DESCRIPTION OF THE COURSE

Name of the course **Technology of Machine Building**	Code: **BpME01**	Semester: 5
Type of teaching: Lectures, (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 30 hours LW – 15 hours SW – 15 hours	Number of credits: 5
Курсов проект (КП)	Code: **BpME07**	Number of credits: 3

LECTURER:

Assoc. Prof. Dr. Angel Stoilov Poparov, Eng. (Faculty of Mechanical and Instrument Engineering), tel: 359 32 659 617; e-mail: poparan@abv.bg,
TU-Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialtiy Mechanical and Instrument Engineering, 5.1 Mechanical engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Compulsory subject from the curriculum / curricula for training of students to obtain Bachelor's degree, specialty „Industrial Engineering“, „Design and printed communications“, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

DESCRIPTION OF THE COURSE: Basic topics: Production and technological process, types of machine-building production, production organization forms; quality of the articles; precision of the machine-building articles, types of mistakes and methods of ensuring precision; stability of the technological system and methods of reducing the power distortion mistakes; dimension set-up and sub-adjustment of the technological system; ensuring the quality of the processed surfaces; statistical analysis and technological processes control; active and adaptive control; methods of rough, pure and finishing processing; designing technological processes.

PREREQUISITES: Materials Science and Technology of Materials; Metrology and Measuring Equipment; Metals Cutting; Cutting Tools; Metal-cutting Machines.

TEACHING METHODS: Lectures supported by slides, laboratory work with written statements about the research (observations) results.

METHOD OF ASSESSMENT: Written examination on a topic, drawn by the student, or examination test covering the whole content of the subject.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1.Георгиев В., Ст. Пашов. Технология на машиностроенето, ТУ-София, Филиал Пловдив, 2003. ISBN 954-8779-51-X; 2.Пашов Ст., П. Хаджийски. Технология на машиностроенето част 1. ИПК ТУ - София, 1997. ISBN 954-438-203-8; 3.Гатев Г.К., В.И. Георгиев. Ръководство за лабораторни упражнения по технология на машиностроенето, София, “Техника”, 1987.

DESCRIPTION OF THE COURSE

Name of the course: **Automation and robotics of production**	Code: **BpME02**	Semester: **5**
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. Angel Lengerov, PhD (MIE), E-mail: anlen@tu-plovdiv.bg,
Senior Assist. Eng. Penko Mitev, PhD (MIE), E-mail: penkomitev@tu-plovdiv.bg,
Technical University of Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Compulsory course from the curriculum for training students for Bachelor's degree, specialty "Mechanical Engineering and Instrumentation", professional field 5.1 Mechanical Engineering, field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of the training in "Automation and robotics of production" is to acquaint students with the nature, basic concepts, prerequisites for automation and robotics, with methods and technical means for automation and robotics of various technological processes, as well as with the implementation and operation of automation equipment.

DESCRIPTION OF THE COURSE: The main directions for CBA, the methods applicable in the design and implementation of projects for automation and robotics of various discrete processes are considered. The main attention is paid to the constructions, areas of application, design and implementation of the main classes of automation equipment with different degrees of automation.

PREREQUISITES: Basic knowledge of "Mathematics", "Mechanics", "Theory of Mechanisms and Machines", "Machine Elements", knowledge of "Mechanical Engineering Technology", "Quality Control", "Regulatory and Control Engineering".

TEACHING METHODS: Lectures delivered using illustrative materials, including: multimedia, foils for overhead projects, boards, etc. Laboratory exercises conducted in a specialized laboratory in the presence of laboratory stands and manuals for laboratory exercises. For experimental research, students prepare protocols, which are accepted by the teacher.

METHOD OF ASSESSMENT: The grade is formed on the basis of an exam grade (80%) and a laboratory exercise grade (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1.”Автоматизация на дискретното производство”,ТУ, 2008 год.; 2 Митев В., Г. Хаджикосев, „Системи от машини с ЦПУ”, С., Техника, 1984 3. Гановски В., и др., Основи на автоматизацията, роботизацията и ГАПС, С., 1997; 4.Хаджикосев Г., „Ръководство за лабораторни упражнения по автоматизация на ГДП” ТУ,С., 1995; 5.Гъвкаво автоматично производство, Техника, превод от руски, 1987 год.; 6. Малаков, И. Нискостойностна автоматизация на дискретното производство. ISBN 978-954-438-799-0, Издателство на ТУ – София, София, 2009.

DESCRIPTION OF THE COURSE

Name of the course: **Lifting and transport equipment**	Code: **BpME03**	Semester: **5**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof. Eng. Angel Dimitrov Lengerov, PhD (MIE), tel.:, e-mail: anlen@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory elective facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialty Mechanical Engineering, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course acquaints students with the constructions of the types of lifting and transport machines and with the methods for calculating their elements.

DESCRIPTION OF THE COURSE: Constructions of hoisting and transport machines. Design of the elements of the lifting and transporting machines.

PREREQUISITES: Theoretical mechanics, resistance of materials, physics, mathematics.

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: Lectures and laboratory work

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: All available scientific literature sources for lifting and transport machines.

DESCRIPTION OF THE COURSE

Name of the course: **Metrology and measuring equipment**	Code: **BpME04**	Semester: 5
Type of teaching: Lectures (L) Laboratory work (LW) Tutorials (T)	Hours per semester: L – 30 hours LW – 15 hours T – 15 hours	Number of credits: **5**
Course project (CP)	Code: **BpME14**	Number of credits: **3**

LECTURER(S):
Assoc. prof. Pavlinka Katsarova Ph.D , department (MIE), e-mail: p_katsarova@abv.bg,
Assist. Prof. Eng. K. Georgiev, department (MIE), e-mail: k.georgiev@tu-plovdiv.bg,
Technical University-Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Compulsory course from the curriculum for training students for Bachelor's degree, specialty "Mechanical Engineering and Instrumentation", professional field 5.1 Mechanical Engineering, field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the training is for students to acquire theoretical and applied knowledge in metrology and measurement techniques and to acquire skills for solving applied problems.

DESCRIPTION OF THE COURSE: The curriculum includes lectures, laboratory work and course work. The basics of metrology, analysis and evaluation of measurement errors, metrological characteristics and application of measuring instruments are considered. The principles for defining and standardizing the requirements for the accuracy of the details, their interchangeability, as well as the modern concepts for analysis and solving problems of dimensional analysis. In the laboratory exercises practical skills for working with measuring instruments and solving applied problems by choosing assemblies and dimensional circuits are acquired.

PREREQUISITES: Knowledge of "Mathematics", "Physics", "Electrical Engineering", "Engineering Graphics", "Machine Elements", "Mechanical Engineering Technology" is required.

TEACHING METHODS: Lectures delivered with the help of visual presentations, slides and videos. Laboratory exercises with the use of stands, methodical instructions and drawing up protocols. Work with various devices for technical measurements, performance of independent tasks, independent solution of applied course tasks from dimensional analysis.

METHOD OF ASSESSMENT: Exam in the form of a test, forming 70% of the total grade, laboratory exercises - 20%, course assignment - 10%.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Радев Хр. и др., Метрология и измервателна техника (в три тома), С., Софттейд, 2008,2010; 2. Харт Х. Въведение в измервателната техника, С. Техника, 1982; 3. Димитров Д., Взаимозаменяемост, стандартизация и технически измервания, С. Техника, 1982; 4. Радев Хр., Уреди за измерване на линейни и ъглови размери, С., Техника 1989; 5. Димитров Д. и др., Ръководство за лабораторни упражнения по взаимозаменяемост и технически измервания. С., Техника, 1989; 6. Яръмов К., Р. Йорданов, Ръководство за решаване на курсови задачи по взаимозаменяемост, С., Софттрейд,

DESCRIPTION OF THE COURSE

Name of the course: **Fine mechanical engineering**	Code: **BpME05**	Semester: 5
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: **5**
Course project (CP)	Code: **BpME14**	Number of credits: **3**

LECTURER(S):
Assoc. Prof. Eng. Angel Dimitrov Lengerov, PhD (MIE), tel.:, e-mail: anlen@tu-plovdiv.bg
Assist. Prof. Eng. Dimitur Dimitrov PhD, (MIE), e-mail: ddimitrov_tu@abv.bg,
Technical University-Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Compulsory course from the curriculum for training students for Bachelor's degree, specialty "Mechanical Engineering and Instrumentation", professional field 5.1 Mechanical Engineering, field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of the training in "Finomechanical Engineering" is to expand and supplement the knowledge of students from previous courses in TMM and Machine Elements. This will allow them to more competently solve the tasks of designing mechanical structures.

DESCRIPTION OF THE COURSE: The general principles and methods for design and calculation of some basic elements and mechanisms applied in the devices and devices of the fine mechanical engineering are presented. Specific fine-mechanical elements and mechanisms, their main characteristics, accuracy indicators, choice of materials, construction, application are considered.

PREREQUISITES : Basic knowledge of "Theory of Machines and Mechanisms" and "Machine Elements" is required.

TEACHING METHODS: Lectures delivered using illustrative materials, including: multimedia, transparencies, boards, etc. Laboratory exercises conducted in a specialized laboratory in the presence of laboratory stands and manuals for laboratory exercises. For experimental research, students prepare protocols, which are accepted by the teacher.

METHOD OF ASSESSMENT: Written exam at the end of the fifth semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Недев Ц. и кол., Основи на проектирането на уредите, София, Техника, 1991г.; 2. Недев Ц., Елементи на уредите и машините, София, Техника, 1979г.; 3. Лилов А., Николов Р., Ръководство за лабораторни упражнения по финомеханична техника", София, Софттрейд, 2003г.; 4. Becwith T., Marangoni R., Lenhart Y., Mechanical Measurement, Massachusetts, 1993.; 5.Ръководство за лабораторни упражнения по финомеханична техника,Габрово, 2008; 6.Mechanisms and Mechanical Devices Sourcebook 3 rd Edition, by Neil Sclater and Nicholas P.Chironis,Jun1,2001; 7.Illustrated Sourcebook of Mechanical Components, by Robert Parmley , May 18,2000; 8.Low Temperature Materials and Mechanisms,by Yoseph Bar-Cohen, Aug 19,2016.

DESCRIPTION OF THE COURSE

Name of the course **Construction non-metallic composites**	Code: **BpME06**	Semester: **5**
Type of teaching: Lectures, (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 15 hours LW – 15 hours	Number of credits: **3**
Course project (CP)	Code: **BpME14**	Number of credits: **3**

LECTURER:
Assoc. Prof. Dr. Angel Stoilov Poparov, Eng. (Faculty of Mechanical and Instrument Engineering), tel: 359 32 659 617; e-mail: poparan@abv.bg
TU-Sofia, Plovdiv Branch,

COURSE STATUS IN THE CURRICULUM: Optional subject in the curriculum for the Bachelor's degree "Mechanical and tool engineering".

AIMS AND OBJECTIVES OF THE COURSE: The goals of the subject "Construction non-metallic composites are students to attain knowledge about the types of construction non-metallic composites, technologies converting them to parts and their qualified application for accelerated process in high-technologies of technics-in mechanical and tool engineering. "Construction non-metallic composites "is major subject. It should deepen engineering culture of prospective designers about: Nature of composites materials and more specific non-metallic composites. Classification of these materials; Composition of polymeric composites, containing high modulus phases and polymeric matrixes; Significant factors for polymeric composites and abilities of their regulation; Technologies for gaining quality polymeric composites and parts from them; Effective application polymeric composites parts; Criteria selection for material and possible interchangeability; Main principles and specific features designing parts from polymeric composites.

DESCRIPTION OF THE COURSE: Learning non-metallic composites materials. They are avant-garde materials applicable in high technologies. Contribution of non-metal composites is development of energetics, energy saving technologies, medicine, sports, etc. Ecological aspects of non-metallic composites.Polymeric composites on base of unsaturated polyester resins and glass fibers(fiberglass).Types fiber glasses ,properties and application. Technology of gaining fiberglass parts,contact forming,vacuum-moulding lamination ,cold pressing, infusion, (filament winding), pultration and SMC-technologies. Features of parts and application.

TEACHING METHODS: Lectures and laboratory work.

PREREQUISITES: Chemistry, Physics, Material Science, Manufacturing processes. Strength of materials

METHOD OF ASSESSMENT: Written examination.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1. Гуняев Г.М. Структура и свойства полимерных волокнистых материалов. Москва, *"Химия"*, (1981). 2.Тростянская Е Б. Пластики конструкционного назначения. Москва, "*Химия*", 1974; 3.Палчев К. и съавтори., Наръчник по преработване на пластмаси, София, Техника, 1980; 4.Табаков П., Полимерни композити, София, Изд.Кл.Охридски, СУ, 1984, 5.Weiss, J., Brod. C. Les materialaux composite, *L'Usine nouvelle*, Paris, (1983), 6. Handbook of Plastic Materials and Technology. I. Rubin ed. A Willey Interscience publ. New York (1990)

DESCRIPTION OF THE COURSE

Name of the course **Technological processes on machine tools with CNC**	Code: **BpME08.1**	Semester: **6**
Type of teaching: Lectures, Laboratory Work	Lessons per semester: L – 30 hours, LW – 30 hours	Number of credits: **5**
Course project (CP)	Code: **BpME14**	Number of credits: **3**

LECTURER:

Asst. Prof. Dr. Sabi Sabev (Faculty of Mechanical Engineering) sabi_sabev@tu-plovdiv.bg;

TU-Sofia, Plovdiv Branch,

COURSE STATUS IN THE CURRICULUM: Compulsory subject in the curriculum for the major "Mechanical and Instrument Engineering", Bachelor's degree.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course the students should be familiar with the technological properties of the metal CNC machine tools HAAS, the principles of designing technological operations and control programs. They should also be able to develop operation technologies and control programs for them.

DESCRIPTION OF THE COURSE: Basic topics: sphere of application and technological properties of metal CNC machine tools; working space and coordinates; structure of the control program and programming moves, dimensions, cutting modes, instruments and auxiliary actions; standard and multiple-thread cycles; parameter programming; specific characteristics of the billet and instruments location; dimension adjustment and sub-adjustment, corrections of the instruments; design of technological operations for lathes and milling machines HAAS.

PREREQUISITES: It is necessary to study in advance or parallel disciplines: Material Science and Technology of Materials, Fundamentals of Design and CAD.

TEACHING METHODS: Lectures visualized by slides and laboratory work with written statements about the research (the observations), the widely used metal CNC machine, which are located in the laboratory of Department of Mechanical Equipment and Technologies.

METHOD OF ASSESSMENT: Written examination on a topic drawn by the student or filling in an examination test-paper covering the whole content of the subject.

INSTRUCTION LANGUAGE: Bulgarian.

BIBLIOGRAPHY: 1. Хаджийски П. Програмиране и настройване на металорежещи машини с ЦПУ, С., ТУ, 2005, 2. Пламен Угринов, Програмиране и настройване на металорежещи машини с ЦПУ София, 2018 г.

DESCRIPTION OF THE COURSE

Name of the course: **External ballistics**	Code: **BpME08.2**	Semester: 6
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: **5**
Course project (CP)	Code: **BpME14**	Number of credits: **3**

LECTURER(S):
Assoc. Prof. Eng. Angel Dimitrov Lengerov, PhD (MIE), tel.:, e-mail: anlen@tu-plovdiv.bg
Technical University of Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Compulsory elective facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialty Mechanical Engineering, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course introduces students to the aerodynamics of asymmetric bodies.

DESCRIPTION OF THE COURSE: Main topics: aerodynamic parameters and flight trajectory of asymmetric bodies.

PREREQUISITES: Theoretical mechanics, resistance of materials, physics, mathematics, thermodynamics, basics of heat transfer.

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: Lectures and laboratory work

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: All available scientific literature sources for external ballistics.

DESCRIPTION OF THE COURSE

Name of the course: **Metrology and measuring equipment II**	Code: **BpME08.3**	Semester: 6
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: **5**
Course project (CP)	Code: **BpME14**	Number of credits: **3**

LECTURER(S):
Assoc. prof. Pavlinka Katsarova, Ph.D, (MIE), e-mail: p_katsarova@abv.bg,
Assist. Prof. Eng. Dimitur Dimitrov PhD, (MIE), e-mail: ddimitrov_tu@abv.bg,
Technical University of Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Mandatory elective from the curriculum for training students for Bachelor's degree, specialty "Mechanical Engineering and Instrumentation", professional field 5.1 Mechanical Engineering, field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Students must acquire knowledge and skills to work with technical means for measuring physical and mechanical quantities, to know the capabilities of modern measuring instruments in this field, as well as to apply what has been learned in the metrological support of various industries.

DESCRIPTION OF THE COURSE: Main topics: Structural and structural-functional means, transmission characteristics; Methods and principles for mass measurement; Methods and principles for measuring forces, moments, pressure and temperature; Measurement of flow and velocity of fluid flows; Methods and principles for measuring time; Speed measuring and measuring instruments; Measurement of mechanical oscillations, etc.

PREREQUISITES: Basic knowledge of "Physics", "Informatics", "Metrology and measuring equipment" and "Measuring transducers".

TEACHING METHODS: Lectures are held with the help of a projector, through which drawings, figures and graphics are presented. During the laboratory exercises various topics are considered under the guidance of the teacher.

METHOD OF ASSESSMENT: Take into account the evaluation of the laboratory exercises and the control in order to form an ongoing evaluation.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Fundamentals of Dimensional Metrology 6 th Edition , by Connie L. Dotson, Jan 1,2015; 2.The Metrology Handbook 2 nd Edition, by Jay L. Bucher , Jul 26, 2012; 3. Metrology Handbook: Understanding the Basics of Metrology, Jan 15,2021; 4. Theory and Design for Mechanical Measurements 6 th Edition, by Richard S. Figliola, Donald E.Beasley, 2020

DESCRIPTION OF THE COURSE

Name of the course: **Transducers in precision engineering**	Code: **BpME09.1**	Semester: **6**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: 4
Course Project (CP)	Code: **BpME14**	Number of credits: **3**

LECTURER(S):
Assoc. Prof. Eng. Misho Matsankov, PhD (FEA), tel.: 032/659 720, e-mail: mishel@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Mandatory elective course from the curriculum for the Bachelor's College of Education, major "Mechanical and Instrumentation Engineering", professional direction 5.1 Mechanical Engineering, area 5. Technical Sciences..

AIMS AND OBJECTIVES OF THE COURSE: Students become familiar with the basic principles of conversion in modern measuring transducers that find application in precision engineering. Their principle of action according to physical quantities, generated signals and areas of application..

DESCRIPTION OF THE COURSE: The most frequently used principle and design schemes of measuring transducers are considered, according to their physical principle of conversion. The peculiarities of static and dynamic characteristics and experimental determination of conversion functions are studied. Attention is paid to the errors of converters and their field of application.

PREREQUISITES: The discipline is based on knowledge acquired in the courses in Physics, Electrical Engineering and Electronics, Mathematics, Analog Circuit Engineering, and Digital Circuit Engineering.

TEACHING METHODS: Lectures are conducted using a multimedia projector. Basic dependencies, schemas, and application areas are presented. Laboratory exercises are conducted with specialized mock-ups and protocol writing.

METHOD OF ASSESSMENT: Two one-hour written midterm and end-of-semester assessments (total 70%), laboratory exercises (30%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Георгиев Н., М. Мацанков, Н. Паунков, Ръководство за лабораторни упражнения по измерване на неелектрични величини, Макрос 2024; 2. Колев Н., Лазаров и колектив. - Електрически измервания, ТУ,2000; 3. Schiessle E. Sensortechnik und mebwertaufnahme, Vogel, 1992; 4. Brindley K., Sensors and transducers, London, 1988; 5. Sincair Ian, Sensor and Transducers, Third edition, British Library Cataloguing in; 6. Мацанков М., Ст. Божков, Ръководство за лабораторни упражнения по измерване на неелектрически величини, ТУ-София 2017г

DESCRIPTION OF THE COURSE

Name of the course: **Internal ballistics**	Code: **BpME09.2**	Semester: 6
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **4**
Course project (CP)	Code: **BpME14**	Number of credits: **3**

LECTURER(S):
Assoc. Prof. Eng. Angel Dimitrov Lengerov, PhD (MIE), tel.:, e-mail: anlen@tu-plovdiv.bg
Technical University of Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Compulsory elective facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialty Mechanical Engineering, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course introduces students to the process of transformation of the chemical energy of gunpowder in the work of expansion in various technical devices.

DESCRIPTION OF THE COURSE: Main topics: properties of gunpowder and solving the right and inverse problems of internal ballistics.

PREREQUISITES: Theoretical mechanics, resistance of materials, physics, mathematics, thermodynamics, basics of heat transfer.

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: Lectures and laboratory work

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: All available scientific literature sources for internal ballistics.

DESCRIPTION OF THE COURSE

Name of the course: **Design methodology**	Code: **BpME10**	Semester: 6
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: **5**
Course project (CP)	Code: **BpME14**	Number of credits: **3**

LECTURER(S):
Assoc. Prof. Dr. Angel Stoilov Poparov, Eng. (Faculty of Mechanical and Instrument Engineering), tel: 359 32 659 617; e-mail: poparan@abv.bg
Technical University-Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Compulsory from the curriculum for Bachelor's degree, specialty "Mechanical Engineering and Instrument Making", professional field 5.1 Mechanical Engineering, field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: is to acquaint students with the basic principles of systematic methods, tools and principles for rational design of machine-building products.

DESCRIPTION OF THE COURSE: Main topics: The essence of design and construction - design as an activity, design tasks; General characteristics of the design process, descriptive and recipe models of the design process, stages of the design process and design work; General methodology of the design process - general characteristics of the design methods, etc.

PREREQUISITES: The knowledge acquired from the training in the courses "Engineering Graphics", "Mechanics" - Part I and II, "Resistance of Materials", "Machine Elements" is required.

TEACHING METHODS: The lectures are presented with the help of video presentations. During the laboratory exercises, tasks are performed in a CAD environment.

METHOD OF ASSESSMENT: The assessment is formed on the basis of the work in the laboratory exercises and by a control test (theoretical and practical part) at the end of the semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Engineering design methods: strategies for product design / Nigel Cross - 3rd ed., ISBN 10:0-471-87250-4, 2000 John Wiley & Sons 2. Eggert, Rudolph J. (2010) Engineering Design, Second Edition, High Peak Press, Meridian, Idaho, ISBN 978-0131433588. 3. Ullman, David G. (2009) The Mechanical Design Process, Mc Graw Hill, 4th edition, ISBN 978-0072975741. 4. Орлов П.И., "Основи конструирования" - книга I, Машиностроение, Москва, 1988; 5. Budynas, R. G., Keith Nisbett, J., 2015, Shigley's Mechanical Engineering Design - Tenth Edition, McGraw-Hill Education, New York, ISBN 978-0-07-339820-4. 6. Mott, R. L., Vavrek, E. M., Wang, J., 2018, Machine elements in mechanical design - Sixth Edition, Pearson Education, Inc., ISBN 10: 0-13-444118-4, NY. 7. Курс: Методология на проектирането копие -МУ (tu-plovdiv.bg)

DESCRIPTION OF THE COURSE

Name of the course: **Engineering logistics**	Code: **BpME11**	Semester: **6**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: 6

LECTURER(S):
Assoc. prof. Pavlinka Katsarova Ph.D , department (MIE), e-mail: p_katsarova@abv.bg,
Assist. Prof. Eng. K. Georgiev, department (MIE), e-mail: k.georgiev@tu-plovdiv.bg,
Technical University-Sofia, branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory course from the curriculum for training students for Bachelor's degree, specialty "Mechanical Engineering and Instrumentation", professional field 5.1 Mechanical Engineering, field 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the training is for students to acquire theoretical and applied knowledge in the field of engineering logistics. Students gain knowledge about the logistics system and methods for moving material flows in different logistics systems. Skills for solving various logistical tasks related to the movement of material flows.

DESCRIPTION OF THE COURSE: Logistics as a science, goals and main tasks are considered. Flows in logistics and logistics operations, The basic principles of movement of material flows in logistics systems. Types of logistics strategies. Methods for planning in logistics. Planning of capacities in logistics. JIT "just in time" concept. The different subsystems in the logistics chain are considered - transport, information, warehousing, supply and finance. In the laboratory exercises students solve various engineering logistics tasks - transport, warehousing and information.

PREREQUISITES: Knowledge of "Mathematics", "KUK", "Physics", "Electrical Engineering", "Machine Elements", "Technology of Mechanical Engineering" and others is required.

TEACHING METHODS: Lectures delivered with the help of presentation of multimedia equipment, slides and videos. Laboratory exercises are the performance of independent applied tasks.

METHOD OF ASSESSMENT: Exam test on the lecture course and the applied tasks. The assessment is formed by 80% of the test and 20% of the independently solved tasks of laboratory exercises.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Записки от лек.курс на водещият преподавател—доц д-р П. Кацарова; 2. Коралиев Я., (2000), Складова логистика, ISBN 954-683-126-3; 3. Казаков Н., (2001), Логистика, ISBN 954-9725-27-8; 4.Македонска, Д., Казаков, Н., Димитров, И., (2001), Основи на логистиката, ISBN 954-90948-1-2

DESCRIPTION OF THE COURSE

Name of the course: **Regulation and control systems**	Code: **BpME12**	Semester: **6**
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 30 hours S – 0 hours LW – 15 hours	Number of credits: **4**

LECTURER(S):
Assoc. Prof. Dr. Borislav Penev (FEA), tel.: 032-659-527, e-mail: bpenev@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 "Mechanical engineering and instrument making", Professional orientation 5.1 "Mechanical Engineering", Field 5 "Technical Sciences".

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to know the basic concepts of the Automatic Control Theory and be able to apply the principles, modelling and methods of the control theory in order to analyze and synthesize controllers and automatic control systems. For that purpose the students are expected to be able to use MATLAB and SIMULINK.

DESCRIPTION OF THE COURSE: The main topics concern: Automatic control systems – introduction; Mathematical models of the linear continuous automatic controls systems: Differential equations, Transfer functions, Block diagrams; Time and frequency domains analysis; Stability: Main definitions; Algebraic and Frequency criteria. Stability margins; Performance; Synthesis of controllers – classical methods.

PREREQUISITES: Mathematics part I, II and III, Physics, Mechanics part 1 and part II, Electronics and Electrical Engineering.

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

METHOD OF ASSESSMENT: Two one-hour written assessments at the mid and the end of semester (80%), laboratory work (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Ищев, К., Теория на управлението, ТУ-София, София, 2002; 2. Ищев, К., Теория на автоматичното управление, ТУ-София, София, 2007; 3. Åström, K. J. and Murray, R. M., Feedback Systems, Princeton University Press, Princeton, New Jersey 08540, 2009; 4. Ищев, Ал., Т. Пулева, Ръководство за лабораторни упражнения по теория на управлението (част1), ТУ-София, 2005; 5. Пенев, Б., Анализ и синтез на примерни системи за автоматично управление на летателни апарати, ТУ-София, Филиал Пловдив, 2006.

DESCRIPTION OF THE COURSE

Name of the course: **Optical technique**	Code: **BpME13.1**	Semester: 5
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: 4
Course project (CP)	none	**none**

LECTURER(S):

Assoc. Prof. Margarita Dineva, PhD (FEA),
Assist.. Prof. Eng. Valeri Bakardzhiev, PhD (FME), tel.:659 519, e-mail:bakardzhiev@tu-plovdiv.bg
Assist. Eng. Georgi Raynov, (FME), tel.: 659 513, e-mail: raynov@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Selectable course from the curriculum for students of Bachelor's degree, specialty "Mechatronics", professional field 5.1 Mechanical engineering, area 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course deals with the basic concepts of optics, the types of optical components and the basic types of optical tools. During the lecture cours, students learn the manufacturing stages of optical components. The course is practical. It develops the logical and analytical thinking necessary for their work as future professionals.

DESCRIPTION OF THE COURSE: Main topics: 'Introduction to the course', 'Geometrical optics', 'Magnifiers, eyepieces and microscopes', 'Lenses', 'Telescopes', 'Optical tools', 'Colorimetry', 'Manufacture of optical components'.

PREREQUISITES: Machine Elements, Theory of Machines and Mechanisms, Engineering Metrology.

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

METHOD OF ASSESSMENT: Written examination (80%), laboratory work (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Иванчев, Н., Алахверджиева, Д. Оптика и оптични уреди, Техника, 1987, София. 2 Brown, N. J., Cook L. M., The role of abrasion in the optical polishing ofmetals and glasses, The Science of Polishing Topical Meeting, Technical, Digest,1984 3. Karow, H, Fabrication methods for precision optics, Wiley, 2004, 768p. ISBN: 978-0-471-70379-2;.

DESCRIPTION OF THE COURSE

Name of the course: **Structure and action of small arms**	Code: **BpME13.2**	Semester: **6**
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. Angel Dimitrov Lengerov, PhD (MIE), tel.:, e-mail: anlen@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory elective facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialty Mechanical Engineering, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course introduces students to the construction and operation of small arms.

DESCRIPTION OF THE COURSE: Main topics: Constructions of automatic small arms.

PREREQUISITES: Theoretical mechanics, resistance of materials, physics, mathematics, thermodynamics, basics of heat transfer.

TEACHING METHODS: Lectures and laboratory work.

METHOD OF ASSESSMENT: Lectures and laboratory work

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: All available scientific literature sources for structure and action of small arms.

DESCRIPTION OF THE COURSE

Name of the course: **Non-destructive testing**	Code: **BpME13.3**	Semester: 6
Type of teaching: Lectures(L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30hours T– hours LW – 15 hours	Number of credits: 4

LECTURER(S):

Assoc. prof. ENG. Pavlinka Katsarova PhD (MIE), e-mail: p_katsarova@abv.bg

Technical University-Sofia, branch Plovdiv

STATUS OF THE COURSE IN THE CURRICULUM: Elective course from the curriculum for training students for Bachelor's degree, specialty "Mechanical Engineering and Instrumentation", professional field 5.1 Mechanical Engineering, field 5. Technical Sciences..

PURPOSE OF THE COURSE: To create in students an understanding and approach for solving various control tasks, as well as practical skills for working with modern methods and devices for measurement and control in mechanical engineering practice

DESCRIPTION OF THE COURSE: The curriculum includes lectures and laboratory exercises. The lectures cover important criteria for the high quality of machine parts related to physical, geometric and functional indicators and technological features. The absence of inadmissible defects such as violation of the integrity of the material, compliance with the physical and mechanical properties and structure of the base material and coating, geometric dimensions and purity of surface treatment. The main aspects of modern production in the conditions of non-destructive testing. The methods used for non-destructive testing such as radiographic control; ultrasonic control; control with penetrating liquids; magnetic dust control; visual control; density control; eddy current control, etc. Laboratory exercises complement the lecture material by relating to the use or demonstration of control methods and instruments used.

PREREQUISITES: Basic knowledge of the previously studied disciplines physics, mechanics, engineering metrology, signal theory and measuring transducers, materials science and design.

TEACHING METHODS: Lectures using slides, POWER POINT presentation and study models, etc. Laboratory exercises using stands, videos and other visual aids.

METHOD OF TESTING AND EVALUATION: Exam

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Попов Александър Безразрушително оценяване на механични свойства на желязовъглеродни сплави, Поредица „Приложна математика и механика”, том трети, Институт по механика-БАН, С. 2013; 2. Харт Х., Въведение в измервателната техника, С., Техника, 1982; 3..сп.“ Инженеринг ревю“ бр. 2-2021г. Damyan Ganchev, Krasimir Staikov Non-Dectructive Testing. Laboratory Exercises, С., издание на авторите (ISBN 978-954-9401-90-5), 2014**;** 4. Стандарти:ISO/TR 25108, БДС EN 4179, EN ISO 9712, ISO 18436-2 и др.