степен "Доктор", София, 1998.
7. Кулон Ж., САПР в электротехнике, Москва, Мир, 1988.
8. Силвестер П., Феррари Р., Метод конечных элементов для радиоинженеров и инженеров электриков, М. Мир, 1986.
9. Демирчян К., Чечурин В., Машинные расчеты электромагнитных полей, Москва, Высшая школа, 1986.
10. Salon S., Finite element analysis of electrical machines, Kluwer Academic Publishers, Second printing 1998.
11. Jin J. The finite element method in electromagnetics, John Wiley & Sons, 1993.
12. Hoole S. Computer-aided analysis and design of electromagnetic devices, Elsevier Science Publishing Co., Inc., 1989.
13. Zienkewich O. The finite element method. London, Mc-Graw Hill, 1977.

COURSE DESCRIPTION

Course Title: **High Voltage Electrical Machines and Apparatuses**	Code: **MEE08**	Semester: **2**
Type of Teaching: Lectures, laboratory work and course work	Hours per week: L – 2 hours, LW – 2 hours, CW – 1 hour, Self Study – 6 hours	Credits: **6**

LECTURERS: Assoc. Prof. Vasil Spasov, Ph.D., e-mail: vasilspasov@yahoo.com; Principal Assistant Ivan Hadzhiev, Ph.D., e-mail: hadzhiev_tu@abv.bg; Phone: (032) 659535, Faculty of Electronics and Automation, TU-Sofia, Branch Plovdiv, Department of Electrical Engineering.

COURSE STATUS IN THE CURRICULUM: Compulsory subject for full-time students in the major of Electrical Engineering of the Faculty of Electronics and Automation of TU-Sofia, Branch Plovdiv, Master of Science.

COURSE OBJECTIVES: The aim of the course is to acquaint students with the general issues of the design, principle of operation, characteristics and testing of high voltage electric machines and apparatuses. Upon completion of the course the students should acquire advanced theoretical knowledge and practical skills in the field of high voltage machines and apparatuses.

COURSE DESCRIPTION:

The High Voltage Electrical Machines module introduces the students to the design, principle of operation, characteristics and testing of turbogenerators and hydrogenerators, high voltage synchronous and induction motors, and high voltage transformers. The cooling methods, excitation systems, winding insulation systems and various modes of operation are discussed.

The High Voltage Electrical Apparatuses module studies the design, principle of operation, characteristics, testing, application and operation of circuit breakers, power disconnectors, reclosers, medium and high voltage switchgear, surge arresters, current and voltage transformers and other high voltage devices. The insulation systems and drives of the apparatuses are discussed and attention is paid to the commutation problems.

PREREQUISITES: The course is based on the knowledge obtained in the Theoretical Electrical Engineering, Electrical Machines and Apparatuses and Electrical Measurements courses.

TEACHING METHOD: Lectures and Laboratory exercises. The lectures are delivered by multimedia. The students prepare an individual report for each exercise and defend it before the supervising lecturer.

METHODS OF ASSESSMENT: Laboratory exercises (20 %), written exam (65%) and course work (15 %).

TEACHING LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Драгомиров Т., Ячев Ив., Електрически апарати за високо напрежение, ИК “ICON”, 1994. 2. Tavner P, Penman J. Condition monitoring of rotating electrical machines. Published by The Institution of Engineering and Technology, London, 2008. 3. Справочник по электрическим апаратом высокого напрежения, под редакцией В. В. Афанасиева, Ленинград, Енергоатомиздат, 1987. 4. Теория и конструкции выключателей, под редакцией Ч. Ф. Фершейна, Ленинград, Енергоатомиздат, 1982. 5. Кукеров Г., Выключватели переменного тока высокого напрежения, Енергия, 1972. 6. Ангелов А., Д. Димитров, Електрически машини, част първа, София, Техника, 1988. 7. Абрамов А., Иванов А. Проектирование гидрогенераторов и синхронных компенсаторов. Москва, Высшая школа, 2001. 8. Глебов И., Диагностика турбогенераторов, Наука, 1989. 9. Димитров Д., Ваклиев И., Сотиров Д., Стоянов М., Ръководство за изпитване на електрически машини, София, Техника, 1991. 10. Dasgupta I. Power transformers quality assurance. New Age International Ltd. Publishers, 2009.

DESCRIPTION OF THE COURSE

Course title**: Measuring instruments and systems**	Code: **MEE09**	Semester: **2**
Type of teaching: Lectures laboratory exercises	Hours per week: L - 2 hours; LE - 2 hours.	number of credits: 7

LECTURER: Associate Professor, PhD **Vania Rangelova** Department "Electrical engineering", tel. 032 659 685, cab. 3325, email: vaniarangelova@tu-plovdiv.bg, Technical University of Sofia, Branch Plovdiv, Associate prof., PhD, **Margarita Deneva**, Dept. "Electrical engineering", tel. 032 659 685, e-mail: mar.deneva@abv.bg, Technical Univercity of Sofia, Branch Plovdiv and и Assis. prof**.,** PhD, **Nikolay Paunkov** tel. 032 659 687, email: nick123@abv.bg, Technical Univercity of Sofia, Branch Plovdiv.

COURSE STATUS IN THE CURRICULUM: The course is mandatory for the students of specialty "*Electrical engineering* " on FEA TU-Sofia, Plovdiv Branch for the academic degree "Master."

PURPOSE OF THE COURSE: The purpose of the course is for students to learn and be able to apply the approaches, methods and technical means to analyze, model, ensure and improve the accuracy and reliability of measurement systems and, in accordance with their needs and interests, to acquire new knowledge and capabilities in this subject area.

COURSE DESCRIPTION: The course covers different types of measurement systems, general principles for their construction, as well as methods for noise reduction and noise effects. Modern specialized measurement systems for the measurement of wave and energy characteristics of electromagnetic radiation in radio and optical range are also considered. A large percentage is also the examination of modern measurement systems realized through virtual measurement tools. The laboratory exercises aim to familiarize students with the practical application of different types of measurement systems, as well as the use of specialized equipment for measuring quantities of contemporary problems.

BACKGROUND: Previous knowledge in Physics, Mathematics, Theoretical Electrical Engineering, Materials Science, Semiconductor components, Computer systems, Electrical measurements.

TEACHING METHODS: Lectures, laboratory reports with a written report and individual protection.

METHODS OF ASSESSMENT: Written ongoing assessment at the end of semester (80%), laboratories assignments (20%).

LANGUAGE: Bulgarian

RECOMMENDED BOOKS

1. John Bentley. Principles of Measurement Systems. Longman Scientific @ Technical. 1992.
2. *https://forums.ni.com/t5/Community-Documents/Introduction-to-LabVIEW-and-Computer-Based-Measurements-Full-Day/ta-p/3526527?profile.language=en*
3. http://zone.ni.com/
4. Krastev G, Tsc. Georgiev. Automation tools of the scientific research, Ruse, 2002
5. M. Deneva, M. Nenchev, „Laser radiation in presentation for engineers and applicators", Technical University of Sofia – branch Plovdiv, 2015

COURSE DESCRIPTION

Course Title: **Electronic devices in transport**	Code: **MEE10.2**	Semester: **2**
Type of teaching: Lectures and laboratory work	Hours per week: L - 2 hours, LW – 2 hour, Self Study – 6 hours	Credits: **5**

LECTURER:
Assoc. Prof. Ph.D. Nikola P. Georgiev, tel.: 659581 e-mail: nikola.georgiev@tu-plovdiv.bg,, Faculty of Electronic and Automation, dept. of Electrical engineering – Technical University of Sofia – branch Plovdiv

COURSE STATUS IN THE CURRICULUM:
Elective subject for full-time students of the specialty "Electrical engineering" of the Faculty of Electronic and Automation of the Technical University of Sofia – branch Plovdiv, for educational and qualification degree "master".

AIMS AND OBJECTIVES OF THE COURSE:
The main aim of this course in "Electrical engineering" should be to develop in the students knowledge in generalprinciples of work of Electronic devices in transport.

DESCRIPTION OF THE COURSE:
In the course the following subject are studied: regulator of voltage, systems for starting the engine, electronic ignition systems, measurement systems and electronic systems for management.

PREREQUISITES:
Necessary knowledge of Electronics and Electrical engineering.

TEACHING METHODS:
Lectures lead with the help of virtual models and slides, laboratory workshops is accompany to making reports and defending.

METHOD OF ASSESTMENT:
A written exam at the end of the second semester.

ISTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Илиев Л, Б.Трайков, Електрически уредби на автомобилите и тракторите, Техника, София, 1990.
2. Трайков Б. Електроника в автомобила, Техника, София, 1997.
3. Ю.П. Чижков, Электрооборудование автомобилей, Машиностроене, Новосибиркс 2002.
4.Тошков Г. П., 'Електроника', ТУ - Варна, 2005.
5. Erickson R, D. Maksimovic, 'Fundamentals of Power Electronics'KAP, Massachusetts, USA, 2001.

COURSE DESCRIPTION

Name of the course: **Marketing**	Code: **MEE11.2**	Semester: 2
Type of teaching: Lectures, seminars	Lessons per week: L – 2 hours , S – 2 hours	Number of credits: **5**

LECTURERS:

Assistant Professor Elena Zlatanova - Pazheva tel.0899 943 956; email: elyzlatanova@abv.bg ,
Technical University – Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Compulsory course for the students with specialty "Electrical Engineering" of the Faculty of Electronics and Automation of TU-Sofia, Branch Plovdiv for Master Degree.

AIMS AND OBJECTIVES OF THE COURSE: The students are expected to acquire and deepen their knowledge of the basic marketing concepts and principles.

COURSE DESCRIPTION: The following issues are in the scope of the course: basic marketing concepts and principles; elements of the marketing environment; market segmentation and positioning. The marketing information systems are considered in detail, along with the methods of collecting, processing, analysis and control of marketing information. The applicable methods of planning and organizing marketing research are studied.

Product planning and implementation of the innovation policy. In the section on pricing policies the basic methods for price formation and the basic pricing strategies are studied. Distribution policy is presented in terms of the channels of distribution and sale strategies for internal and external markets. Special attention is paid to the implementation of logistics in market structuring.

In the section on communication policy all basic methods of promotion, carried out by means of conventional advertising forms, as well as by electronic means (Internet etc.) are studied.

TEACHING METHOD: Lectures with presentations, discussions with active participation of students after preparation; laboratory exercises – group work for solving case studies.

METHODS OF ASSESSMENT: Exam test.

LANGUAGE OF INSTRUCTION: Bulgarian

BIBLIOGRAPHY:

1.Blagoev, V. Marketing, S., 2003
2. Kotler, F. Marketing, S., 1999
3. Kotler, F. Marketing Advice from A to Z, S., 2006
4.Kuzmanov, G. Marketing, Pv, 2006
5. Kuzmanov, G. Management, Practical Course, Fr, 2004
6.Kuzmanov, G. The Firm of Change and Improvement, Pv, 2003
7. Kuzmanov, G. Bulgaria in the EU: New Marketing Realities and Tasks in Business Management, 2007
8. Doganov, D., Z. Mladenov, R. Panova, Marketing, Tests and Tasks, Dictionary, S. Dionis, 2007
9. Kotler, F. and Others, The Evolution of Marketing, S., "Classic and Style", 2003
10. Kotler, F., The Ten Death Sin of Marketing, S., "Locus", 2006
11.Hill, S., 60 Trends, 60 Minutes, S., Locus, 2006
12.Rees, Al. etc. Non-Modifying 22 Problems of Marketing, S., 2001