COURSE DESCRIPTION

Name of the course: **Artificial intelligence and neural networks**	Code: **MpE01**	Semester: **I**
Type of the education: Lectures, Laboratory exercises.	Hours during the semester: Lectures – 30 hours, Lab. exercises – 30 hours.	Credits: **4**

LECTURERS:

Assoc. Prof. Ph.D. Nikola Shakev (FEA) – tel.: +359 32 659 528,
email: shakev@tu-plovdiv.bg Technical University of Sofia, Branch in Plovdiv
Assoc. Prof. Ph.D. Sevil Ahmed (FEA) – tel.: +359 32 659 585,
email: sevil.ahmed@tu-plovdiv.bg Technical University of Sofia, Branch in Plovdiv;

STATUTE OF THE COURSE IN THE CURRICULUM: Compulsory course for the students specialty "Electronics" at the Faculty of Electronics and Automation in TU-Sofia, Plovdiv Branch, Master's degree.

GOALS OF THE COURSE: Upon completion of the course, students should be able to apply the methods of artificial intelligence and in particular artificial neural networks for information and signals processing, decision making, design of systems based on training and self-learning.

COURSE DESCRIPTION: The course is built on the basis of modern concepts of the application of artificial intelligence approaches in information processing and decision-making. A set of algorithmic solutions and methods that have key characteristics for the artificial intelligence are considered, namely: training and self-learning, adaptation, etc. The discipline presents artificial neural networks in detail. Students are introduced to different structures and architectures of neural networks. Algorithms for training and adjusting the weights of artificial neural networks are considered. A number of applications are considered, mainly in the field of technology, signal processing, classification, etc.

PREREQUISITES: Mathematics, Computer Programming.

TEACHNG METHOD: Lectures with multimedia presentation. Laboratory exercises are conducted using personal computers.

GRADING: Two two-hour assessments at mid and end of semester.

LANGUAGE OF TEACHING: Bulgarian

REFERENCE TEXTS: **1.** Petrov M., A. Topalov, A. Taneva, N. Shakev. Lecture notes in Artificial Intelligence Methods in Control Systems. Part I. Fuzzy Logic and Control (in Bulgarian). Edition of theTechnical University - Sofia , 2009, p. 168. ISBN 978-954-438-801-0. **2.** A. Topalov, Petrov M., N. Shakev, A. Taneva. Lecture notes in Artificial Intelligence Methods in Control Systems. Part II. Application of Neural Networks (in Bulgarian). Edition of theTechnical University - Sofia , 2010 **3**. F. O. Karray, C. de Silva. Soft Computing and Intelligent Systems Design. Theory, Tools and Applications, Addison Wesley, 2004. **4**. J. C. Principe, N. R. Euliano, W. C. Lefebvre. Neural and Adaptive Systems. Fundamentals Through Simulations. John Wiley & Sons, Inc., 2000. **5**. Z. Michalewicz. Genetic Algorithms + Data Structures = Evolution Programs. Third Ed., Springer-Verlag, 1995. **6**. O. Castillo, P. Melin. Soft Computing for Control of Non-Linear Dynamical Systems, Physica-Verlag, 2001.

DESCRIPTION OF THE COURSE

Name of the course: **Computer networks and communications**	Code: **MpE02**	Semester: **I**
Type of teaching: Lectures and laboratory work	Semester hours: L – 30 hours, LW – 30 hours.	Number of credits: **4**

LECTURER:
Prof. PhD. Grisha Spasov (FEA) – tel.: 032 659 724, e-mail: gvs@tu-plovdiv.bg,
Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Optional in module for the students in specialty "Electronics" MsC programme of FEA.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to give students knowledge about the open systems architecture – OSI model of ISO, the global computer network INTERNET and the modern internet applications, based on TCP/IP protocols and industrial networks. To obtain skills in computer networks development, installing and administrating network devices and applications.

DESCRIPTION OF THE COURSE: In the course the students study the open systems architecture – OSI model of ISO, communications mediums, methods and tools for data transfer, communications protocols, LAN topologies, wireless LAN, internet based distributed embedded systems and data security.

PREREQUISITES: Computing, Digital and microprocessor circuits design.

TEACHING METHODS: Lectures are presented using multimedia as well as in the traditional classic form by blackboard and chalk. The lectures are in ppt format and are accessible on the announced by the lecturer web-addresses: http://cst.tu-plovdiv.bg/moodle/. The laboratory work is led in a frontal way.

METHOD OF ASSESSMENT: Continuous assessment – the mark is composed as the average of the marks of two tests, conducted in the sixth and in the tenth weeks of the semester. The second test includes solving a practical problem from the laboratory work.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. http://cst.tu-plovdiv.bg/moodle/ » Компютърни системи и технологии » Бакалаври » Компютърни мрежи. 2. Гриша Спасов, Николай Каканаков, Митко Шопов, “Ръководство за лабораторни упражнения по Компютърни мрежи”, ТУ - София, 2011, ISBN: 978-964-438-790-7. 3. James F. Kurose, Keith W. Ross, “Computer Networking. A Top-Down Approach Featuring the Internet”, Fifth edition, Pearson, 2010, ISBN-13: 978-0- 13-607967-5. 4. Andrew S. Tanenbaum , David J. Wetherall , “Computer Networks”, 5th Edition, Prentice Hall, 2010, ISBN-10: 0132126958.

DESCRIPTION OF THE COURSE

Name of the course **Electronic development**	Code: **MpE03**	Semester: **I**
Type of teaching: Lectures, laboratory work.	Semester hours: L – 30 hours, LW – 30 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 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.

DESCRIPTION OF THE COURSE

Name of the course **Medical systems for remote monitoring, storage and data processing**	Code: **MpE04**	Semester: **I**
Type of teaching: Lectures, laboratory work	Semester hours: L – 30 hours, LW – 20 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: Compulsory 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 two-hour assessments at mid and end of semester.

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 energy converters**	Code: **MpE05**	Semester: **I**
Type of teaching: Lectures, laboratory work	Semester hours: L – 30 hours, LW – 20 hours	Number of credits: **5**

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 **CAD systems in microelectronics**	Code: **MpE06**	Semester: **I**
Type of teaching: Lectures and laboratory work,	Semester hours: L – 30; LW– 30	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: Ongoing assessment.

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 **Design of embedded systems**	Code**: MpE08**	Semester: **II**
Type of teaching: Lectures and laboratory work, semester project	Semester hours: L – 20; LW– 20	Number of credits: **3**

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: Ongoing assessment.

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 **Electronic converters for controlling of electric motors**	Code: **MpE09.1**	Semester: **II**
Type of teaching: Lectures and laboratory work.	Semester hours: L – 20; LW– 20	Number of credits: **3**

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: Ongoing assessment.

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.

DESCRIPTION OF THE COURSE

Name of the course **Programming of Embedded Systems**	Code: **MpE09.2**	Semester: **II**
Type of teaching: Lectures and laboratory work, semester project	Semester hours: L – 20; LW– 20	Number of credits: **3**

LECTURER:
PhD. Nikolay Kakanakov, Assistant Professor, tel :659758 e-mail:kakanak@tu-plovdiv.bg
PhD. MitkoShopov, Assistant Professor, tel :659758 e-mail : mshopov@tu-plovdiv.bg

COURSE STATUS IN THE CURRICULUM: Elective course 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: Ongoing assessment.

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.

COURSE DESCRIPTION

Name of the course **Programmable Logic Controllers**	Code: **MpE10.1**	Semester: **II**
Type of teaching: Lections (L) Laboratory work (LW)	Semester hours: L – 20; LW– 20	Credits: **3**

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: Elective course 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: Two two-hour assessments at mid and end of semester.

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 **Mathematical methods for digital signal processing**	Code: **MpE10.2**	Semester: **II**
Type of teaching: Lectures and Laboratory work	Semester hours: L – 20; LW– 20	Number of credits: **3**

LECTURER:

Assoc. Prof. PhD B. K. Pachedjieva (FEA) – tel.: 659 708
e-mail: pachedjieva@yahoo.com, 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: 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 **Optical communication systems**	Code: **MpE11.1**	Semester: **II**
Type of teaching: Lectures and Laboratory work	Semester hours: L – 20; LW– 20	Number of credits: **3**

LECTURER:
Assoc. Prof. PhD B. K. Pachedjieva (FEA) – tel.: 659 708
e-mail: pachedjieva@yahoo.com, 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: 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: **Telecommunications**	Code: **MpE11.2**	Semester: **II**
Type of teaching: Lectures and laboratory work	Semester hours: L – 20; LW– 20	Credits: **3**

LECTURER: Assist. Prof. Iliya E. Petrov, Ph.D., Department of Electronics,

e-mail: iedu@abv.bg, Technical University-Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: The course is elective for master degree students of Electronics in Faculty of Electronics and Automatics in Technical University - Sofia, branch Plovdiv.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is the student to learn the basic architecture of fixed, mobile and IP telecommunication systems, transmission media, transmission transport and service.

DESCRIPTION OF THE COURSE: The main topics concern: Structure and organization of telecommunication systems; tele services and quality factors; standards (recommendations) and organizations in telecommunications; basic reference models; switching modes; analogue and digital multiplexing; channel switching; transmission media; coding types in telecommunications; digital hierarchy; access methods to the telecommunication network; structure of mobile networks; organization of satellite communications.

PREREQUISITIES: Good knowledge of Signals and Systems and Communication Equipment.

TEACHING METHODS: Lectures with multimedia projector for the structure of the lecture, some definitions and essential knowledge, magnitudes, schematics, equations, graphics and formulae. On labs is used principally MATLAB.

METHOD OF ASSESSMENT: Control work– 70%; labs – 30%.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:

- Цанков Б., Телекомуникации фиксирани, мобилни и IP, Нови знания, София, 2006.
- Пулков Вл., Мултиплексни системи в телекомуникациите, Нови знания, София, 2007.
- Мерджанов П., Телекомуникационни мрежи, Нови знания, София, 2002.
- Мирчев С., Телеграфично проектиране, Нови знания, София, 2002.
- Пенчева Е, Мобилни мрежи, Нови знания, София, Нови знания 2002.
- Freeman R., Fundamentals of Telecommunications, John Wiley & Sons Inc., New Jersey, 2005.
- Уиндър С., Телекомуникации. Принципи, Технологии, Стандарти, Техника, София, 1999.
- Пулков Вл., П. Колева, Основи на предаване на информацията, Нови знания, София, 2009.
- Желев Ст., Спътникови комуникации, Университетско издателство „Епископ Константин Преславски", Шумен, 2012.

COURSE CHARACTERISTICS

Course Title: **Project Management**	Code: **MpE12.1**	Semester: **II**
Type of Teaching: Lecturers, Laboratory exercises	Semester hours: L – 20; LW– 20	Number of credits: **3**

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: Elective course for students in the Master's degree in Electronics.

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: Ongoing assessment.

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: **Industrial legislation**	Code: **MpE12.2**	Semester: **II**
Type of teaching: Lectures, Laboratory Work	Semester hours: L – 20; LW– 20	Number of credits: **3**

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 students in the Master's degree in 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: Ongoing assessment.

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.

DESCRIPTION OF THE COURSE

Name of the course **Power supplies**	Code: **FaMpE01**	Semester: **II**
Type of teaching: **Lectures, laboratory work,**	Semester hours: L – 20; LW– 20	Credits:**4**

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: Optional course for the students of specialty "Electronics", degree "Master".

AIMS AND OBJECTIVES OF THE COURSE: The course "Power supplies" is intended to acquire theoretical, practical knowledge and skills in the field of the power supply devices and their application. The students acquire knowledge about modern trends in the circuitry of power supplies and the methods of their control.

DESCRIPTION OF THE COURSE: The purpose of the lectures and the laboratory exercises is to give to the students an idea of the principle of operation and the modes of operation of the power supply devices, and to obtain practical experience with such devices.

PREREQUISITES: Knowledge of the following disciplines: Theoretical Electrical Engineering and Electrical Measurements.

TEACHING METHODS: Lectures and laboratory exercises in properly equipped laboratories. For the laboratory exercises are developed methodical manuals and templates on topics, covered in the lectures. Software packages are used to model and simulate SPICE. Software pakages are used for SPICE modeling and simuling.
METHOD OF ASSESSMENT: Ongoing assessment.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

- Stefanov N.Y., Power Supplies, S. Technika, 1985.
- Stefanov N.Y., Handbook of Power Supplies., Technika, 1985.
- Krastev G., Handbook for laboratory exercises in industrial electronics and design of industrial electronics, S. Technika, 1978.
- Stefanov N.Y., A guide to lab work of Power Supplies., Technika, 1985.
- Китаев В.Е. и колектив, Расчет источников электропитания устройств связи, учебное пособие, М., Р и С, 1993.
- Brown, Marty, Power supply cookbook" 2th ed., Newnes, Copyright © 2001 by Butterworth–Heinemann A member of the Reed Elsevier group ISBN 0-7506-7329-X.
- „Handbook of batteries", David Linden, Thomas B. Reddy, 3d ed., McGraw-Hill, ISBN 0- 07-135978-8.
- Stefanov N.Y., Design Guide for Power Supplies, Technika, 1988.
- Dinkov E., Sv. Ivanov, M. Dinkova – A guide to lab work on specialized power supplies, TU Sofia, branch Plovidv, 1999 г.

DESCRIPTION OF THE COURSE

Name of the course: **Intelligent sensor-actuator-systems**	Code: **FaMpE02**	Semester: **II**
Type of teaching: Lectures and laboratory work	Semester hours: L – 20; LW– 20	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: Optional discipline for full-time students in the qualification Master's degree in „ Electronics".

AIMS AND OBJECTIVES OF THE COURSE The aim of the course is to provide electronics engineering students with detailed knowledge about the types of sensors and actuators in the industry and the mechatronic systems. The emphasis is laid upon the control systems analysis where the systems are described with discrete response curves.

DESCRIPTION OF THE COURSE: The course describes the particular features of control of parameters in mechatronic systems and possibility to react by different types of actuators. The course provides knowledge about special sensor integrated circuits, the realization of the connection between sensors, also some modern trends in the use of actuators are explained. Laboratory exercises reinforce the presented in lectures, and aim at enhancing students' knowledge in the practical application of the presented theories.

PREREQUISITIES: Needed is basic knowledge obtained from the courses in "Electronics", "Microprocessor circuits design", "Electromechanical devices", as well as knowledge in physics and chemistry.

TEACHING METHODS: Lectures supported by slides and PowerPoint applications. Labs are done with real sensor and actuators systems. Students work out individual term tasks

METHOD OF ASSESSMENT: Ongoing assessment.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY:

1. Clarence W. de Silva. Sensors and Actuators: Control System Instrumentation, 2007. 2. Stephen E. Derenzo. Practical Interfacing in the Laboratory Using a PC for Instrumentation, Data Analysis and Control. University of California, Berkeley, 2003. 3. Manfred Kaltenbacher. Numerical Simulation of Mechatronic Sensors and Actuators, , ISBN 9783642090516 Springer-Verlag Berlin and Heidelberg GmbH & Co. K, 2010.