DESCRIPTION OF THE COURSE

Name of the course **Mathematical methods for digital signal processing**	Code: ME01	Semester: I
Type of teaching: Lectures and Seminary work	Lessons per week: L – 2 hours; SW – 1 hour	Number of credits: 4

LECTURER:

Assoc. Prof. PhD B. K. Pachedjieva (FEA) – tel.: 659 708
Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course for the students in Master's program in Electronics.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to provide theoretical knowledge and practical skills using mathematical methods for digital processing and in particular Probabilistic and statistic methods at solving most important theoretical and practical problems in electronics – in particular statistical treatment of experimental data.

DESCRIPTION OF THE COURSE: The main topics concern: Probabilities; Random variables; System from random variables; Deterministic connections between Random variables; Statistical treatment experimental date; Random Processes; Stationary Random Processes; Markov Random Processes; Elements of the theory telegraphic systems; Transforming random processes in electronics units.

PREREQUISITES:. Good fundamental knowledge in the courses: Higher mathematics, Theoretical electrical engineering, Signals and systems.

TEACHING METHODS: Lectures, and laboratory work.

METHOD OF ASSESSMENT: Two two-hour assessments at mid and end of semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Vencel E. S., L. A. Ovcharov. The theory of probability and its engineering applications. Moscow, Science press, 1988. 2. Gmurman V. E. The theory of probabilities and mathematical statistics. Moscow, Higher school press, 2002. 3. Gmurman V. E. Manual to the decision of tasks on the theory of probabilities and mathematical statistics Moscow, Higher school press, 2003. 4. Srinath M. D. Introduction to statistical signal processing with applications. Prentice-Hall, New Jersey, 1996. 5. Alberto Leon-Garcia. Probability and Random Processing for Electrical Engineering, Addison–Wesley, 1994. 6. Ferdinandov E. S., B. K. Pachedjieva. Probabilistic and statistic methods in communications. Sofia, Siela, 2005.

DESCRIPTION OF THE COURSE

Name of the course **Design of embedded systems**	Code: **ME02**	Semester: **I**
Type of teaching: Lectures and laboratory work, semester project	Lessons per week: L – 2 hours; LW – 2 hour	Number of credits: **6**

LECTURER:
Ass. Prof. PhD. Boyko Petrov, tel: 659760 e-mail: bpetrov@tu-plovdiv.bg TU-Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Obligatory subject for student's specialty "Electronics", M.Sc.

AIMS AND OBJECTIVES OF THE COURSE: After subject completion the students know an organization, development and applications of microprocessors and microcontroller embedded systems, based on advanced architectures

DESCRIPTION OF THE COURSE: The main topics concern: Microprocessor architectures for embedded applications; Integrated development environment tools; Microcontroller architectures; Low power mode microprocessors and microcontrollers; Digital signal processors: architecture, organization, modes of operations, applications. The study course material is located to the industrial control and measuring applications.

PREREQUISITES: Physics, Digital electronic and Software skills

TEACHING METHODS: Lectures, using slides, case studies, laboratory and semester project (obligatory), work in teams, protocols and semester project description preparation and defence.

METHOD OF ASSESSMENT: Written examination (70%), three laboratory assessments (30%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. TMS320 FAMILY – Data books, CD - C2000 Teaching materials, DSP24 Workshop; 2. MICROCHIP DATA BOOK, MICROCHIP 1993, Microchip technical library CD – ROM; 3. MSP430 FAMILY, TEXAS INSTRUMENTS 1994, 4.Hitz K., D. Tabak, Microcontrollers- Architecture, Implementation and Programming, McGraw Nill, 1992. 5. ADSP-21xx, ADSP-21xxx - Family data books.

DESCRIPTION OF THE COURSE

Name of the course **CAD systems in microelectronics**	Code: ME03	Semester: 1
Type of teaching: Lectures and laboratory work, course project of choice	Lessons per week: L–2 hours; LW–2 hours.	Number of credits: 5

LECTURER:

Assoc. Prof. Ph.D.. Svetoslav Ivanov (FEA), tel.: 032 659720, email: bluflam@tu-plovdiv.bg
Technical University of Sofia, branch Plovdiv.

COURSE STATUS INTHE CURRICULUM: Compulsory for the students specialty "Electronics" of Faculty of Electronics and Automation, educational-qualification degree " Master".

AIMS AND OBJECTIVES OF THE COURSE: To form knowledge in the design of electronic circuits. The subject acquaints students with the automated design systems in microelectronics for design of analog, digital and digital-analog integrated circuits.

DESCRIPTION OF THE COURSE: Main themes: General characteristic of automated design systems; Organization of the database; Libraries, structure of the library; Introduction of circuit diagram - VHDL; Simulation of circuits; Conversion and optimization of VHDL description; Design of integrated circuit topology; System for design of digital integrated circuits; Introduction to the Design Environment; Design algorithm; Simulate the project and detect errors in its design; Tools for re-engineering the project; Synthesis of input HDL description in a bound technology project at the gate level; Input description of the technology library and compilation of the description in a VHDL library.

PREREQUISITES: The discipline is based on the knowledge gained in the following disciplines: microelectronics, theory of electronic circuits, analog and digital electronics.

TEACHING METHODS: Lectures using a multimedia projector and demo programs, laboratory exercises with protocols.

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

INSTRUCTION LANGUAGE; Bulgarian.

BIBLIOGRAPHY:

1.) M. Hristov, Design Systems in Microelectronics, Sofia, 2004; 2.) Cr. Filipova et al., Using (v) HDL for Electronic Hardware Synthesis, Sofia, 2004; 3.) Ashenden P.J The Designer's Guide to VHDL, 2nd Edition Morgan Kaufmann Publishers 2001; 4.) Charles. H., Digital System Design Using VHDL, 1998.

DESCRIPTION OF THE COURSE

Name of the course **Electronic energy converters**	Code: **ME04**	Semester: **1**
Type of teaching: Lectures, Laboratory work, Course project or Course work	Lessons per week: L– 2 hours, LW – 2 hours	Credits: **6**

LECTURER:

Assoc. Prof. PhD Tsvetana Grigorova, (FEA), e-mail: c_gr@tu-plovdiv.bg

e-mail: c_gr@tu-plovdiv.bg, Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course for the students of specialty "Electronics", "Master" degrees.

AIMS AND OBJECTIVES OF THE COURSE: The course "Electronic energy converters" aims to acquaint the students with the theoretical bases, models, methods, algorithms and applied analysis programs of the electronic power converters.

DESCRIPTION OF THE COURSE: Main topics: Main parameters of power electronic devices in terms of the power grid; Variation of the power factor in the regulation of single-phase and three-phase controlled rectifiers; Controlled rectifiers as a source of higher harmonics with respect to the power supply; Hysteresis current controlled rectifiers; Active power factor correction for uncontrollable rectifiers; Transistor active power filters; Transistor converters; Transistor converters with soft switching; Self-excited converters; Converters for electric drives; Voltage and current control; Current protections for power converters; Frequency compensation in the negative feedback loop;

PREREQUISITES: Knowledge of the following disciplines: Mathematic, Physics, Semiconductor devices, Theoretical Electrical Engineering, Analogue electronics, Power supplies

TEACHING METHODS: Lectures and laboratory exercises in properly equipped laboratories. For the laboratory exercises are developed methodical manuals, laboratory models and PSpice computer models on topics, covered in the lectures.

METHOD OF ASSESSMENT: A written exam (80%), laboratory exercises (20%).

LANGUAGE OF INSTRUCTION: Bulgarian.

BIBLIOGRAPHY:

1. Анчев М.Хр. Силови електронни устройства, С., изд. на ТУ, 2008; 2. Браун М. "Токозахранващи устройства", София, Техника, 2000; 3. HEXFET POWER MOSFET Designer's Manual Application Notes, IRF vol1. HDM1, 1993; 4. Кръстев Г. идр. "Ръководство за проектиране по промишлена електроника", София, Техника, 1988; 5. Power semiconductor applications, Philips Components, 1993; 6. Поликарпов А.Г., Однотактные преобразователей напрежения, Москва, Р.и С., 1989г; 7. MOHAN R., ROBINS, UNDELAND, Power Electronics – Converters, Applications and Design, 1994

DESCRIPTION OF THE COURSE

Name of the course **Electronic development**	Code: **ME05**	Semester: **1**
Type of teaching: Lectures, laboratory work, Course project	Hours per week: L – 2 hours, LW – 2 hours	Credits: **5**

LECTURER:
Assist. Prof. Ph.D Georgi Bonev – dep. of Electronics, Technical University of Sofia, branch Plovdiv, tel.: +35932692814, email: gbonev@engineer.bg

COURSE STATUS IN THE CURRICULUM: Compulsory course for full-time students majoring in "Electronics" for the "Master's Degree".

AIMS AND OBJECTIVES OF THE COURSE: To deepen students' knowledge in the field of electronic engineering and applied electronics. To develop skills in the design and development of electronic measuring and control devices, power supplies that meet the requirements of international safety standards and electromagnetic compatibility.

DESCRIPTION OF THE COURSE: Schematic solutions of devices for measuring and control of technological processes in industry, in the home security systems, requirements of international standards for safety and electromagnetic compatibility of power supply devices are considered. Students are introduced to the basic stages of designing and manufacturing electronic devices and the application of software products for the analysis of modeling and design of electronic systems.

PREREQUISITES: Knowledge of the following courses: Knowledge of the following courses: Electrical Engineering, Electrical Measurements, Semiconductor Elements, Analog Circuits, Digital Circuits, Power Supplies, Theory of Electronic Circuits.

TEACHING METHODS Lectures delivered with the help of audio-visual technical means.
Laboratory exercises are based on the lecture material and are carried out in groups of 2 students. Part of the laboratory tests are carried out on laboratory models, and most of them use CAD-CAM-CAE software for analysis, modeling and design on electronic devices. Students complete individual assignments. The results are described in reports and verified by the training coach.

METHOD OF ASSESSMENT: Written exam at the end of the semester, taking into account the results of the individual assignments of the students during the laboratory exercises.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Sokloff S., "Applications on analog integrated circuits ", Sofia, "Technique", 1990.
2. Zlatarev V.K. and collective, "Application on analogue integrated circuits-handbook", Sofia, "Technique",1985.
3. Kraus H. and col., "Semiconductor radio engineering" Sofia, "Technique" 1985.
4. Williams B., "Power Electronics, Devices, Control, Application", Moscow, Energoatomizdat, 1993.
5. Linear Applications Handbook. TL/3187, National Semiconduktor, 1998.
6. Best, Roland E., "Phase-Locked Loop - design, simulation and application", 5th ed. McGraw Hill 2003, ISBN 0-07-141201-8.
7. Robert W. Ericson, Dragan Maksimovic, "Fundamentals of Power Electronics", second ed., Kluwer Academic Publishers 2004, eBook ISBN 0-306-48048-4, Print ISBN 0-7923-7270-0.

COURSE CHARACTERISTICS

Course Title: **Project Management**	Code: **ME06**	Semester: 1
Type of Teaching: Lecturers, Seminar exercises	Contact hours per week: L - 2 hours, S – 1 hour	Number of credits: 4

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 full-time Motor Transport Management Master Degree students in the Faculty of Mechanical Engineering.

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%) Final written exam (50%) and term assignment defence(40%).

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.

DESCRIPTION OF THE COURSE

Name of the course **Programming of Embedded Systems**	Code: **ME07**	Semester: **2**
Type of teaching: Lectures and laboratory work, semester project	Lessons per week: L – 2 hours; LW – 1 hour	Number of credits: 4

LECTURER:
PhD. Boyko Petrov, Assistant Professor, tel: 659760 e-mail: abpetrov@persecteam.com TU-Sofia, branch Plovdiv
PhD. Nikolay Kakanakov, Assistant Professor, tel :659758 e-mail:kakanak@tu-plovdiv.bg

COURSE STATUS IN THE CURRICULUM: Obligatory subject for student's specialty "Electronics", M.Sc.

AIMS AND OBJECTIVES OF THE COURSE: After subject completion the students will be familiar with the principles of design and implementation of embedded software applications, designed to run on embedded operating systems.

DESCRIPTION OF THE COURSE: The main topics concern: The specifics of the programming language C when designing embedded software applications, The Architecture of Embedded Operating Systems, Computer Networks and Network Topologies, IDEs for embedded software design

PREREQUISITES: Good understanding of Microprocessor Systems, Design of Embedded Microprocessor Systems and Programing

TEACHING METHODS: Lectures, using slides, case studies, laboratory work

METHOD OF ASSESSMENT: Written test examination (90%), one laboratory assessments (10%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Макс, Ж., Методы и техника обработки сигналов при физических измерениях, М.: Мир, 1983, I и II. 2. Ташев, Ив., Методи, устройства и системи за събиране и преобразуване на информация, Учебник за дистанционно обучение при ТУ София. 3. Опенхайм, Ал., Сигнали и системи, С.: Техника, 1992. 4. Иванов, Р., Ив.Ташев, Б.Петров, Методи и средства за събиране и обработка на информация. Ръководство за лабораторни упражнения, ТУ София, 1993.

DESCRIPTION OF THE COURSE

Name of the course **Programmable logical devices**	Code: **ME08**	Semester: **2**
Type of teaching: Lectures and laboratory work semester project	Lessons per week: L – 2 hours; LW – 2 hour	Number of credits: **5**

LECTURER:
Assoc. Prof. Ph.D. Boyko Petrov, tel: 659760 e-mail: abpetrov@persecteam.com TU-Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective subject from list 1 block A for student's specialty "Electronics", M.Sc.

AIMS AND OBJECTIVES OF THE COURSE: After subject completion the students know a theoretical basis, methods of development, hardware description languages, simulation and verification process and realization of programmable logical devices applications, based on Complex Logical Devices (CPLD) and Field Programmable Gate Arrays (FPGA).

DESCRIPTION OF THE COURSE: The main topics concern: Hardware description languages (HDL); Combinatorial- and register-based logical modules, asynchronous and synchronous inputs; Finite state machines (FSM) - theory, description and applications; Hierarchical instantiations; CPLD and FPGA architecture: basic cells, integrated specific block: RAM, DSP, Digital Locked Loops (DLL), Digital Clock Manager (DCM); Design process - behavior simulation, verification, timing analysis, configuration and applications. The study course material is located to digital filters realization, ALU and CPU design and other specific measuring units such as digital oscilloscopes.

PREREQUISITES: Good preparation of Mathematics, Digital electronic, Signals and systems, Microprocessors and Software development skills.

TEACHING METHODS: Lectures, using slides, case studies, laboratory and semester project (elective), work in teams, protocols and semester project description preparation and defence.

METHOD OF ASSESSMENT: Written examination (70%), three laboratory assessments (30%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1.Гиздарски Е.,"Проектиране с програмируема логика" - "Авангард принт" - Русе, 1998г. 2. Xilinx CPLD XC95xl Data Book 3. Xilinx FPGA Spartan II Data book; 4. Model Sim User Manual

DESCRIPTION OF THE COURSE

Name of the course: **Electric Drives**	Code: **ME09.1**	Semester: **2**
Type of teaching: Lectures, Laboratory work and Course project/ coursework	Lessons per week: L – 2 hours; LW – 2 hours. optional	Number of credits: **5**

LECTURER: Assoc. Prof. PhD. Ivan Kostov (FEA) – tel.: +35932659526, email: ijk@tu-plovdiv.bg , Technical University - branch Plovdiv.

COURSE STATUS IN THE CURRICULUM: Elective subject for full-time students in the curriculum in the major of Electronics at the Faculty of Electronics and Automation in TU-Sofia, Plovdiv Branch, from the Master's degree of Science plan.

AIMS AND OBJECTIVES OF THE COURSE: The ease of controlling electrical drives is an important aspect for meeting the increasing demands by the user with respect to flexibility and precision, caused by technological progress in industry as well as the need for energy conservation. The control of electrical drives provided strong incentives to control engineering in general, leading to the development of new control structures and their introduction to other areas of control systems. The purpose of the acquired knowledge is to prepare engineers for the graduation thesis design and for the practice.

DESCRIPTION OF THE COURSE: The course Automated Electrical Drives (AED) examines the dynamic properties: DC motors, induction motors and semiconductor converters for electric drives. Mathematical model and dynamic behaviour of DC motor with constant flux; line- and force-commutated converters for DC drives. Mathematical model and dynamic behaviours; cascade control of converter-supplied DC motors and dynamic behaviours; symmetrical three-phase AC machines. Mathematical model and dynamic behaviour of a General AC machine; converters with and without DC-link for AC drives. Mathematical model and dynamic behaviours; cascade control of converter-supplied AC motors and dynamic behaviours; field orientated, "sensorless", and optimal control systems of AC drives. The course includes the opportunities associated with the implementation of digital algorithms for vector control of induction motors (IM) - functional capabilities of microcontrollers, programming and algorithmic tools. Laboratory work is conducted on physical and mathematical models. They provide for acquiring practical skills and abilities for adjustment of some of the most common control structures in addition to better learning of the lecture material.

PREREQUISITES: The course is conducted on the basis of knowledge from the courses: ME04, ME05, BE31, BE43.

TEACHING METHODS: Board panels have been prepared for visualization of the lecture material, for conducting the laboratory work a manual and models for the exploration of mathematical description of various AED, protocols and course project/ course work description, preparation and presentation.

METHOD OF ASSESSMENT: Written test during 15th academic week on the subject matter. Test duration – two hours. Lectures (73%), laboratories (27%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

Основна литература:

1. http://dox.bg/files/dw?a=2ae90cb3bff
2. Ключев В. И., Теория на електрозадвижването, Техника, С., 1989, с.560.
3. Костов И., Г. Иванов, Ръководство за лабораторни упражнения по управление на електрозадвижванията, Пловдив, 2014, с.100.
4. Костов И., Г. Иванов, Ръководство за курсово проектиране и семинарни упражнения по управление на електрозадвижванията, Пловдив, 2014, с.140.
5. Костов И., Автоматизирани електрозадвижвания с двигатели за постоянен ток, записки на лекции, Пловдив, 2014 (ел.издание).

6. И. Й. Костов, ЕЛЕКТРОЗАДВИЖВАНИЯ С ПОСТОЯННОТОКОВИ, АСИНХРОННИ И СИНХРОННИ ДВИГАТЕЛИ, учебно пособие, Пловдив, 2016, ISBN 978-619-90128-0-2.
7. http://dox.bg/files/dw?a=f43c4514dff

Допълнителна литература:

8. Fundamentals of industrial electronics / editors, Bogdan M. Wilamowski and J. David Irwin. © 2011 by Taylor and Francis Group, LLC, International Standard Book Number: 978-1-4398-0279-3 (Hardback), 691pp.
9. Power electronics and motor drives / editors, Bogdan M. Wilamowski and J. David Irwin. © 2011 by Taylor and Francis Group, LLC, International Standard Book Number: 978-1-4398-0285-4 (Hardback), 974pp.
10. Riccardo Marino, Patrizio Tomei, Cristiano M. Verrelli, Induction Motor Control Design, Springer-Verlag London Limited, 2010, ISBN 978-1-84996-283-4, e-ISBN 978-1-84996-284-1, 371pp.
11. Chiasson J, Modelling and High-Performance Control of Electric Machines, John Wiley & Sons Inc., 2005, ISBN 0-471-68449-X (cloth), p.709.
12. B. K. Bose, Modern Power Electronics and AC Drives, Prentice Hall PTR, 2002, ISBN 0-13-016743-6, p. 711.
13. W. Leonhard, Control of Electrical Drives 3 Ed., Springer, 2001, ISBN 3-540-41820-2, p. 600.
14. R. Krishnan, Electric Motor Drives. Modelling, Analysis, and Control, Singapore, 2003, ISBN 81-297-0319-1, p. 626.
15. Иванов С. Ц., Електронни регулатори, София, Технически университет, 2008.
16. Георги Иванов, Иван Костов, Йосиф Пищийски, Сравнителен анализ на MRAS структури за оценка на скоростта в асинхронни електрозадвижвания, Journal of the Technical University – Sofia, Plovdiv branch, Bulgaria, "Fundamental Sciences and Applications", Vol. 18, 2012.
17. Костов И., Г. Иванов, Изследване на електромагнитната съвместимост на асинхронни електрозадвижвания със синусоидална ШИМ в Матлаб среда, Международна конференция Автоматика 2012, ФА, 1-4 юни, 2012, Созопол, България, Годишник на ТУ-София, том 62, книга 2, 2012 номер 48, страници 429-437, ISSN 1311-0829.
18. Костов И., Г. Иванов, Изследване на електромагнитната съвместимост на асинхронни електрозадвижвания със синусоидални филтри в МАТЛАБ среда, Journal of the Technical University – Sofia, Plovdiv branch, Bulgaria, "Fundamental Sciences and Applications" Vol. 19, 2013, International Conference Engineering, Technologies and System, TECHSYS 2013, BULGARIA, pp. 125-130.
19. Иванов Г., Ахмед С., Костов И., Определяне на ъгловата скорост на асинхронни електрозадвижвания на база невронен MRAS модел с размита адаптация на скоростта на обучение, Journal of the Technical University – Sofia, Plovdiv branch, Bulgaria, "Fundamental Sciences and Applications" Vol. 19, 2013, International Conference Engineering, Technologies and System, TECHSYS 2013, BULGARIA, pp. 97-102.
20. Костов И., Г. Иванов, Проектиране и анализ на оценител на съпротивителен момент за асинхронно електрозадвижване, V-та национална научна конференция за студенти, докторанти и млади научни работници, Технически университет – София, филиал Пловдив, 18.05.13 г.
21. Костов И., Г. Иванов, Състояние на теорията на асинхронните електрозадвижвания. Модели и управление, Международна конференция Автоматика 2013, ФА, 14-16 юни, 2013, Созопол, България, Годишник на ТУ-София, том 63, книга 2, 2013, страници 115-124, ISSN 1311-0829.

DESCRIPTION OF THE COURSE

Name of the course **Application of Distributed Systems in Medicine**	Code: **ME09.2**	Semester: **2**
Type of teaching: Lectures, laboratory work, Course project	Lessons per week: L – 2 hours; LW – 2 hours;	Number of credits: **5**

LECTURERS: Prof. Ph.D. Galidiya Petrova (FEA), Dept. of Electronics – tel.: 659 574, e-mail: gip@tu-plovdiv.bg, Assoc. Prof. Ph.D Mitko Shopov (FEA), tel.: 659 764, e-mail: mshopov@tu-plovdiv.bg, Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Obligatory elective (modular) course for the M.Sc. students of Electronics, FEA, Technical University of Sofia, Branch Plovdiv.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course, students should acquire basic knowledge in the field of architecture and organization of Internet-based distributed systems and wireless networks applicable to monitoring vital physiological parameters. As well as knowledge of various distributed applications such as: Intelligent Emergency Response and Management Systems, Mobile Telemedicine Systems, Personalized Healthcare Systems.

DESCRIPTION OF THE COURSE: The main topics concern: Distributed system architectures - client / server models. Communication aspects of distributed systems - computer networks. Wireless computer networks. Sensor networks - Embedded networks. Wireless sensors for acquiring and monitoring of physiological signals. Mobile tele-medicine systems employing different type wireless networks. Personalized healthcare systems.

PREREQUISITES: Good fundamental knowledge in the B.Sc. courses: Microprocessor technic and Medical electronic equipment.

TEACHING METHODS: Lectures using multimedia presentations, laboratory exercises with demo programs.

METHOD OF ASSESSMENT: Two hours written exam at the end of semester in the form of a test with open questions. The final grade for the course is based on the exam results (80% in total) and work on laboratory exercises (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Petrova G., 1998, Introduction to Biological Signal Processing, Inter-University Centre for Education in Medical Radiation Physics and Engineering.; 2. A. S. Tanenbaum and M. van Steen. "Distributed Systems: Principles and Paradigms," Second Edition Prentice Hall, 2007, ISBN: 0-13-239227-5; 3. James F. Kurose, Keith W. Ross, "Computer Networking. A Top-Down Approach Featuring the Internet", Addison Wesley, 2003, ISBN 0-201-97699-4; 4. Boyanov K., "Working principles of computer networks. Internet", BAS, 2003. 5. H. LABIOD, H. AFIFI, C. DE SANTIS, "Wi-Fi,BLUETOOTH, Zig Bee and WiMAX", 2007 Springer, ISBN 978-1-4020-5396-2.; 6. Guang-Zhong Yang, "Body Sensor Networks", Springer-Verlag 2006, ISBN-13: 978-1-84628-272-0; 7. Ana Fred, Joaquim Filipe, Hugo Gamboa, "Biomedical Engineering Systems and Technologies", Springer-Verlag 2011, ISBN 978-3-642-18471-0.

DESCRIPTION OF THE COURSE

Name of the course **Electronic converters for controlling of electric motors**	Code: ME10.1	Semester: 2
Type of teaching: Lectures and laboratory work, course project or course work of choice	Lessons per week: L–2 hours; LW–2 hours	Number of credits: **5**

LECTURERS:

Assoc. Prof. Ph.D.. Svetoslav Ivanov (FEA), tel.: 032 659720, email: isveto@dir.bg
Assoc. Prof. Ph.D. Cvetana Grigorova (FEA), tel.: 032 659721, e-mail: c_grigorova@abv.bg
Technical University of Sofia, branch Plovdiv.

COURSE STATUS IN THE CURRICULUM: Elective course from list 1a, with laboratory exercises for students of specialty "Electronics", master's degree.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to acquaint the students with the power electronic devices that are applicable to the DC and AC electric drives as well as the used element base of powerful electronic switches and sensor devices applicable in the feedback circuits. To gain knowledge about the basic methods for speed control of DC, asynchronous and stepped motors.

DESCRIPTION OF THE COURSE: The subject is fundamental for the students' knowledge and skills in the field of power electronic circuits and devices for control of electric motors. In it are studied the basic methods and the principle schemes for construction of electric drives for control of DC, asynchronous and stepped motors. Models of thyristor DC and AC regulators, single-phase and three-phase autonomous voltage inverters, as well as specialized control circuits for stepper motors are modeled and studied. In the laboratory exercises the students examine the joint work of the power circuit and the electric machine and introduce themselves in the practical solution of a real engineering project.

PREREQUISITES: The discipline is based on the knowledge gained from the subjects: Electromechanical Devices, Converting Equipment, and Electronic Regulators.

TEACHING METHODS: Lectures using a multimedia projector and demo programs, laboratory exercises with protocols.

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

INSTRUCTION LANGUAGE; Bulgarian.

BIBLIOGRAPHY:

Minchev D., Automated Electric Drives, Sofia, 1974; 2. Genchev L., Manual for laboratory exercises in automated electric drive, Gabrovo, 1987; 3. С. Герман – Галкин, компьютерное моделирование полупроводниковых систем в Matlab 6.0, Санкт-Петербург, 2001г.; 4. Ivanov S., Electronic regulators, Technical University of Sofia, 2008.

COURSE DESCRIPTION

Name of the course **Programmable Logic Controllers**	Code: **ME11.1**	Semester: **2**
Type of teaching: Lections (L) Laboratory work (LW)	Lessons per week: L– 2 hours, LW – 2 hours	Credits: **5**

LECTURERS:

assoc. prof. Krum Kutryanski Ph.D., phone: 659 526, e-mail: kkutryanski@tu-plovdiv.bg
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 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. UnityPro, Ръководство за програмиране на Schneider, 2012
4. FPWIN Pro, Ръководство за програмиране на Panasonic, 2012
5. SIMATIC S7-300 CPU 31xC: Specifications Manual, Technical data of the integrated I/O, 2010
6. SIMATIC Programming with STEP 7, (Manual), Siemens, 2010
7. Melsec FX Family, Programmable Logic Controllers, Beginner's Manual, Mitsubishi Electric, Art.no.:166388, Version B, 2007

DESCRIPTION OF THE COURSE

Name of the course Optoelectronics system	Code: ME11.2	Семестър: I I
Type of teaching: Lectures and Seminary work	Lessons per week: L – 2 hours; SW – 2 hour	Number of credits: 5

LECTURER:

Assoc.Prof. PhD Ivan V. Rachev (FEA) – tel.: 659 718
Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective course for the students in Master's program in Electronics.

AIMS AND OBJECTIVES OF THE COURSE: At the end of their studies, students will be able to determine the parameters and characteristics of optoelectronic systems (ECO), will be familiar with the modern element base used in optoelectronics and will be able to optimally compare different technical solutions in the ECO according to a predefined criterion.

DESCRIPTION OF THE COURSE:. Main topics: Graphical construction and calculation of beam travel in an ideal optical system. Methods for describing the emission of real light sources. Basic parameters and characteristics of the photodetectors, as well as their coordination with the electronic and optical units. Description of random signals and noise in the ECO. Logging (detecting) the useful signal against the background of noise and interference and determining the probability of error. Estimation of the parameter of the useful signal received against the background of noise. ECO Energy Design

PREREQUISITES:. Good fundamental knowledge in the courses: Theoretical electrical engineering, Signals and systems.

TEACHING METHODS: Lectures, and laboratory work.

METHOD OF ASSESSMENT: Two two-hour assessments at mid and end of semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1.Johnson, M., *Photodetection and Measurement*, NY, McGraw-Hill, 2003; 2.Фердинандов, и др., *Световодни комуникационни системи* – част I, II, III, С., Сиела, 2001, 2002, 2003; 3. Порфирьев Л.Ф., *Осноы теории преобразования сигналов в оптико-электронных системах,* Л., Машиностроение, 1989. 4.Фердинандов, Е., Б. Пачеджиева, *Вероятностни и статистически методи в комуникациите* С., Сиела, , 2005; 5. Barry J.R., *Wireless Infrared Communications*, Boston, Kluwer Academic Publishers, 1994; 6.Христов, Б., Ал. Банков., *Геометрична оптика и оптични* уреди, С., Техника,1990;

DESCRIPTION OF THE COURSE

Name of the course **Optical communication systems**	Code: ME12.1	Semester: 2I
Type of teaching: Lectures and Seminary work	Lessons per week: L – 2 hours; JIW – 1 hour	Number of credits: 4

LECTURER:

Assoc. Prof. PhD B. K. Pachedjieva (FEA) – tel.: 659 708

Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective course course for the students in Master's program in Electronics.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to acquaint the students with the basic quantitative dependencies between the parameters of the structural units and their relations with the qualitative indicators of the optical, transatmospheric and space optical communication systems; to learn the methods and algorithms for engineering design of optical, transatmospheric and space optical communication systems.

DESCRIPTION OF THE COURSE: The main topics concern: Fiber-optic communication systems-compaction of systems during and along the wavelength (TDM and WDM); basic qualitative indicators of multichannel digital fiber optic communication systems; algorithm for general engineering design of FOCS with WDM. Optical Communication Systems with Open Transmission Media (Transatmospheric OCS) - Transmission and propagation of optical radiation in an open transmission medium; statistical properties of the atmosphere - transparency fluctuations, turbulent fluctuations, mechanical vibrations, influence on Bit-Error Rate. Optical Communication Systems with Open Transmission Mediums (Space CCS) - a method of recording weak optical signals in photon-counting mode (RBF), analytical description of a telemetric space communication system with reception in RBF;

PREREQUISITES:. Good fundamental knowledge in the courses: Higher mathematics, Theoretical electrical engineering, Signals and systems.

TEACHING METHODS: Lectures, and laboratory work.

METHOD OF ASSESSMENT: Two two-hour assessments at mid and end of semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1: 1. Фердинандов, Е., **Б. Пачеджиева**, К. Димитров. Оптични комуникационни системи. Техника, София, 2007, ISBN 9789540306780; 2. Фердинандов, Е., **Б. Пачеджиева**, К. Димитров. Оптични комуникационни системи – аналитични описания, алгоритми за инженерен синтез, примерни проектирания. ТУ–София, филиал Пловдив, 2007, ISBN 9789548779890; 3. Фердинандов, Е., Б. Пачеджиева, Вероятностни и статистически методи в комуникациите, Сиела, София, 2005; 4. Фердинандов, Е., Лазерното лъчение в радиотехниката, София, Техника, 1981; 5. Фердинандов, Е, Основи на оптоелектрониката – част I, София, Техника,

DESCRIPTION OF THE COURSE

Name of the course **Applied photovoltaic**	Code: **ME12.2**	Semester: **2**
Type of teaching: Lectures, Laboratory work, Seminar work, Course project	Hours per week: L – 2 hours, LW – 1 hour SW– 1 hour	Credits: **4**

LECTURER:

Assist. Prof. Ivan Maradzhiev, Ph.D., Department of Electronics, e-mail: iv_mar@tu-plovdiv.bg
Technical University-Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective course for students of specialty "Electronics" of faculty "Electronics and Automation" at the Technical University - Sofia, Plovdiv branch, educational degree "Master".

AIMS AND OBJECTIVES OF THE COURSE: During the course the students acquire specialized knowledge and skills about practical application of the photovoltaic systems for converting solar energy into electricity. Acquired knowledge in the field of differential sunny audit; materials, solar cells and modules for photovoltaic systems; foundation design of photovoltaic generators and power plants; monitoring of photovoltaic systems and efficient use of electricity obtained from them; acquiring skills for work with specialized software used in the photovoltaic systems; critical analysis of the results obtained from the use of software; risk assessment and recommendations for effective implementation of photovoltaic systems;

DESCRIPTION OF THE COURSE: Main topics: Modern sustainable energetics based on photovoltaic effect and solar energy as a renewable energy source; materials and technologies used in the photovoltaics; design of solar cells and photovoltaic modules; design of photovoltaic generators up to 100 kWp; integration of the photovoltaic systems in buildings and vehicles; hybrid photovoltaic systems; monitoring of photovoltaic systems and legislation in EU countries for photovoltaic systems and their connection to the grid;

PREREQUISITES: Knowledge of the following disciplines: Mathematic, Physics, Semiconductor devices, Theoretical Electrical Engineering, Analogue electronics, Power supplies, Microelectronics.

TEACHING METHODS: Lectures and laboratory exercises in properly equipped laboratories. For the laboratory exercises are developed methodical manuals, templates and laboratory models on topics, covered in the lectures.

METHOD OF ASSESSMENT: A written exam 70%, laboratory exercises 30%.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1.Dimitrov D., Vl. Lazarov, Renewable energy sources, TU-Sofia, 1999, 2. M. S. Imamura, P. Helm, W. Palz: Photovoltaic System Technology, A European Handbook, Brussels, 1992, 3. S. Kaplanis: Technology of PV-Systems and Applications, Patra, Greece, 2003

DESCRIPTION OF THE COURSE

Name of the course Television systems	Code: ME12.3	Семестър: I I
Type of teaching: Lectures and Seminary work	Lessons per week: L – 2 hours; SW – 1 hour	Number of credits: 4

LECTURER:

Assoc.Prof. PhD Ivan V. Rachev (FEA) – tel.: 659 718
Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective course for the students in Master's program in Electronics.

AIMS AND OBJECTIVES OF THE COURSE: At the end of their studies, students will be familiar with the principles of operation, basic parameters and characteristics of digital television systems. The purpose of the laboratory exercises is to study the algorithms for signal processing in the type of systems under consideration.

DESCRIPTION OF THE COURSE: Main topics: Physical principles of operation and basic parameters of image converters (sensors); Video signal compression; Signal encoding in the communication channel; Displays used in television systems.

PREREQUISITES:. Good fundamental knowledge in the courses: Theoretical electrical engineering, Signals and systems.

TEACHING METHODS: Lectures, and laboratory work**.**

METHOD OF ASSESSMENT: Two two-hour assessments at mid and end of semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

Прэтт, У. Цифровая обработка изображений. Перевод с англ., под редакцией Д. С. Лебедева. М., Мир, 1992. Безруков, В. Н. И др., Цифровое телевизионное вещание по международном стандартом MPEG-2 и DVB. Електросвязь, 1998.

DESCRIPTION OF THE COURSE

Name of the course: **Specializing practical work**	Code: **ME13**	Semester: II
Type of teaching: Laboratory work (LW)	Lessons per week: LW - 2	Number of credits: 2

LEADING LECTURER:

Assist. Prof. Rosen Bozhilov, PhD., (FEA), Dept. of Electronics,
Technical University of Sofia - Branch Plovdiv, e-mail: rossen_chi@abv.bg

COURSE STATUS IN THE CURRICULUM:

Compulsory for the Master's degree students majoring in Electronics at the Faculty of Electronic and Automation.

AIMS AND OBJECTIVES OF THE COURSE:

The specializing practicum in Schemotechniques aims at providing the students with the necessary practical skills and engineering experience for analysis, synthesis and construction by experimental realization of a particular topic, problem or a problematic project in the field of their major (Electronics).

DESCRIPTION OF THE COURSE:

By nature and specifics, the classes intertwine elements from various work types such as laboratory work and course design projects for two semesters. They combine the following inherent for the engineering practice activities: literature review, catalogue and company research; analysis and synthesis of an electric circuit; experimental study; constructive design; development of a laboratory model; functional testing; techno-economic justification etc.

PREREQUISITES:

The subject is based on the students' knowledge acquired from the following courses: Analog schemotechniques; Digital schemotechniques; Semiconductor elements; Electrical measurements; Electronic management and control systems; Measurements in electronics; Power supplying devices; Microprocessor schemotechniques.

TEACHING METHODS:

Laboratory work with practical realization of specific electronic devices. The leading lecturer works on individual basis with each of the students.

TESTING AND ASSESSMENT METHODS:

Lecturer's signature at the end of the course.

INSTRUCTION LANGUAGE: Bulgarian

RECOMMENDED LITERATURE:

1. Konov, K. A brief guide to digital integrated circuits. Technics, 1998;
2. Stoilov, G., Electronic circuit diagrams, Technics, Sofia, 1989;
3. Oppenheim Al., Signals and Systems, Technica press, Sofia 1995;
4. Specialized catalogues