DESCRIPTION OF THE COURSE

Name of the course: **Learning and self-learning in programming**	Code: **BpES15**	Semester: **7**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **4**

LECTURER(S):

Assoc. Prof. Eng. Dilyana Budakova, PhD (FEA), tel.: 0895587539,
e-mail: dilyana_budakova@tu-plovdiv.bg ; dilyana_budakova@yahoo.com
Technical University of Sofia

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

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to introduce students with the theory, approaches, methods, algorithms and models that are applied in one of the most modern and fast-growing sub-areas of the scientific field of artificial intelligence, known as machine learning. Upon completion of the course, the students will be able to design systems that can be trained and that can be learned from their own experience; will be able to realize and apply algorithms for training by building identification trees; for learning by simulating evolution and Genetic algorithms; for Reinforcement learning; for Imitation learning; for Deep learning; etc.

DESCRIPTION OF THE COURSE: The main topics concern: Learning by analyzing differences, learning by explaining experience, learning by recording cases, learning by managing multiple models, learning by building identification trees, learning by training neural nets, Deep learning, learning by simulating evolution and Genetic algorithms; Training by applying of Conditional probability, Bayes rule, Bayesian networks, Probabilistic Graphical Models, Markov models, Hidden Markov Models, Reinforcement learning, Imitation learning, etc.

PREREQUISITES: Basic programming languages.

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

METHOD OF ASSESSMENT: Written exam, forming (72%), laboratories (28%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Sutton S. Richard, Barto A. Andrew, Reinforcement Learning: An Introduction, Second Edition, (2017), The MIT Press, Cambridge, Massachusetts, London, England.; 2. Russell S., Norvig P., Artificial Intelligence A Modern Approach, Prentice Hall, Third Edition, (2010), ISBN-13 978-0-13-604259-4, ISBN-10 0-13-604259-7; 3.Teahan W. J., Artificial Intelligence – Agent Behaviour I, (2010) William John Teahan & Ventus Publishing ApS, ISBN 978-87-7681-559-2; 4. Winston P.H. Artificial intelligence, Third edition, (1992), MIT Press, ISBN-13: 978-0201533774, ISBN-10:0201533774, 5.Michael Nielsen, http://neuralnetworksanddeeplearning.com.

DESCRIPTION OF THE COURSE

Name of the course: **Acquisition methods and devices for processing and compression of signals and images**	Code: **BpES16.1**	Semester: **7**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**
Course project (CP) - optional	Code: **BpES21**	Number of credits: **2**

LECTURER(S):
Assoc. Prof. Eng. Boyko Petrov, PhD (FEA), tel.: 659 760, e-mail: bpetrov@tu-plovdiv.bg
Technical University of Sofia

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

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the course students know the theoretical foundations, principles of design, implementation and use of modern modules, devices and systems for data acquisition and digital processing of information in every day life, industry and research.

DESCRIPTION OF THE COURSE: Main topics: Classical and special methods for digital processing of one-dimensional and two-dimensional signals: Digital filtration, Spectral and Cepstral analysis, Window Fourier transform, Scanning analysis; Special methods for ADC. The architectural features and methods for analysis and design of devices and systems based on digital signal processors (DSP) for processing and compression of signals and images are considered. The studied material is directed and illustrated in the processing of biomedical, audio and video signals and images.

PREREQUISITES: Good preparation in Mathematics, Physics, Signals and Systems, Circuit design and programming for microprocessors and microcontrollers, Programming

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

METHOD OF ASSESSMENT: Written exam, forming 70%, defense of laboratory (30%), course project on individual task and defense

INSTRUCTION LANGUAGE: Bulgarian/English

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; 5. Lyons R.G., "Uderstanding of digital signal processing", Prentice Hall PTR Publication, NJ 07458, ISBN 0-201-63467-8; 6. Crane R., "A Simplified Approach To Image Processing- Classical And Modern Techniques in C", Prentice Hall PTR Publication, NJ 07458, ISBN 0-13-226416-1;

DESCRIPTION OF THE COURSE

Name of the course: **Real-time control systems**	Code: **BpES16.2**	Semester: **7**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**
Course project (CP) - optional	Code: **BpES21**	Number of credits: 2

LECTURER(S):
Assoc. Prof. Eng. Boyko Petrov, PhD (FEA), tel.: 659760,e-mail: bpetrov@tu-plovdiv.bg
Technical University of Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum / curricula for training of students in Bachelor's degree, speciality Design and programming of electronic systems, Electrical, Electronics and Automation, Professional orientation 5.2, Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: After subject completion the students know a theoretical basis, methods of development and realization of real-time microprocessor based single-devices and systems for industrial control and measuring applications.

DESCRIPTION OF THE COURSE: The main topics concern: The circumstance of real-time microprocessor based applications; Mathematical methods of function response descretization; Basic parts and their parameters determination - ADC, DAC, memory, ALU, period of sampling, type of microprocessor; Software development of real-time applications - calculations acceleration methods. The study course material is located to the industrial control and measuring applications.

PREREQUISITES: Good preparation of Mathematics, Physics, Control Theory, Signals and systems, Microprocessors and Firmware development skills

TEACHING METHODS: Lectures, using slides, case studies, laboratory work, work in teams, protocols description preparation and defence.

METHOD OF ASSESSMENT: Written exam, forming 70%, defense of laboratory (30%), course project on individual task and defense.

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY: 1.Петров Бойко Б. - „Компютризирани устройства и системи за работа в реално време“, Пловдив, 2013 г. - Лекционни записки, ISBN : 978-619-167-040-6 2. B.C.Kuo - Discrete Data Control Systems, Prentice-Hall Inc. Englewood Cliffs, New Jersey,1991 3. Paul Katz - Digital Control using Microprocessors, Technion - Israel Institute of Technology,1991, ISBN 0-13-212191-3 4.Marc Davio, Jean-Pierre Deschamps, Andre Thayse – Discrete and Switching Functions, Advanced Book Program, Georgi Publishing Co and McGraw-Hill Inc., 1984, ISBN 0-07-015509-7. 5. Острем К., Виттенмарк Б. Системы управления с ЭВМ, Москв, Мир,1987

DESCRIPTION OF THE COURSE

Name of the course: **Analysis, modelling and design of electronic converters**	Code: **BpES17.1**	Semester: **7**
Type of teaching: Lectures(L), Laboratory work (LW)/ Tutorials (T)	Hours per semester: L – 30hours T – 15hours LW – 20 hours	Number of credits: **5**
Course project (CP)- optional	Code: **BpES21**	Number of credits: **2**

LECTURER(S):

Prof. Eng. Tsvetana Grigorova, PhD (FEA), tel.: 032 659 711, e-mail: c_gr@tu-plovdiv.bg

Technical University of Sofia

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

AIMS AND OBJECTIVES OF THE COURSE: The aims and objectives of the course "Analysis, modelling and design of electronic converters" is to teach students on the fundamental theory for electromagnetic processes description, models, algorithms, applicable programs for analysis, modelling in the transient/steady-state mode of the electrical energy converters.

At the end of the course the students must have theoretical and practical knowledge on the main types of power electronic converters, their basic parameters and characteristics as well as methods of their investigation and computer simulation.

DESCRIPTION OF THE COURSE: "Analysis, modelling and design of electronic converters" gives the students' knowledge about bases analysis methods, investigation and design of the electrical energy converters. Because of the industrial applications and the related technical requirements of the different types of circuits, different algorithms for control of power devices and formation of output voltage and output current in are considered; series, parallel, series-parallel (LCC, LLC) resonant DC/DC converters; methods for power regulation in resonant DC/DC converters and specialized controllers for their control. The general principles of modelling power electronic devices and their realization with the help of computers are presented. Software products are used for the creation SPICE models and simulation analysis, building blocks and subsystems, links and interfaces, input and output, analogue behavioral modelling.

In addition, *laboratory exercises* expand students' knowledge and provide opportunities for independent work. The *seminars* give students knowledge in analysis and methods for designing the listed types of converters.

PREREQUISITES: Electronic circuits theory, Power supplies and energy sources, Analogue circuits, Digital electronics, Electronic converters.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work, teams work, protocols preparation and defense, demo-programs.

METHOD OF ASSESSMENT: The exam consists of written answers to 3 of 5 questions, cases or tasks that productively test the student's knowledge and skills (80 %), laboratories (20 %).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: Main literature**:** 1.Григорова, Цв., Анализ, моделиране и проектиране на преобразователни устройства. ТУ- София, 2012, ISBN: 978-954-438-999-4, 2. Анчев, М. Силови електронни устройства, Изд. ТУ-София, 2019, ISBN: 978-619-167-373-5; Additional literature: 1. Mohan, N. Power electronics, A First Course. John Wiley & Sons, 2012; ISBN 978-1-118-07480-0, 2. Rashid, M., H. Rashid, SPICE for Power Electronics and Electric Power, CRC/Taylor & Francis, 2012, ISBN-13:978-1439860465, 3. OrCad Pspice A/D Reference Manual, 2015.

DESCRIPTION OF THE COURSE

Name of the course: **Automated design of power electronic converters**	Code: **BpES17.2**	Semester: 7
Type of teaching: Lectures(L), Laboratory work (LW)/ Tutorials (T)	Hours per semester: L – 30hours T – 15hours LW – 20 hours	Number of credits: **5**
Course project (CP)- optional	Code: **BpES21**	Number of credits: **2**

LECTURER(S):
Prof. Eng. Tsvetana Grigorova, PhD (FEA), tel.: 032 659 711, e-mail: c_gr@tu-plovdiv.bg
Technical University of Sofia

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

AIMS AND OBJECTIVES OF THE COURSE: The aims and objectives of the course "Automated design of power electronic converters" is to teach students on the fundamental theory for electromagnetic processes description, models, algorithms, applicable programs for analysis, modelling in the transient/steady-state mode of the electrical energy converters.

At the end of the course the students must have theoretical and practical knowledge on the main types of power electronic converters, their basic parameters and characteristics as well as methods of their investigation and computer simulation.

DESCRIPTION OF THE COURSE: The general principles of modelling power electronic devices and their realization with the help of computers are presented. Software products are used for the creation SPICE models and simulation analysis, building blocks and subsystems, links and interfaces, input and output, analogue behavioral modelling. The main attention is paid to the application of the automated design to solve specific technical problems in the autonomous inverters due to the significant complexity of their electromagnetic processes.

In addition, laboratory exercises expand students' knowledge and provide opportunities for independent work.

PREREQUISITES: Electronic circuits theory, Power supplies, Analogue circuits, Digital electronics, Electronic converters/Power electronics.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work, work in teams, protocols preparation and defence, demo-programs.

METHOD OF ASSESSMENT: Students are required to take a written exam. Chosen questions are developing over themes included in conspectus (62 %), laboratories (18 %), and course work (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: Main literature**:** 1. Попов, Е., Анализ, моделиране и проектиране на преобразувателни устройства (Автоматизирано проектиране на силови електронни устройства), 2005**,** ТУ- София, ISBN: 954-438-495-2, 2. Григорова, Цв., Анализ, моделиране и проектиране на преобразувателни устройства. ТУ- София, 2012 ISBN: 978-954-438-999-4, 3. Анчев, М. Силови електронни устройства, Изд. ТУ-София, 2019, ISBN: 978-619-167-373-5; Additional literature: 1. Mohan, N. Power electronics, A First Course. John Wiley & Sons, 2012; ISBN 978-1-118-07480-0, 2. Rashid, M., H. Rashid, SPICE for Power Electronics and Electric Power, CRC/Taylor & Francis, 2012, ISBN-13:978-1439860465, 3. OrCad Pspice A/D Reference Manual, 2015.

DESCRIPTION OF THE COURSE

Name of the course **Medical electronics**	Code: **BpES18.1**	Semester: **7**
Type of teaching: Lectures (L) Laboratory work (LW),	Hours per semester: L – 30 hours; LW – 25 hours;	Number of credits: **5**
Course project (CP) - optional	CP - **BpES21**	Number of credits: **2**

LECTURER:

Prof. Eng. Galidiya Petrova, PhD (FEA), tel.: 659 576, e-mail: gip@tu-plovdiv.bg,
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Design and programming of electronic systems, Professional orientation 5.2 Electrotechnic, electronics and automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to be able to apply the approaches, methods and technical means for analysis and synthesis of electronic devices and devices with specific application in the medical electronic equipment, to acquire new knowledge and opportunities in this subject area.

DESCRIPTION OF THE COURSE: The course is designed to acquaint students with the theoretical foundations and the principles of action of modern medical devices for the registration of biopotentials. The characteristics and parameters of the biopotentials generated by the heart, the cerebral cortex and the muscles in the patient's body, the leads systems, the characteristics and the technical requirements of the apparatus for their reliable amplification and registration are studied. The circuit diagrams of the apparatuses, as well as the principal schemes and specific features of the individual blocks, are considered. Students are acquainted with various clinical applications of Bioimpedance Measurements, specificities and technical requirements to individual blocks of aparatus as well as specific schematic solutions. The impact of electric currents on human tissues and organs are studied. The methods and devices for direct current, low and medium frequency alternating currents and current pulses therapy are discussed.

PREREQUISITES: Good fundamental knowledge in the courses: Analogue and digital electronics, Microprocessors.

TEACHING METHODS: Lectures using multimedia presentations, laboratory exercises with protocols containing experimental results and oral defense of course project with description.

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%) and work on laboratory exercises (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Petrova G., Medical electronic equipment, 2015, TU-Sofia; 2. Petrova G., 1998, Introduction to Biological Signal Processing, Inter-University Centre for Education in Medical Radiation Physics and Engineering.; 3. Carr J. Brown J., 1981, Introduction to Biomedical Equipment Technology, *John Wiley&Sons*.; 4. Metting Van Rijn, Peper A., Grimbergen C.A, 1990, 'High-quality recording of bioelectrical events, Part 1 Interference reduction, theory and practice', *Med. Biol. Eng. Comput.*, 28, p.389-397.

DESCRIPTION OF THE COURSE

Name of the course **Biomedical engineering**	Code: **BpES18.2**	Semester: **7**
Type of teaching: Lectures (L) Laboratory work (LW),	Hours per semester: L – 30 hours; LW – 25 hours;	Number of credits: **5**
Course project (CP) - optional	CP - **BpES21**	Number of credits: **2**

LECTURER:

Prof. Eng. Galidiya Petrova, PhD (FEA), tel.: 659 576, e-mail: gip@tu-plovdiv.bg,
Technical University of Sofia, Plovdiv branch, Deptartment of Electronics

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Design and programming of electronic systems, Professional orientation 5.2 Electrotechnic, electronics and automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to be able to apply the approaches, methods and technical means for analysis and synthesis of electronic devices and devices with specific application in the medical electronic equipment, to acquire new knowledge and opportunities in this subject area.

DESCRIPTION OF THE COURSE: The course is designed to acquaint students with the theoretical foundations and the principles of action of modern medical devices for the registration of bio-potentials, impedance-cardiography and low-frequency physiotherapy. The characteristics and parameters of the bio-potentials generated by the heart, the cerebral cortex and the muscles in the patient's body, the leads systems, the characteristics and the technical requirements of the apparatus for their reliable amplification and registration are studied. The circuit diagrams and principal schemes of the apparatuses, and specific features of the individual blocks, are considered. The students are acquainted with clinical applications of bio-impedance measurements, specificities and technical requirements to individual blocks of apparatus, as well as specific schematic solutions. The impact of electric currents on human tissues and organs are studied. The methods and devices for direct current, low and medium frequency alternating currents and current pulses therapy are discussed.

PREREQUISITES: Good fundamental knowledge in the courses: Analogue and digital electronics, Microprocessors.

TEACHING METHODS: Lectures using multimedia presentations, laboratory exercises with protocols containing experimental results and oral defense of course project with description.

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%) and work on laboratory exercises (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Petrova G., Medical electronic equipment, 2015, TU-Sofia; 2. Petrova G., 1998, Introduction to Biological Signal Processing, Inter-University Centre for Education in Medical Radiation Physics and Engineering.; 3. Carr J. Brown J., 1981, Introduction to Biomedical Equipment Technology, *John Wiley&Sons*.; 4. Metting Van Rijn, Peper A., Grimbergen C.A, 1990, 'High-quality recording of bioelectrical events, Part 1 Interference reduction, theory and practice', *Med. Biol. Eng. Comput.*, 28, p.389-397.

DESCRIPTION OF THE COURSE

Name of the course: **Fundamentals of programmable logic controllers**	Code: **BpES19.1**	Semester: **7**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **4**

LECTURER(S):
Assoc. Prof. Eng. Albena Taneva, PhD (FEA), tel.: 032 659 585, e-mail: altaneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective course for students in the "Design and programming of electronic systems", BEng program of the Faculty of Electronics and Automation at the Technical University of Sofia, branch Plovdiv, Professional orientation 5.2 Electrical engineering, electronics and automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course to familiarize students with fundamentals and knowledge in programmable logic controller applications. Both programming trainee and input-output device equipment in the frame of control system, are included. At the end of the course the students will be able to understand, to develop user programs for programmable logic controllers, wired to the separate laboratory set up.

DESCRIPTION OF THE COURSE:

The subject of the course are different software environments and hardware of the programmable logic controllers. The main topics concern: Discrete (relay) 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: Industrial elements of automation, Data and signal processing, Programming of industrial controllers.

TEACHING METHODS: Lectures, using slides, case studies, laboratory work with reports. Practical exercises with laboratory set up with programmable logic controllers of OMRON, SIEMENS, Schneider, Mitsubishi and Panasonic..

METHOD OF ASSESSMENT: Temporary evaluation at the end of the semester (70%), laboratories (30%).

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 **Automation of electronic production**	Code: **BpES19.2**	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **4**

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: Freely elective course 4 from list 2 for electronics students, bachelor's degree.

AIMS AND OBJECTIVES OF THE COURSE: To introduce the students to the main tasks of automation of electronic production and with the methods for control and diagnostics of electronic elements and devices. At the end of the course the student will know the basic principles for building flexible automated systems; the organizational structure of the electronic production and will have knowledge of functional diagnostics of analogue and digital electronic devices.

DESCRIPTION OF THE COURSE: The discipline is fundamental to the knowledge and skills in the field of automation of electronic production. The course covers issues related to flexible automated manufacturing systems, digital and program control, programmable logic (industrial) controllers, interfaces and local networks used for automation of production, the structure of electronic production and diagnostics of electronic products.

PREREQUISITES: Control Theory, Analog Circuits, Digital Circuits, Measurements in Electronics, Electronic control and command devices.

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

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (70%), laboratories (30%).

INSTRUCTION LANGUAGE; Bulgarian

BIBLIOGRAPHY:

1. Ovcharov S., Automation of electronic production, Technics, S., 2004.
2. Stoilov G., Quality control in the electronic industry, Auto Spectrum, Plovdiv, 1998.
3. Dally J, W.F.Riley, K.G. McConnell, Instrumentation for Engineering easurement, J.Wiley&Sons, inc., N.Y., 1993
4. Taguchi Genichi and Yu-In Wu , Introdaction of off- Line Quality Control, Central Japan Quality Control Assoeiation.

DESCRIPTION OF THE COURSE

Name of the course: **Sensors and sensor devices**	Code: **BpES20.1**	Semester: **7**
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**

LECTURER(S):
Assist. Prof. Eng. Ivan Maradzhiev, PhD (FEA), tel.: 032 659 776, e-mail: iv_mar@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Design and programming of electronic systems, Professional orientation 5.2 Electrical Engineering, electronics and automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: During the course, the students acquire specialized knowledge about the construction and operating principles of different types of sensors and sensor systems.

DESCRIPTION OF THE COURSE: The main topics concern: Types and classifications of sensors and sensor systems; Conversion of non-electrical quantities into an electrical signal; Power-management techniques for sensor systems; Energy harvesting for low-power sensor systems; Temperature sensors; Humidity sensors; Speed and acceleration measurement; Mass, torque, force and strain measurement; Optical sensors; Motion detector using passive infrared sensors, Magnetic field sensors; Hall sensors; Electromechanical sensors; Industrial sensors and control; Electromagnetic flowmeter; MEMS sensors; Digital gyroscope; Digital accelerometer; Composition Sensors; 4 to 20-mA current loop transmitter; Terahertz spectroscopy; GMR sensors; Internet of things;

PREREQUISITES: Mathematics, Physics, Semiconductor devices, Theoretical Electrical Engineering, Analogue electronics, Digital electronics, Electronics circuits theory, Impulse circuitry, and devices, Circuit design and programming for microprocessors and microcontrollers.

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. Individual course work and defense.

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester ester (50%), course work (35%), laboratories (15%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Solomon S. Sensors. Handbook M. G. Hill 2010 ISBN 9780071605717; 2. Moris A. Measurement and instrumentation. Priciples. ISBN 0750650818 2001; 3. Sensor. Technology Handbook 2005 ISBN0750677295; 3. Webster J.G.The measurment instrmentation and sensors. CRCPress LLC 1999 ISBN 084932145-X; 4. Semiconductor Sensors.Daate Handbook. SC17, Philips,1989; 5. Mukhopadhyay S., K. Jayasundera, O. Postalache, Modern Sensing Technologies, Springer International Publishing, 2019, ISBN 978-3-319-99539-7;978-3-319-99540-3

DESCRIPTION OF THE COURSE

Name of the course: **Sensors and actuators**	Code: **BpES20.2**	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**

LECTURER(S):
Assist. Prof. Eng. Ivan Maradzhiev, PhD (FEA), tel.: 032 659 776, e-mail: iv_mar@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Electronics, Professional orientation 5.2 Electrical engineering, electronics and automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Aim of the course is to provide electronics engineering students with detailed knowledge about the types of sensors and actuators in the electronic and 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.

PREREQUISITES: Mathematic, Physics, Semiconductor devices, Theoretical Electrical Engineering, Electronics, Microelectronics

TEACHING METHODS: Lectures, using slides, case studies, laboratory work in teams, protocols preparation and defence.

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester ester (50%), course work (35%), laboratories (15%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Solomon S. Sensors. Handbook M. G. Hill 2010 ISBN 9780071605717; 2. Moris A. Measurement and instrumentation. Priciples. ISBN 0750650818 2001; 3. Sensor. Technology Handbook 2005 ISBN0750677295; 3. Webster J.G.T he measurment instrmentation and sensors. CRCPress LLC 1999 ISBN 084932145-X; 4. Semiconductor Sensors.Daate Handbook. SC17, Philips,1989; 5. Mukhopadhyay S., K. Jayasundera, O. Postalache, Modern Sensing Technologies, Springer International Publishing, 2019, ISBN 978-3-319-99539-7;978-3-319-99540-3

DESCRIPTION OF THE COURSE

Name of the course: **Sport**	Code: **SPR07**	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Self-Study (SS)	Hours per semester: L – 0 hours S – 0 hours SS – 30 hours	Number of credits: 1

LECTURER(S):
Sen. Lect. Daniel Vladimdirov, PhD (FEA), tel.: 032 659 646, e-mail: danielv@tu-plovdiv.bg
Sen. Lect. Petar Doganov, PhD (FEA), tel.: 032 659 648, e-mail: pdoganov@tu-plovdiv.bg
Sen. Lect. Boris Spasov, PhD (FEA), tel.: 032 659 647, e-mail: boris_spassov@tu-plovdiv.bg
Technical University of Sofia

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

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

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

1. General Physical Preparedness (GPP) – in these seminars the students develop a wide range of motor skill and habits; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

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

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

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

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

INSTRUCTION LANGUAGE: Bulgarian

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

DESCRIPTION OF THE COURSE

Name of the course: **Fundamentals of network technologies**	Code: **BpES22.1**	Semester: **8**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**

LECTURER(S):
Prof. Eng. Grisha Spasov, PhD (FEA), tel.: 032 659724, e-mail: gvs@tu-plovdiv.bg
TU Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Elective course for training of students to obtain Bachelor's degree, specialty Design and programming of electronic systems, Professional orientation 5.2. Electrical engineering, electronics and automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of the course is to provide students with knowledge for Open Systems' Architecture – ISO OSI model, Data Communication Networks, Global network – Internet and TCP/IP client-server applications.

DESCRIPTION OF THE COURSE: Open Systems' Architectures – ISO OSI model. Structure and functions of OSI layers. Communication media. Methods of data transfer. Hardware aspects of data transfer – standard interfaces. Communication protocols. Data transfer control. Data link layer. LAN – topology. Media access control. Network layer. Internet Protocols. Transport Layer. TCP and UDP protocols, Sckets. Internet applications. DNS, FTP, SMTP, HTTP. Network operation systems. Client-server architecture – applications. Network administration.
PREREQUISITES: Introduction in Programing, Basic programming languages, Electrical Engineering, Semiconductor elements, Synthesis and Analysis of Algorithms

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

METHOD OF ASSESSMENT: Written exam with test on the theory and written work on problems. The final grade is constructed on the exam results (totally 80%) and the protocols from the laboratory work (20%).

INSTRUCTION LANGUAGE: Bulgarian/English
BIBLIOGRAPHY:
1. Grisha Spasov, Nikolay Kakanakov, Mitko Shopov, "Guide for laboratory work in Computer Networks", TU Sofia, 2011, ISBN: 978-964-438-790-7. 2. James F. Kurose, Keith W. Ross, "Computer Networking. A Top-Down Approach", 7th edition, Pearson, 2017, ISBN-13: 978-0-13-359414-0. 3. Andrew S. Tanenbaum , David J. Wetherall , "Computer Networks", 5th Edition, Prentice Hall, 2010, ISBN-10: 0132126958. 4. William Stallings, "Data and Computer Communications" ,10th Edition, Prentice Hall, 2013, ISBN-10: 0133506487.

DESCRIPTION OF THE COURSE

Name of the course: **Industrial network technologies**	Code: **BpE22.2**	Semester: **8**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**

LECTURER(S):

Prof. Eng. Grisha Spasov, PhD (FEA), tel.: 032 659724, e-mail: gvs@tu-plovdiv.bg

Assoc. Prof. Nikolay Kakanakov, PhD(FEA), tel.: 032 659725, e-mail: kakanak@tu-plovdiv.bg

Assoc.Prof. Mitko Shopov PhD(FEA), tel.: 032 659765, e-mail: mshopov@tu-plovdiv.bg

TU Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Elective curricula for training of students to obtain Bachelor's degree, specialty Design and programming of electronic systems, Professional orientation 5.2. Electrical engineering, electronics and automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of the course is to provide students with knowledge for Open Systems' Architecture – ISO OSI model, Data Communication Networks, Global network – Internet and TCP/IP client-server applications.

DESCRIPTION OF THE COURSE: Open Systems' Architectures – ISO OSI model. Structure and functions of OSI layers. Communication media. Methods of data transfer. Hardware aspects of data transfer – standard interfaces. Communication protocols. Data transfer control. Data link layer. LAN – topology. Media access control. Network layer. Internet Protocols. Transport Layer. TCP and UDP protocols, Sckets. Internet applications. DNS, FTP, SMTP, HTTP. Network operation systems. Client-server architecture – applications. Network administration.

PREREQUISITES: Introduction in Programing, Basic programming languages, Electrical Engineering, Semiconductor elements, Synthesis and Analysis of Algorithms

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

METHOD OF ASSESSMENT: Written exam with test on the theory and written work on problems. The final grade is constructed on the exam results (totally 80%) and the protocols from the laboratory work (20%).

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY:
1. Grisha Spasov, Nikolay Kakanakov, Mitko Shopov, "Guide for laboratory work in Computer Networks", TU Sofia, 2011, ISBN: 978-964-438-790-7. 2. James F. Kurose, Keith W. Ross, "Computer Networking. A Top-Down Approach", 7th edition, Pearson, 2017, ISBN-13: 978-0-13-359414-0. 3. Andrew S. Tanenbaum , David J. Wetherall , "Computer Networks", 5th Edition, Prentice Hall, 2010, ISBN-10: 0132126958. 4. William Stallings, "Data and Computer Communications" ,10th Edition, Prentice Hall, 2013, ISBN-10: 0133506487.

DESCRIPTION OF THE COURSE

Name of the course: **Optical communication systems**	Code: **BpES23.1**	Semester: **8**
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof. Eng. Boryana Pachedjieva, PhD (FEA), tel.: 659708, e-mail: pachedjieva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum of students to obtain Bachelor's degree, specialty Design and programming of electronic systems, Professional orientation 5.2 Electrical engineering, electronics and automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students should be familiar with modern innovations in the field of optical communication systems, as well as the trends in the development of these systems.

DESCRIPTION OF THE COURSE: The main topics concern: Types of Optical Communication Systems; Fiber optic radiation propagation - fiber optic modes; Localized and distributed energy losses in fiber optic communication systems (FO); Dispersion of code pulses - mode and chromatic dispersions, InterSymbol disturbances; Methods and means for compensating for energy losses; Algorithm for general engineering design of FO; Optical properties of the atmosphere - coefficients of scattering, absorption, extinction, intrinsic radiation; Propagation of laser radiation in the atmosphere; Radiation extinction; Photoelectron conversion mode; Generalized scheme of the Free space Optics (FSO); Algorithm for engineering design of FSO.

PREREQUISITES: Mathematics I – III, Signals and Systems, Semiconductor Devices.

TEACHING METHODS: Lectures, using slides, case studies, laboratory and course work, work in teams, protocols and course work description preparation and defence.

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (70%), laboratories (10%), Course work (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Фердинандов, Е., Лазерното лъчение в радиотехниката, София, Техника, 1981; 2. Фердинандов, Е, Основи на оптоелектрониката – част I, София, Техника, 1993;3. Фердинандов, Е., Б. Пачеджиева, К. Димитров. Оптични комуникационни системи - аналитични описания, алгоритми за инженерен синтез, примерни проектирания., ТУ-София, филиал Пловдив, 2007; 4. Фердинандов, Е., Б. Пачеджиева, К. Димитров. Оптични комуникационни системи. Техника, София, 2007. 5. Фердинандов, Е., Б. Пачеджиева, К. Димитров. Влакнесто–оптични комуникационни системи. Техника, София, 2014. 6. Willebrand, H., B.S. Chuman, Free–Space Optics: Enabling Optical Connectivity in Today's Networks, Sams Publ., Indianapolis, 2002; 7. Hranilovic, S., Wireless Optical Communication Systems, Springer Science, Boston, 2005.

DESCRIPTION OF THE COURSE

Name of the course: **Information systems with laser radiation**	Code: **BpES23.2**	Semester: **8**
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof. Eng. Boryana Pachedjieva, PhD (FEA), tel.: 659708, e-mail: pachedjieva@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum of students to obtain Bachelor's degree, specialty Design and programming of electronic systems, Professional orientation 5.2 Electrical engineering, electronics and automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students should be familiar with modern innovations in the field of information systems with laser radiation, as well as the trends in the development of these systems.

DESCRIPTION OF THE COURSE: The main topics concern: Types of information systems with laser radiation; Fiber optic radiation propagation - fiber optic modes; Localized and distributed energy losses in fiber optic information systems (SIS); Dispersion of code pulses - mode and chromatic dispersions, intersymbol disturbances; Methods and means for compensating for energy losses; Algorithm for general engineering design of SIS; Optical properties of the atmosphere - coefficients of scattering, absorption, extinction, intrinsic radiation; Propagation of laser radiation in the atmosphere; Radiation extinction; Photoelectron conversion mode; Generalized scheme of the transatmospheric laser information system (TALIS); Algorithm for engineering design of TALIS.

PREREQUISITES: Mathematics I – III, Signals and Systems, Semiconductor Devices.

TEACHING METHODS: Lectures, using slides, case studies, laboratory and course work, work in teams, protocols and course work description preparation and defence.

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (70%), laboratories (10%), Course work (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Фердинандов, Е., Лазерното лъчение в радиотехниката, София, Техника, 1981; 2. Фердинандов, Е, Основи на оптоелектрониката – част I, София, Техника, 1993;3. Фердинандов, Е., Б. Пачеджиева, К. Димитров. Оптични комуникационни системи - аналитични описания, алгоритми за инженерен синтез, примерни проектирания., ТУ-София, филиал Пловдив, 2007; 4. Фердинандов, Е., Б. Пачеджиева, К. Димитров. Оптични комуникационни системи. Техника, София, 2007. 5. Фердинандов, Е., Б. Пачеджиева, К. Димитров. Влакнесто–оптични комуникационни системи. Техника, София, 2014. 6. Willebrand, H., B.S. Chuman, Free–Space Optics: Enabling Optical Connectivity in Today's Networks, Sams Publ., Indianapolis, 2002; 7. Hranilovic, S., Wireless Optical Communication Systems, Springer Science, Boston, 2005.

DESCRIPTION OF THE COURSE

Name of the course: **Electronic technologies in the industry**	Code: **BpES24.1**	Semester: **8**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof. Eng. Svetoslav Ivanov, PhD (FEA), tel.: 032/659 720, e-mail: blueflam@tu-plovdiv.bg
Assist. Prof. Eng. Rossen Bojilov, PhD (FEA), tel.: 032/659 766, e-mail: rossen_chi@abv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum of students to obtain Bachelor's degree, specialty "Design and programming of electronic systems", Professional orientation 5.2 Electrical Engineering, Electronics and Automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The discipline "Electronic technological devices " enables students to master the basic principles of operation and structures of control circuits, automatic regulation and protection of power electronic converters applicable in electronic technological devices. Students gain basic knowledge of the physical processes in electronic technology.

DESCRIPTION OF THE COURSE: Main themes: Methods for controlling step motors; DC motor control systems; Incremental speed and position measurement schemes; Control signals and drivers for control of MOSFET and IGBT transistors; Loss of power and energy in MOS controlled switch elements; Current measurement with MOS field transistor with built-in sensor and magnetostrictive matrix; Application of insulating phototransformers; Application of fiber optic interfaces in power electronic devices; Induction heating theory; Dielectric heating devices; The technique of intensive ultrasonic oscillations.

PREREQUISITES: The course of lectures and exercises is based on the knowledge of Power Electronics, Analog Circuit Engineering, Introduction to Control Theory, Impulse and Digital Circuit Engineering, Sensor Technology.

TEACHING METHODS: The lectures are presented with the help of a multimedia projector and by writing the board, considering the structure of the lecture, definitions and basic theoretical concepts, quantities, drawings, dependencies, graphs and formulas. Students are provided with the content of the lectures delivered in electronic format.

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

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY:
1. Zagaevsky T., Industrial Electronics, Moscow, Energy, 1976.; 2. Skvarenina T., Power Electronics, Purdue University West Lafayette, Indiana, © 2002 by CRC Press LLC.; 3. Krishnan R., Electric motor drivers, (Modeling, analysis, and Control), Prentice Hall, Inc. New Jersey 07458, 2001.; 4. Todorov D., Converters in Appliance Engineering, Sofia, Technology, 1992.; 5. Kazmerkovsky V., Control systems for industrial electronics, Energoatomizdat, M., 1984

DESCRIPTION OF THE COURSE

Name of the course **Electronic devices for measuring non-electrical quantities**	Code: **BpES24.2**	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 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: Elective subject from the curriculum of students to obtain Bachelor's degree, specialty "Design and programming of electronic systems", Professional orientation 5.2 Electrical Engineering, Electronics and Automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: With the lecture course, students learn about the principle of operation of sensor devices for measuring the basic physical quantities in industry, and with the known circuit solutions of the electronic transducers for signal processing from the sensors output. At the end of the course the students will be able to design sensor devices for application in management systems.

DESCRIPTION OF THE COURSE: The discipline is fundamental for the students' knowledge and skills in the field of modern sensing elements, which are applied in the electronic technological devices and various industrial fields. They become acquainted with modern circuit solutions and methods for processing signals from sensor outputs. In the lecture course are included basic primary transducers for measuring the basic physical quantities in the industry - temperature, humidity, pressure forces, fluid flow, mechanical displacements, intensity of light, etc. Students will be prepared to design the electronic circuits needed to amplify and convert signals from the sensors output.

PREREQUISITES: The discipline is based on the knowledge gained in: Physics; Electronic and semiconductor elements; Analog Circuits; Digital Circuits and Signals and Systems.

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

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

INSTRUCTION LANGUAGE; Bulgarian.

BIBLIOGRAPHY:

1. Ivanov S., Electronic devices for measuring non-electric quantities, Technical University of Sofia,2017; 2. Velchev N.. Metrology and Sensor, University Publishing House, Plovdiv, 1999; 3. System Applications Guide, Analog Devices, Inc., 1993, Section 14.; 4 Ramon Pallas-Areny and John G. Webster, Sensors and Signal Conditioning, John Wiley, New York, 1991.

DESCRIPTION OF THE COURSE

Name of the course: **Management information systems**	Code: **BpES25.1**	Semester: **8**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof.Radoslav Hrischev, PhD, (FEA), e-mail: hrischev@tu-plovdiv.bg
Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum of students to obtain Bachelor's degree, specialty Design and programming of electronic systems, Professional orientation 5.2 Electrical engineering, electronics and automation, Field 5 Technical Sciences.

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

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

PREREQUISITES: Computing, Control Theory

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

METHOD OF ASSESSMENT: Test at the end of the semester (70%l), laboratory work (20%), abstract with research orientation (10%).

INSTRUCTION LANGUAGE: Bulgarian.

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

DESCRIPTION OF THE COURSE

Name of the course: **Microelectronics**	Code: **BpES25.2**	Semester: **8**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 20 hours	Number of credits: **5**

LECTURER(S):

Assist. Prof. Eng. Dimitar Yankov, PhD (FEA), tel тел.: 032659776, e-mail: d.yankov@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum of students to obtain Bachelor's degree, specialty Design and programming of electronic systems, Professional orientation 5.2 Electrical engineering, electronics and automation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Introduction to the basic technological processes in microelectronics; basic microelectronic elements;basic knowledge of microelectronic circuits and Microelectromechanical Systems (MEMS). Graphical user interface Active-HDL for design development, starting from a hardware description.

DESCRIPTION OF THE COURSE: Basic subjects: **Introduction:** Main characteristics. Basic concepts. Stages of development. Materials in microelectronic production. **Technological processes in microelectronics:**Classification of technological processes.Forming semiconductor junctions and layers.Thin insulating and conducting layers. Cleansing and removing thin layers. Transfering the topographic image . Assembly of elements. **Microelectronicelements:** Classificationandstructure. Hybrid Integrated Circuits. BipolarandMOSelements. **Microelectroniccircuits**: Basic elements. Analog Integrated Circuits. Digital integrated circuits. Memory - types, organization. Specialized modules. Microelectromechanical Systems (MEMS): General Information. MEMS sensors and actuators.Active-HDL is a new generation VHDL simulator. Its context graphical user interface starting from a hardware description, through synthesis, implementation, and debugging to design simulation.

PREREQUISITES: Courses of Physics, Semiconductor devices, analog circuits, electronics measurements.

TEACHING METHODS: The lectures are presented with the help of a multimedia projector and by writing the board, considering the structure of the lecture, definitions and basic theoretical concepts, quantities, drawings, dependencies, graphs and formulas. Laboratory work..

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (70%), laboratories (30%).

INSTRUCTION LANGUAGE: Bulgarian,English

BIBLIOGRAPHY:
1.Атанасов,А.С.,Основи на микроелектрониката, С., Техника 1987; 2. Вълков, С. А., Микроелектронна схемотехника, София, Техника 1987; 3. Razavi, B., Fundamentals of Microelectronics, 2007, ISBN / ASIN: 047007292X; 4. М. Христов, Системи за проектиране в микроелектрониката, София, 2004г.; 5. Campbeli, St., The Science and Engineering of Microelectronic Fabrication, Oxford University Press, 2001; 6. MEMS Introduction and Fundamentals, © 2006 by Taylor & Francis Group, LLC.

DESCRIPTION OF THE COURSE

Name of the course: **Sport**	Code: **SPR08**	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Self-Study (SS)	Hours per semester: L – 0 hours S – 0 hours SS – 30 hours	Number of credits: 1

LECTURER(S):
Sen. Lect. Daniel Vladimdirov, PhD (FEA), tel.: 032 659 646, e-mail: danielv@tu-plovdiv.bg
Sen. Lect. Petar Doganov, PhD (FEA), tel.: 032 659 648, e-mail: pdoganov@tu-plovdiv.bg
Sen. Lect. Boris Spasov, PhD (FEA), tel.: 032 659 647, e-mail: boris_spassov@tu-plovdiv.bg
Technical University of Sofia

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

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

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

1. General Physical Preparedness (GPP) – in these seminars the students develop a wide range of motor skill and habits; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

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

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

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

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

INSTRUCTION LANGUAGE: Bulgarian

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