

DESCRIPTION OF THE COURSE

Name of the course : Quality Control	Code: BpIEe54	Semester: 7
Type of teaching: Lectures(L) Laboratory work (LW)/ Tutorials (T)	Hours per semester: L – 26 hours T– 15 hours LW – 15 hours	Number of credits: 5

LECTURER(S):

Assist. Prof. Angel Lichev, PhD (FEA) 032659713, email: alichev@tu-plovdiv.bg |
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty Industrial Engineering, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: To give knowledge about use of techniques to achieve, sustain, and improve the quality of a product or service. It involves integrating the following related techniques and activities – specifications, design of the product or service to meet the specifications, production or installation to meet the full intent of the specifications.

DESCRIPTION OF THE COURSE: The course treats the Quality Control basic principles and international systems. The theory of probability and statistics, which is used in the various methods for Quality Control, is discussed. The basic experimental methods and techniques for evaluation of quality are treated.

PREREQUISITES: Mathematics, Measurements and Instrumentation, Measurement Systems.

TEACHING METHODS: Lectures with slides, supplemented by auxiliary materials and virtual labs in Moodle for self-preparation. Tutorials with problem solving and discussion on the topic. Laboratories with individual reports.

METHOD OF ASSESSMENT: Written examination.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. D. Besterfield, Quality Control, 8-th Edition, Prentice Hall, USA, 2009; 2. E. Ott, E. G. Schilling, D. V. Neubauer, Process Quality Control, McGraw-Hill, USA 2000; 3. J. R. Evans, W. M. Lindsay, The Management and Control of Quality, Thomson, Singapore, 2005; 4. R. Deliyski, Quality Control – Problems and solutions. Student manual, Publishing house of TUSofia, 2014.

DESCRIPTION OF THE COURSE

Name of the course: Systems Control	Code: BpIEe55	Semester: 7
Type of teaching: Lectures(L) Laboratory work (LW)	Hours per semester: L – 26 hours LW – 15 hours	Number of credits: 4
Course project (CP)	Code:	Number of credits: 0

LECTURER(S):

Assoc. Prof. Radoslav Hrishev, PhD tel.: 032 659527, e-mail: hrishev@tu-plovdiv.bg |
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty Industrial Engineering, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Upon completion of the course students will be able to apply the basic methods for analysis and synthesis of continuous and discrete control systems in solving engineering problems. The course aims to create and develop knowledge and skills for presenting and solving problems related to the design, setup and construction of control systems in various technical fields, using methods and tools of management theory.

DESCRIPTION OF THE COURSE: The main topics are: Mathematical modelling of systems; structural schemes; system resilience; accuracy in the established mode, quality and indicators; frequency domain analysis, complex plane analysis; regulators; main blocks in the control loops; frequency domain synthesis methods; methods for synthesis and adjustment of regulators; nonlinear elements in control systems. The course simultaneously expands theoretical knowledge and develops applied skills in the design and construction of control systems using analog and digital, microprocessor and computer-based technical means and elements. Examples from the field of process automation are used to illustrate different concepts and methods.

PREREQUISITES: Physics, Mechanics, Control Theory, Measuring Equipment, Electronics, Informatics.

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

METHOD OF ASSESSMENT: Exam - test at the end of the semester (80%), laboratory work (20%).

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. Dorf, D.C. Modern Control Systems, Prentice Hall, 12 ed. 2011. 2. Norman S. Nise. Control Systems Engineering, 6th Ed.. 2010. 3. Morris, N.M. Control Engineering. McGraw-Hill Book Company, 1991. 4. Sami Fadali, Antonio Visioli. Digital Control Engineering, 2 ed: Analysis and Design, 2012. 5. Farhi O., A. Todorov, E. Nikolov, Industrial automation systems, TU Sofia, 1989.

DESCRIPTION OF THE COURSE

Name of the course: Systems Modelling and Simulation	Code: BpIEe56	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 26 hours LW – 15 hours	Number of credits: 4

LECTURER(S):

Chf. Asst. Prof Vasil Popov, PhD (FEA), tel.: +359 896282030, e-mail: vasil_popov@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty Industrial Engineering, Professional orientation 5.13 General Engineering, 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 methodology for modeling, simulation, analysis, and design of continuous, discrete, linear, and nonlinear systems, to know the software products MATLAB, SIMULINK, and to use them in solving of engineering problems, analysis and validation of results.

DESCRIPTION OF THE COURSE: The students study computer-aided design and simulation of control systems. Central in the course are the topics of computer-aided analysis, modeling, and simulation of linear, nonlinear, continuous, and discrete control systems. Computer modeling and simulation of dynamical systems by differential and difference equations, transfer functions in various forms, transformations and properties of models, system responses in the frequency and time domains are considered. The peculiarities of numerical and analogue simulation, methods of numerical integration of differential equations, computer-aided methods for analysis and design of continuous and discrete control systems, matrix-vector algebra, manipulating of vectors and matrices, matrix functions, 2D and 3D computer graphics are included.

PREREQUISITES: Control Theory, Electrical Engineering, Electronics, Computing, Physics.

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

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (62%), laboratories (18%), course work assignment (20%).

INSTRUCTION LANGUAGE: in English

BIBLIOGRAPHY: 1. Yordanova S., E.Gadjeva. System Modelling and Simulation. Technical University of Sofia, Sofia, 2019, 143, ISBN 954-438-350-6; 2. MATLAB with SIMULINK, User's Guide. The Math Works Inc., 2012; 3. Chisman J. Introduction to Simulation Modeling using GPSS/PC. Prentice Hall, 2015. ISBN 0-13-473695-8; 4. Law A. M. Simulation Modeling and Analysis, 4th Ed., McGraw-Hill, NY, 2007; 5. Chapra S. C., Applied Numerical Methods with MATLAB for Engineering and Science. 3rd Ed., WCB/McGraw-Hill, New York, 2011; 6. MATLAB User's Guide, The Math Woks, Inc. 1993; 7. SIMULINK User's Guide, The Math Works, Inc. 1993; 8. Control systems Toolbox User's Guide, The Math Works Inc. 1992; 9. Optimization Toolbox User's Guide, The Math Works Inc. 1992; 10. Signal Processing Toolbox User's Guide, The Math Works Inc. 1992;.

DESCRIPTION OF THE COURSE

Name of the course: Manufacturing Design II	Code: BpIEe57	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW) Course project (CP)	Hours per semester: L – 26 hours LW – 15 hours	Number of credits: 4

LECTURER(S):

Assoc. Prof. Eng Iliya Chetrokov, (FME), tel.: 659 616, e-mail: chetrokov@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum / curricula for training of students to obtain Bachelor's degree, specialty Industrial Engineering, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: To give the students knowledge about the design of basic units used in modern machine-building industry, basic principles of the design of machine tools, basic of the design of technological processes for machining, CNC programming.

DESCRIPTION OF THE COURSE: The main topics concern: General principles of machine design; Concurrent engineering; Functional characteristics of machine tools; Basics of Technological design; Jigs and fixtures; Selecting the sequence of machining operations and their contents; Technological calculations; Program composition for CNC machine tools.

PREREQUISITES: Physics, Mechanics; Applied Geometry and Engineering Graphics; Materials Science; Strength of Materials; CAD; Industrial Manufacturing Systems; Manufacturing Design I.

TEACHING METHODS: Lectures, laboratory work (defence of protocols) and course project with defence.

METHOD OF ASSESSMENT: Exam at the end of semester (80%), laboratory work (20%). Course project (100%).

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. Groover M. P. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 4th Edition, Wiley and Sons 2010, ISBN 978-0470-467002; 2. Kalpakjan, S., St. Schmid, C. Kok, Manufacturing, Engineering and Technology, 6th Edition, Prentice Hall 2009. ISBN-10: 9810681445 . 3. Dimitrov L. Principles of Mechanical Engineering Design, Heron Press, Sofia, 2009. ISBN 978-954-580-257-7. 4. Hadjikosev G., Automation of Discrete Production Engineering, TUS Publishing house, 2013, ISBN 978-619-167-025-3.

DESCRIPTION OF THE COURSE

Name of the course: Computer Integrated Manufacturing II	Code: BpIEe58	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 26 hours LW – 15 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: Mandatory for all students in the Industrial Engineering BEng program of the Faculty of Electronics and Automation at the Technical University of Sofia, branch Plovdiv. Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: To provide the basic knowledge about basic discrete manufacturing structures, its automation and information integration.

DESCRIPTION OF THE COURSE: The main topics concern: types of discrete manufacturing systems, working and layout models and metric, structures for automation of production and assembly process (orientation, transport, storage), robotics (kinematics, industrial environment, control and programming) and the identification of objects and processing data.

PREREQUISITES: Physics, mechanics, industrial production systems, production engineering, computer science.

TEACHING METHODS: Lectures using slides. Laboratory works in a computer class and laboratory with set up. Individual or team work with input control, preparation of e-protocols and presentations.

METHOD OF ASSESSMENT: Two written test (at the end of the semesters) with a duration of one academic hour, with weight in the overall assessment - 80% (up to 80 points). The remaining 20% (20 points) is formed from the current control and presentation of laboratory protocols.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. Слайдове на лекциите; 2. Groover M. P., 2008, Automation, Production Systems, and Computer Integrated Manufacturing, *Pearson Education Inc.* ISBN 0-13-207073-1; 3. Assembly automation, *The international journal of assembly technology and management*, ISSN: 0144-5154, Thomson Scientific (ISI); 4. Lotter, L. Wirtschaftliche Montage. VDI Verlag, 1986; 5. Gershwin S., B., 1994, Manufacturing systems engineering, ISBN 0-13-560- 608X. 6. De Ron A., J., 1999, Performance measures for technical production systems, Eindhoven University of technology, School of industrial Engineering and management science, Syllabus; 7. Lin Zhang at all, 2014, Cloud manufacturing: a new manufacturing paradigm, *Enterprise Information Systems*, Vol. 8, 167-187. 8. Neshkov, T., 2013, Introduction to the speciality mechatronic systems, University Textbook, Heron Press Ltd, ISBN 978-954-580-329-1, 9. *Gerhard Pahl, Wolfgang Beitz, Jorg Feldhusen, Karl-Heinrich Grote*, 2007, Engineering Design. A Systematic Appr, oSachpri, nger-Verlag London Limited, ISBN-10: 1846283183..

DESCRIPTION OF THE COURSE

Name of the course: Elements of Industrial Automation	Code: BpIEe59	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 26 hours LW – 15 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: Mandatory for all students in the Industrial Engineering BEng program of the Faculty of Electronics and Automation at the Technical University of Sofia, branch Plovdiv. Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: physics, electrical engineering, electronics, control systems, computer integrated production, measurement, informatics.

DESCRIPTION OF THE COURSE: The main topics concern: Input – Output devices classifications, applied in industrial systems. Wiring to the programmable logic controllers. Discrete automation, principles. Pneumatic elements and types actuators. Pneumatic system design for control..

PREREQUISITES: Physics, electrical engineering, electronics, control systems, computer integrated production, measurement, informatics.

TEACHING METHODS: Lectures, using multimedia, case studies, laboratory work from laboratory manual, work in teams, protocols preparation and defense .

METHOD OF ASSESSMENT: A two hours exam at the end of semester - 75% plus Laboratory tasks assessment 25%

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. Yordanova S., N.Kolev, R.Litchev. Elements of Industrial Automation. TU-Sofia, 1998; 2. Petruzella F., Programmable Logic Controllers, McGraw-Hill Science, 2010 3. Popovic D. Distributed Computer Control for Industrial Automation, Marcel Dekker, 1990. 4. Parr A, Hydraulics and Pneumatics, Third Edition: A technician's and engineer's guide, 2011; 5. Berger H, Automating with STEP 7 in LAD and FDB: SIMATIC S7-300/400 Programmable controllers, 2012, Publics..

DESCRIPTION OF THE COURSE

Name of the course: Introduction to SAP	Code: BpIEe61.1	Semester: 7
Type of teaching: Lectures(L) Laboratory work (LW)	Hours per semester: L – 24 hours LW – 15 hours	Number of credits: 4
Course project (CP)	Code:	Number of credits: 0

LECTURER(S):

Assos. Prof. Radoslav Hrishev, PhD tel.: 032 659527, e-mail: hrishev@tu-plovdiv.bg |
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Industrial Engineering, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: To introduce the basic knowledge of the organization of ERP systems based on a real working system. The course is the first step and prerequisite for additional training and acquisition of specific skills for working with SAP (Systems, Applications & Products in Data Processing ".

DESCRIPTION OF THE COURSE:The main topics include: Overview and description of ERP systems, their place in automation systems, Description of SAP as the number one ERP system in the world, Consideration of the main modules of the system, their relationship and importance, Detailed overview of the most important modules. Practical skills for working with the system based on exercises in demonstration and test systems hosted on servers of universities, members of SAP University Alliances.

PREREQUISITES: Informatics, Systems Control.

TEACHING METHODS: L Lectures, presentations, demonstrations, simulations, laboratory exercises, group work, protocols and defense.

METHOD OF ASSESSMENT: One-hour written current assessment - test at the end of the semester (75% in total), laboratory work (25%) with protocols and defense.

INSTRUCTION LANGUAGE:English

BIBLIOGRAPHY:1.SAP University Alliances, Global Bike (GBI) curricula, 2. SAP University Alliances, Introduction to Industry 4.0, 3.Open Online Courses: <https://open.sap.com/>.

DESCRIPTION OF THE COURSE

Name of the course: Multivariable control systems	Code: BpIE61.2	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 24 hours LW – 15 hours	Number of credits: 4

LECTURER(S):

Chf. Asst. Prof Vasil Popov, PhD (FEA), tel.: +359 896282030, e-mail: vasil_popov@tu-plovdiv.bg |
Technical University of Sofia

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

AIMS AND OBJECTIVES OF THE COURSE: The students receive knowledge for application of methods and necessary tools for analysis and design of multivariable control systems. The obtained practical skills allow successful development of multivariable control systems for real world plants.

DESCRIPTION OF THE COURSE: The course considers the problems for analysis and design of systems for control and observation of linear and nonlinear continuous and discrete multivariable control systems. The additional practical knowledge helps the students in the self-solving of tasks for multivariable control systems design in practice.

PREREQUISITES: Programming and methods for mathematical modelling, Physics, Mathematics, Mechanics, Automatic control theory, Linear control systems, Nonlinear control systems.

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

METHOD OF ASSESSMENT: Continuous assessment two tests (80%), laboratory work (20%).

INSTRUCTION LANGUAGE: in English

BIBLIOGRAPHY: 1. S. Skogesdat, I. Postlethwaite, (2005), Multivariable Feedback Control. Analysis and Design, John Wiley & Sons, ISBN-13 978-0-470-01167-6 (HB) 978-0-470-01168-3 (PBK); 2. P. Albertos, A. Sala, (2005), Multivariable Control Systems: An Engineering Approach. 2004 Springer-Verlag London Limited, ISBN 1-85233-738-9; 3. Yordanova S., E.Gadjeva. System Modelling and Simulation. Technical University of Sofia, Sofia, 2019, 143, ISBN 954-438-350-6; 4. MATLAB with SIMULINK, User's Guide. The Math Works Inc., 2012; 5. Chisman J. Introduction to Simulation Modeling using GPSS/PC. Prentice Hall, 2015. ISBN 0-13-473695 6 П. Петков, Многомерни системи за управление, 1997 изд. на Технически Университет София, ISBN 954-438-209-7.

DESCRIPTION OF THE COURSE

Name of the course: Computer Integrated Manufacturing III	Code: BpIEe62	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 20 hours LW – 15 hours	Number of credits: 3

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: Mandatory for all students in the Industrial Engineering BEng program of the Faculty of Electronics and Automation at the Technical University of Sofia, branch Plovdiv. Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: To provide the basic knowledge about basic discrete manufacturing structures, its automation and information integration.

DESCRIPTION OF THE COURSE: The main topics concern: types of discrete manufacturing systems, working and layout models and metric, structures for automation of production and assembly process (orientation, transport, storage) and robotics.

PREREQUISITES: Physics, mechanics, industrial production systems, production engineering, computer science.

TEACHING METHODS: Lectures using slides. Laboratory works in a computer class and laboratory with set up. Individual or team work with input control, preparation of e-protocols and presentations.

METHOD OF ASSESSMENT: Two written test (at the end of the semesters) with a duration of one academic hour, with weight in the overall assessment - 80% (up to 80 points). The remaining 20% (20 points) is formed from the current control and presentation of laboratory protocols.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1.Groover M. P.,2008, Automation, Production Systems, and Computer Integrated Manufacturing, *Pearson Education Inc.* ISBN 0-13-207073-1; 2.Assembly automation, *The international journal of assembly technology and management*, ISSN: 0144-5154, Thomson Scientific (ISI); 3. Lotter, L. Wirtschaftliche Montage. VDI Verlag, 1986; 4.Gershwin S., B., 1994, Manufacturing systems engineering, ISBN 0-13-560- 608X. 5 De Ron A., J.,1999, Performance measures for technical production systems, Eindhoven University of technology, School of industrial Engineering and management science, Syllabus; 6. Lin Zhang at all, 2014, Cloud manufacturing: a new manufacturing paradigm, *Enterprise Information Systems*, Vol.8, 167-187. 7.Neshkov, T.,2013, Introduction to the speciality machatronic systems, University Textbook, Heron Press Ltd, ISBN 978-954-580-329-1, 8. *Gerhard Pahl, Wolfgang Beitz, Jorg Feldhusen, Karl-Heinrich Grote*, 2007, Engineering Design. A Systematic Appr,oSacphri,nger-Verlag London Limited, ISBN-10: 1846283183.

DESCRIPTION OF THE COURSE

Name of the course: Environmental Production Engineering	Code: BpIEe63	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 20 hours S – 15 hours LW – 0 hours	Number of credits: 3

LECTURER(S):

Assoc.Prof. Eng. Margarita Deneva, PhD (FA), tel.: 659 759, e-mail: deneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty Industrial Engineering, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Acquiring knowledge, concerning the relationships between the environment and the human production activity. Establishment of abilities for determination of the determination of the interaction and the development of the ecosystems, for the influence of the basic air-, water- and soil pollutants. Completing the course, the students will be acquainted with the relations between the environment, the ecosystems, soils, water and the air, is able to take into consideration the impact of the change of each component on the entire development; will be familiar with the terminology for preservation of the environment and steady development; can select basic elements, related with the application of the technologies for waste water treatment, gases and wastes; will know some methods and techniques for decreasing the influence of the present production on the environment.

DESCRIPTION OF THE COURSE: The main subjects are grouped in following topics: - structures, organization, relations and balance of the ecosystems; - special features of atmosphere, hydrosphere and soils; - pollution of the air, water and the soils; - alternative and renewable energy sources, technologies for waste water, air and solid wastes treatment.

PREREQUISITES: Knowledge on Physics, Chemistry and Material Science; basic knowledge in the field of Electronics, Electrical Engineering and technology..

TEACHING METHODS: Lectures, using multimedia projector, suitable interactive materials for some of the topics. The laboratory work completed with preparation of protocols..

METHOD OF ASSESSMENT: Final semester mark, based on two components: major final test at the end of the semester giving 70% of the mark and a combined mark both from the prepared presentation for given ecological problem and participation in the laboratory work appending 30% of the final mark.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. Davis, Mackenzie Leo et al., „Introduction to environmental engineering”, McGraw-Hill Companies, 2008, ISBN 978-007-125922-4, sign. 7925; and mainly provided and recommended by the teacher and the lecture notes.

DESCRIPTION OF THE COURSE

Name of the course: Fundamentals of design	Code: BpIEe64	Semester: 8
Type of teaching: Lectures(L) Seminars (S)	Hours per semester: L – 20hours S – 20 hours	Number of credits: 4

LECTURER(S):

Assist. Prof. Eng. Konstantin Chukalov, PhD (FME), tel.: 659 618, e-mail: chukalov@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum foreducation of students learningBachelor's degree, specialty Industrial Engineering, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE:At the end of the course the students are expected to know the tools for strategic analyze,modern production strategies,to plan strategic changes and to adapt production strategies.

DESCRIPTION OF THE COURSE:The main topics concern:Mission and vision,strategicalanalyzes,strategicplanning,types of organizational structure,types of production systems,total quality management,lean manufacturing.

PREREQUISITES:Production operation management,Managementsystems,Quality control.

TEACHING METHODS: Lectures using laptop and multimedia projector. Conducting seminars working in teams to solve taskst

METHOD OF ASSESSMENT:Conducting two tests-at the middle and at the end of the semester (100%),.

INSTRUCTION LANGUAGE:English

BIBLIOGRAPHY:.1. ByrneA. andJ. P. Womack.The Lean Turnaround: How Business Leaders Use Lean Principles to Create Value and Transform Their Company. McGraw Hill, 2012 ,.2. Stevenson W. Production and Operations management, 11th ed., McGraw Hill, 2011

DESCRIPTION OF THE COURSE

Name of the course: Control systems with microcontrollers	Code: BpIE66.1	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 15 hours S – 0 LW – 10 hours	Number of credits: 3

LECTURER(S):

Assoc. Prof. Sevil Ahmed-Shieva, PhD (FEA) tel.: 032 659 583, e-mail: sevil.ahmed@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective for training of students to obtain Bachelor's degree, specialty Industrial Engineering 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to have basic knowledge how to design and implement control systems with microcontrollers. Basics of discrete controllers, such as relay control and PID, would be given. Microcontrollers are also concerned as a standalone components or integrated part of more complicated systems. Basic skills of programming and input/output configuration would be gained.

DESCRIPTION OF THE COURSE: This course introduces basic knowledge on discrete controllers and programmable microcontrollers. The main topics concern: Basics of discrete controllers. Discretization (Discrete time integrals and derivatives, Z-Transform, Discrete TF of integrals and derivatives, Discrete TF of PID, Control signal limit (Saturation)); Implementation of digital P, PI, I, PD and PID controllers; Programming of microcontrollers. Data exchange in Control systems with microcontrollers; Methodology in software development; Basics of Microcontroller Programming.

PREREQUISITES: Mathematics I, Mathematics II, Programming I, Programming and mathematical modelling tools.

TEACHING METHODS: Lectures, visually illustrated; demo systems and programs.

METHOD OF ASSESSMENT: Written final examination.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. Dorf, D.C. Modern Control Systems, Prentice Hall, 12 ed. 2011. 2. Norman S. Nise. Control Systems Engineering, 6th Ed.. 2010.; 3. K. Arnold, Embedded Controller Hardware Design, LLH Technology Publishing, ISBN 1- 878707-87-6, 2001; 4. J. Ganssle, Embedded Systems. World Class Designs, Newnes Press, ISBN-13: 978- 0750686259, 2007; 5. B. Yang and I. Abramova, Dynamic Systems: Modeling, Simulation, and Analysis. Cambridge: Cambridge University Press, 2022 6. Yoshifumi Okuyama, Discrete Control Systems, DOI: <https://doi.org/10.1007/978-1-4471-5667-3>, Hardcover ISBN 978-1-4471-5666-6, Springer-Verlag London 2014

DESCRIPTION OF THE COURSE

Name of the course: Communication networks in systems automation	Code: BpIEe66.2	Semester: 8
Type of teaching: Lectures(L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 15 hours T–0 hours LW – 10 hours	Number of credits: 3
Course project (CP)		Number of credits: 0

LECTURER(S):

Assoc. Prof. Radoslav Hrishev, PhD (FEA), tel.: 032659585, e-mail: hrishev@tu-plovdiv.bg
 Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Industrial Engineering, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Upon completion of the course, students must know the types of communication networks and be able to apply the approaches, methods and technical means for analysis, modeling and configuration of industrial communication systems and taking into account the specifics of the specific task and automation system. They get acquainted with modern methods of data transfer.

DESCRIPTION OF THE COURSE: The industrial networks from the field, management and information level. Particular attention is paid to field industrial networks for connecting intelligent terminals, as a prerequisite to create systems with open architecture. A comparative analysis of many modern industrial networks for the transmission of various types of information is made - digital and analog, audio and video, and wireless communications in an industrial environment. The course examines sample solutions in various industries. Examples of the respective software and technical implementation of systems are also presented for network communication in industrial environment. The peculiarities of the automatic control systems with network communication as a part of the control process are considered. Students study the importance of network communications in IoT / Internet of Things /. The modern Industrial IP protocol for data transfer from terminal devices to integrated production automation systems is considered.

PREREQUISITES: Electronics, Informatics, Control Theory, Industrial Production Systems.

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

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

INSTRUCTION LANGUAGE: In English

BIBLIOGRAPHY: 1. Deon Reynders., Practical Industrial Data Communications. 2007, 2. Sunit Kumar, Fieldbus and Networking in Process Control. 2014, 3. St. Dzhiev, Industrial Communication Networks, 2003, Technical University of Sofia.

DESCRIPTION OF THE COURSE

Name of the course: Industrial applications of laser technology	Code: BpIEe67.1	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 15 hours S – 10 hours LW – 0 hours	Number of credits: 3

LECTURER(S):

Assoc.Prof. Eng. Margarita Deneva, PhD (FA), tel.: 659 759, e-mail: deneva@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 Industrial Engineering, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Introduction in the problems of functioning, complex questions and maintenance of industrial laser complexes, as well as basic professional orientation at the selection of the needed parameters of the laser apparatus for work with them. Essential part is related with an introduction and understanding of the characteristics of basic practical laser apparatus and their constructive assemblies, on the base of this knowledge – orientation in necessary practical parameters. The gained knowledge and skills for their application give for formed specialists' also professional orientation in present-day problems of the field, understanding the principles of action and development of new modern apparatus and systems and to work effectively on the maintenance and their adaptation for different purposes and needed modifications.

DESCRIPTION OF THE COURSE: The course provide for student introduction into the industrial applications of laser devices, as well as in the principles for construction of other practical systems with lasers. Essential part is related with basic representation of the action and the technical solutions of the most applicable lasers in the industrial. The gained knowledge can be applied for estimation and necessary modifications of laser apparatus for construction of systems and devices with lasers for the industry. The gained knowledge and the skills for their use create preconditions for professional orientation of future engineers into present-day problems, apparatus and systems from the field, and also give a base for orientation and specialized approach for solving of given and arisen varied engineering tasks, related with laser apparatus and devices. This knowledge is combined at appropriate manner with the basic electronic training of the students accounting that the main part from the laser apparatus are electrically powered and have electronic control and operating systems.

PREREQUISITES: Academic courses on Physics, Electrical engineering, Mathematics.

TEACHING METHODS: Lectures using multimedia projector, practical work with protocols..

METHOD OF ASSESSMENT: Exam, mark, based on two components: major final test with weight 0.7 and evaluation of practical work with weight 0.3.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: M. Deneva, M. Nenchev, "Laser radiation in presentation for engineers and practitioners", Intelxexpert-94, ISBN 978-954-8835-76-3 (2013); S. Dinev, "Lasers in modern technologies", "Alfa", Sofia, 1993; O.Svelto, "Principles of lasers", Springer, 2010 and literature provided and recommended by the teachers and the lecture notes..

DESCRIPTION OF THE COURSE

Name of the course: Manufacturing in Electronics Industry	Code: BpIE67.2	Semester: 8
Type of teaching: Lectures(L) Laboratory work (LW)	Hours per semester: L – 15 hours LW – 10 hours	Number of credits: 3

LECTURER(S):

Assist. Prof. Eng., Iliya Petrov, PhD (FEA), tel.: 32 659 718, e-mail: ilpetrov@tu-plovdiv.bg |
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory elective subject from the curriculum for training of students to obtain Bachelor's degree, specialty Industrial Engineering, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students will obtain knowledge of the perimeter of the Electronic Industry, what are the products of this industry, and will generalized the knowledge and skills of Electronics to form full and deep vision of Electronics Manufacturing.

DESCRIPTION OF THE COURSE: The main topics concern: Influence of Electronic Industry on other Industries. Economic parameters of Electronic Industry. CAD-CAM software in Electronics. Range of Electronic Products. Organization and manufacturing of passive and semiconductor components and ICs. Application of passive and discrete semiconductor components and Op Amps. Manufacturing and application of classical digital ICs. Manufacturing, application and programming of microprocessors, microcontrollers and programmable logic devices (FPGA and CPLD). Construction of PC. Types of packages of electronic components and ICs. Technology of printed circuit boards.

PREREQUISITES: Introduction to Manufacturing and Industrial Practice I and II, Physics I and II, Chemistry, Electrical Engineering I and II, Electronics I and II, Industrial manufacturing Systems I and II, Computer Integrated Manufacturing I, Elements of Industrial Automation.

TEACHING METHODS: Lectures with multimedia projector. Solving practical problems on lectures and laboratories.

METHOD OF ASSESSMENT: Two hours exam with test questions and tasks (70%) and laboratory work (30%).

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. World Electronic Industries 2008-2013, Executive summary, 2009. 2. Sinclair, I. R. and Dunton, J., Practical Electronics Handbook, 6th edition, Elsevier, 2007. 3. Horowitz, P. and Hill, W., The Art of Electronics, Cambridge University Press, 2015. 4. Edwards, P., Manufacturing Technology in the Electronics Industry: An Introduction, Springer, 1991. 5. Тренков Й., Енциклопедия на електрониката т.1: Елементи и технологии, Техника, София, 2010.

DESCRIPTION OF THE COURSE

Name of the course: Sport	Code: FaBBpIEe5	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 Vladimirov, 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_spasov@tu-plovdiv.bg

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COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialties "INDUSTRIAL ENGINEERING in English", 5.13 General Engineering, 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 curriculum presumes 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. Туризм и ориентиране. Методическо ръководство за студентите от ТУ София, филиал Пловдив. Издателство на ТУ - София. 2010.

DESCRIPTION OF THE COURSE

Name of the course: Sport	Code: FaBBpIEe6	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 Vladimirov, 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_spasov@tu-plovdiv.bg

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Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialties "INDUSTRIAL ENGINEERING in English", 5.13 General Engineering, 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 curriculum presumes 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. Туризм и ориентиране. Методическо ръководство за студентите от ТУ София, филиал Пловдив. Издателство на ТУ - София. 2010.