

DESCRIPTION OF THE COURSE

Name of the course: Knowledge of materials and technology of materials – Part III (highly efficient materials)	Code: MpMTT01	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: 4

LECTURER(S):

Assoc. Prof. Eng.Georgi Levicharov, PhD (FME), tel.: 659 624, e-mail: glevi@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory facultative subject from the curriculum for training of students to obtain Master's degree, specialty “Mechanical Engineering Equipment and Technologies”, Professional orientation 5.1 Mechanical engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students should receive basic knowledge about the structure, properties and applications of some new efficient materials used in practice.

DESCRIPTION OF THE COURSE: The main topics concern: Performance of highly efficient materials, innovations in their creation and their processing by plastic deformation. The structure, properties and application of different composite materials - metal, polymer and ceramic bases, as well as some environmental and economic aspects in the implementation of highly efficient materials are considered. The course is based on the modern achievements of physics, chemistry, materials science, etc. basic sciences and is a theoretical basis for the development and implementation in industry of the considered highly effective materials.

PREREQUISITES: Physics, Chemistry, Materials Science.

TEACHING METHODS: Lectures and laboratory with protocols.

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

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Желев А., Б. Александров. Композиционни материали, С., ТУ- София, 1988; 2. Желев А. Матриалознание, техника и технология –Том I, Демакс- София 3. Ashby, F.Jones, D.R.H. Engineering Materials 2 . Pergamon Press, 1992.

DESCRIPTION OF THE COURSE

Name of the course: Knowledge of materials and technology of materials – Part IV (highly efficient technologies)	Code: MpMTT02	Semester: 1
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. Georgi Levicharov, PhD (FME), tel.: 659 624, e-mail: glevi@tu-plovdiv.bg
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COURSE STATUS IN THE CURRICULUM: Compulsory facultative subject from the curriculum for training of students to obtain Master's degree, specialty “Mechanical Engineering Equipment and Technologies”, Professional orientation 5.1 Mechanical engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students should receive basic knowledge for processing materials with non-traditional technologies.

DESCRIPTION OF THE COURSE: The main topics concern: Electron beam processing of materials; interaction of an electron beam with an electromagnetic field, rarefied gases and metal vapors; laser processing; energy sources; physical features; technology of welding sheets of different thicknesses; RP-process; physical foundations of soldering; soldering technology; solder structure: layering of metal and non-metal surfaces; bonding; adhesives; bonding technology.

PREREQUISITES: Materials Science, Knowledge of materials and technology of materials – Part III.

TEACHING METHODS: Lectures and laboratory, using boards, slides, foils and samples.

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

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Желев, Ал. Материалознание. Техника и технология. Том 1: Получаване на машиностроителните материали, С., 1999. Том 2: Технологични процеси и обработваемост. 4. Григорьянц, А. Лазерная сварка металлов, Москва, 1988. Рыкалин, Н. и др. Лазерная и электроннолучевая обработка металлов, М., М-е, 1985 г. Дьюри, У. Лазерная технология и анализ материалов, М., Мир, 1986 г. Steem, W. Laser Material Processing, 2nd ed., Springer Verlag, Berlin, 1998. 11. Fritz, H., Schulze, G. Fertigungstechnik, Berlin, Springer Verlag, 2001. Callister, W. Fundamentals of Materials Science and Engineering, John Wiley and Sons, 2005. Kalpakjian S. Manufacturing processes for engineering materials, Addison-Wesley, 1991.

DESCRIPTION OF THE COURSE

Name of the course: Theory of design of machinery	Code: MpMTT03	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: 5

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory subject in the curriculum for the major “Mechanical Engineering Equipment and Technologies”, Master’s degree..

AIMS AND OBJECTIVES OF THE COURSE: The course treats the theoretical fundamentals of synthesis and analysis of kinematics schemes of cutting aiming at improving the efficiency of the metal cutting machines by expanding their technological properties..

DESCRIPTION OF THE COURSE: The subject treats original technical solutions for treatment by cutting complex profile surfaces. Discussed is the kinematics scheme of cutting for treating profile surfaces, whose analogue (by imposing geometrical and kinematics limitations) is the technological two between the instrument and the billet.

PREREQUISITES: Required basic knowledge of Metals Cutting, Cutting Tools and Metal Cutting Machines.

TEACHING METHODS: Lectures and laboratory work.

METHOD OF ASSESSMENT: Written examination..

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Вачев А. А. Синтез и анализ на кинематични схеми на рязане при въртящи се инструмент и заготовка. ТУ-София, Филиал Пловдив, 1998.

DESCRIPTION OF THE COURSE

Name of the course: Adaptive Control and Active Control in Mechanical Engineering Machining	Code: MpMTT04	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 5

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory for specialty "Mechanical Engineering and Technologies" educational degree "Master".

AIMS AND OBJECTIVES OF THE COURSE: The goal of the course is to give students a solid understanding of the basic principles for control the indicators for efficiency of the machining process, through automatic control, application of the methods for adaptive control and active control..

DESCRIPTION OF THE COURSE: Main topics: Automatic control of the technological process during mechanical processing; Modelling of the technological process; Adaptive control of accuracy; Adaptive control of productivity; Adaptive cost control; Active control before machining process, Active control during machining process; Active control over the outcome of machining the process..

PREREQUISITES: Basic knowledge in Machine tools technologies, Machine tools, Cutting of Materials, Programing of CNC machine tools, CAD/CAM systems, Automation.

TEACHING METHODS: Lectures and laboratory exercises supported by audio, video and multimedia equipment. Active teaching methods, constantly engaging the students, are used..

METHOD OF ASSESSMENT: Assessment at the end of the 1-th term. Three tests and solving practical tasks..

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Георгиев В. С. Салапатева, И. Четроков, А. Ленгеров. Адаптивно управление и активен контрол в машиностроенето. „ЕКС-ПРЕС” Габрово, Пловдив, 2012. 2. Георгиев В. Технология на машиностроенето. Част трета - управление на процеса механично обработване. Издателско полиграфично звено при ТУ-София, филиал Пловдив, 2004. 3. Георгиев В., С. Салапатева, И. Четроков, С. Лилов. Ръководство за лабораторни упражнения по технология на машиностроенето част 3. „ЕКС-ПРЕС” Габрово, Пловдив, 2009. 4.

Groover M. P. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 4th Edition. John Wiley and Sons. 2010.

DESCRIPTION OF THE COURSE

Name of the course: Strength, destruction and computer engineering analysis	Code: MpMTT05	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: 4

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory subject in the curriculum for the major “Mechanical Engineering Equipment and Technologies”, Master’s degree..

AIMS AND OBJECTIVES OF THE COURSE: The curriculum aims at introducing the students from the major of “Machine Building Technics and Technologies” to some of the modern methods of strength and distortion calculations of the machines and the constructions. Some of the aspects of the linear and non-linear fracture mechanics are treated in the curriculum..

DESCRIPTION OF THE COURSE: Basic topics: Introduction – types of fracture, basic terms; Approaches and methods of defining a stress and strain state; System of equations of the elasticity theory; Types of linear and non-linear problems; Matrix methods of defining the stressed and strain state; Structural mechanics method and finite elements method (FEM); FEM in stress and strain analysis of structures; FEM in stress and strain analysis of solids; FEM basic equations; Types of finite elements – degrees of freedom, stiffness characteristics, input data and results; Exceptions of plane stress, plane and axisymmetric finite elements; FEM in stress and strain analysis of plates and shells; FEM in plastic material response and large displacements; Linear fracture mechanics – types of cracks; Defining the stress state in the range of the apex of the crack; Basic parameters of the linear fracture mechanics in static loading; Criteria for the estimation of the crack resistance in static and dynamic effects; Statistical characteristics of the exploitation loadings; Statistical methods in calculations of fatigue in stochastic loading; Estimation of the recourse..

PREREQUISITES: Mechanics, Materials Strength.

TEACHING METHODS: Lectures supported by multimedia, laboratory work, problem solving using CAD-systems..

METHOD OF ASSESSMENT: Examination (70%), laboratory work (30%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Джонов Цв. Компютърни методи за инженерен анализ, ТУ-Габрово, 1996; 2. Атлури С. Вычислительные методы в механике разрушения, Москва, “Мир”, 1990; 3. Биргер И.А. и др., Расчет на прочность деталей машин, Москва, “Машиностроение”, 1979; 4. Нотт Дж. Ф. Основы механики разрушения, Москва, “Металлургия”, 1978; 5. Серенсен С.В., и др., Несущая способность и расчеты деталей машин на прочность, Москва, “Машиностроение”, 1975..

DESCRIPTION OF THE COURSE

Name of the course: Computer Design of Machines, Processes and Systems	Code: MpMTT06	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: 4
Course project (CP)	Code: MpMTT06	Number of credits: 0

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory subject in the curriculum for the major “Mechanical Engineering Equipment and Technologies”, Master’s degree.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course the students should know the basic principles and concepts of working with CAD/CAM system, details design, joint units and machines, as well as preparing technical documentation, preparing control programs for processing the developed detail standards on CNC machines.

DESCRIPTION OF THE COURSE: Basic topics: Details moulding; Moulding of joint units; Positioning and movement of the fit details; Editing the standards in the joint units; Generating technical documentation; Visualizing the standards; Generating control programs for CNC machines; Using libraries with cutting tools and processed details; Editing the generated programs; DNC software..

PREREQUISITES: Technology of Machine Building; Metals Cutting; Cutting Tools; Machine Elements; Metal Cutting Machines; Engineering Graphics..

TEACHING METHODS: Lectures visualized by slides and laboratory work with using CAD/CAM software..

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

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Тодоров Н., Чакърски Д. Автоматизация на проектирането в машиностроенето. София, Техника, 1994 ; 2. Чакърски Д. Тодоров Н., Ръководство за автоматизация на проектирането. София, ТУ, 1991 3. Донков Д., CAD/CAM системи в машиностроенето, Габрово, УИ “В.Априлов”, 2001..

DESCRIPTION OF THE COURSE

Name of the course: Testing and Investigation of Production Equipment	Code: MpMTT07.1	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: 4

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master's degree

AIMS AND OBJECTIVES OF THE COURSE: The subject aims at introducing the students to the standardized testing of production engineering (metal cutting machines, cutting tools) as well as to introduce them to the theory, methodology and the means of investigating the production engineering..

DESCRIPTION OF THE COURSE: The course aims at introducing the students to the types of testing, Moulding during the investigation of Metal cutting machines; Dynamic system of PT. Investigation of linear systems with concentrated parameters; Frequency dynamic characteristics. Experimental investigation of the frequency characteristics; Steadiness of dynamic systems, Elastic system of spindle and carriage assembly; Motion smoothness; Investigation of heat and noise characteristics of manufacturing equipment. The methods and the technical means of carrying out the production engineering investigations are discussed.

PREREQUISITES: Studying the subjects from the Bachelor's degree course - Metal Cutting Machines – Part I and II; Cutting Tools.

TEACHING METHODS: Lectures and laboratory work supported by slides and written statements.

METHOD OF ASSESSMENT: Written examination..

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Тошев И. Изпитване и изследване на металорежещи машини и автоматизирани системи, София, 1989;2. Кудинов В.А. Динамика станков. Москва, Машиностроене, 1967.

DESCRIPTION OF THE COURSE

Name of the course: Electrophysical and Electrochemical Technologies	Code: MpMTT07.2	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: 4

LECTURER(S):

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Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master's degree.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course the students extend their knowledge in the sphere of electrophysical and electrochemical technological processes in details manufacturing.

DESCRIPTION OF THE COURSE: Basic topics: Classification; Physical basics and technological characteristics of the treatment of detail surfaces by electrical-erosion destruction and lamination; Electrochemical dissolving by supersonic and ray energy effect; Electric impulse and magnetic field and combined methods; Technological properties, characteristics of the realization of the methods, the effect of the main technological factors on the quality indices of the treated surfaces; Characteristics of the use of the machines and the equipment; Setting the particular machines and equipment for operation and development of technological processes for detail treatment.

PREREQUISITES: Materials Science and Technology of Materials; Metrology and Measuring Equipment; Physics; Electrical Engineering; Technology of Machine Building.

TEACHING METHODS: Lectures visualized by slides and laboratory work with written statements about the results from the researches (the observations).

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

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Георгиев А. П. Електрофизични и електрохимични технологии в машиностроенето, Печатна база, ВМЕИ, С., 1989, 1994; 2. Георгиев А. П., Д. П. Патарински, Д. К. Станков. Ръководство за лабораторни упражнения по електрофизични и електрохимични технологии в машиностроенето, С., 1991, Печатна база – ТУ; 3. Динев, П. Д. Електрофизични и механични технологии. С., 1991, Печатна база – ТУ; 4. Артамонов Б. А. и др. Електрофизические и электрохимические методы обработки материалов, том 1 и 2, Высшая школа, М., 1983.

DESCRIPTION OF THE COURSE

Name of the course: Theoretical Foundations of Treatment by Plastic Distortion	Code: MpMTT07.3	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T))	Hours per semester: L – 30 hours T – 0 hours LW – 30 hours	Number of credits: 4

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master's degree.

AIMS AND OBJECTIVES OF THE COURSE: Studying the topics in the curriculum aims at giving more profound knowledge to the students in the sphere of the theory of metals treatment by plastic distortion and their application in solving engineering problems concerned with various technological processes..

DESCRIPTION OF THE COURSE: Basic topics: Method of the average values – defining the strained state and the distortion strengths during pressing, extension and milling; Method of the sliding lines – properties and defining the strained state during wedging swages in, flattening, pressing, extension and milling; Method of the upper marks – investigation of the plastic distortion processes..

PREREQUISITES: Metal Treatment by Plastic Distortion, Mathematics, Materials Strength.

TEACHING METHODS: Lectures and laboratory work with written statements about the calculations results.

METHOD OF ASSESSMENT: Written examination.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Тошев И. Изпитване и изследване на металорежещи машини и автоматизирани системи, София, 1989;2. Кудинов В.А. Динамика станков. Москва, Машиностроене, 1967.

DESCRIPTION OF THE COURSE

Name of the course: Theory of casting processes	Code: MpMTT08.1	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 3

LECTURER(S):

Assoc. Prof. Boyan Dochev PhD (FME) e-mail: dochev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master's degree, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to provide basic theoretical knowledge about the processes of melting, crystallization, solidification of castings and the occurrence of internal stresses in castings. Introduction to the mechanisms of modification of light alloys by using conventional and new modifiers.

DESCRIPTION OF THE COURSE: The mechanisms of melting of metals and alloys, the energetic conditions for the crystallization process, formation and growth of crystals, the formation of the structure of castings are examined. New concepts of metal melts are examined, as well as the influence of various modifiers on the structures of light alloys. The mechanisms for the occurrence of internal stresses and their consequences on the quality of castings are discussed.

PREREQUISITES: Materials Science, Physics, Chemistry, Foundry production technology.

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: Written examination and discussion.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Ангелов Г. – “Технология на лярското производство”, ДИ - Техника, София 1988 г. 2. Галдин Н. М., Д. Ф. Чернега и др. – “Цветное литье” Москва, Машиностроение, 1989 г. 3. Баландин Г.Ф., “Основы теории формирования отливки”, Москва, Машиностроение, 1979 г. 4. “Усадочные процессы в сплавах и отливках”.

DESCRIPTION OF THE COURSE

Name of the course: Technology of Automated Production	Code: MpMTT08.2	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 3

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master's degree..

AIMS AND OBJECTIVES OF THE COURSE: The subject aims at giving the future Masters of Engineering the necessary knowledge of designing automated production processes.

DESCRIPTION OF THE COURSE: The design of technological operations on metal cutting semi-automatic machines, automatic machines, aggregate machines, automated technological lines, automated technological modules and GAPS is studied. The following issues are clarified: the characteristics, the sequence of the treated surfaces, the automation of control in the motion of the technological process, as well as the necessary equipment.

PREREQUISITES: Technology of Machine Building, Technological Equipment; Metal Cutting Machines; Metals Cutting.

TEACHING METHODS: Lectures visualized by slides and laboratory work with written statements about the results from the researches (the observations).

METHOD OF ASSESSMENT: Written examination with additional specific questions – orally.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1.Технология автоматизированного машиностроение; Проектирование технологии, под ред. Соломенцева Ю.М., Машиностроение, М., 1990; 2.Митрофанов С.П., Групповая технология машиностроительного производство, Машиностроение, Санкт Петербург, 1983, том 1 и том 2; 3.Гусев А.А. и др. Технология машиностроение, М., 1986.; 4.Пашов Ст.К. Технология на машиностроенето, част I, С., ТУ, 1997, 1990.; 5.Ръководство за курсово проектиране по Технология на машиностроенето, под ред. на П.Д.Патарински, С., Техника, 1981.

DESCRIPTION OF THE COURSE

Name of the course: Quality Control and Management	Code: MpMTT09.1	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 3

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master's degree..

AIMS AND OBJECTIVES OF THE COURSE: After completing the course the students should know the main principles and methods of quality management of machine building articles in the process of their manufacturing..

DESCRIPTION OF THE COURSE: Basic topics: Improving the quality; Diagnostics of quality; Quality control and factors determining the control efficiency; Control and regulation of the processes with control cards; Statistical receiving control; Output reliability; Ensuring the quality in product design; Systems of quality management; The human aspect in quality management.

PREREQUISITES: Metrology and Measurement Equipment; Technology of Machine Building; Industrial Management..

TEACHING METHODS: Lectures visualised by slides and laboratory work with written statements about the results from the researches (the observations)..

METHOD OF ASSESSMENT: Currents control consisting in two test-papers..

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Корийков Ц. Управление на качеството, Русе, 1998; 2. Кузманов Т. Технологически основи на управление на качеството на машиностроителните изделия, ТУ-Габрово, 1991; 3. Под ред. на Георгиев В. Контрол и управление на качеството в машиностроенето-ръководство за упражнения, ТУ-София, Филиал Пловдив, 2004..

DESCRIPTION OF THE COURSE

Name of the course: Automated Manufacture Complexes and Flexible Automated Manufacturing Systems	Code: MpMTT09.2	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 3

LECTURER(S):

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COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master's degree..

AIMS AND OBJECTIVES OF THE COURSE: After completing the course the students should know the different methods of manufacture automation and the principles of constructing automatic technological modules, lines and complexes.

DESCRIPTION OF THE COURSE: Basic topics: Automation of production – problems, perspectives of development, requirements for the elements of the automatic complexes; Prerequisites and criteria for the construction of automated lines; Theoretical fundamentals, productivity, methods of exploitation and moulding the automated complexes; Essence, use, characteristics and construction of flexible automated manufacture systems (FAMS)..

PREREQUISITES: Higher Mathematics; Theoretical Mechanics; Theory of Mechanisms and Machines; Metal Cutting Tools; Technology of Machine Building; Automation of the Machine Building Production.

TEACHING METHODS: Lectures visualised by slides and laboratory work with written statements about the results from the researches (the observations)..

METHOD OF ASSESSMENT: Currents control consisting in two test-papers or checking the knowledge by a test..

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Гановски В., Д.Дамьянов, Д.Чакърски. Основи на автоматизацията, роботизацията и ГАПС. С. “Техника”, 1994. 2. Под ред. на Гановски В. Автоматизация на дискретното производство. С. “Техника”, 1995. 3. Гановски В. и др. Автоматизация на производствените процеси с манипулатори и роботи., С. “Техника”, 1995. 4. Кузнецов М., Л. Волчкевич. Автоматизация производственных процессов. М. “Высшая школа”, 1978; 5. Дамьянов Д. и др. Ръководство по ОАР и ГАПС. С. “Техника”, 1992. 6. Гановски В., И. Бояджиев, Л. Ключков. Автоматични линии. С. “Техника”, 1989. 7. Козырев Ю., Промышленные Роботы. М. “Машиностроение”, 1986..

DESCRIPTION OF THE COURSE

Name of the course: Heat and Mass Transfer in Material Processing	Code: MpMTT09.3	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 3

LECTURER(S):

Assoc. Prof. Boyan Dochev PhD (FME) e-mail: dochev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master’s degree.

AIMS AND OBJECTIVES OF THE COURSE: To extend the knowledge of the students about the physical fundament regarding the hot processing of materials.

DESCRIPTION OF THE COURSE: Basic topics: Transfer characteristics of fluids; diffusion; distortion and rotation of fluid fractions; fluxional equations for transfer processes; theory of similarity; methods of moulding; transfer processes with phase change; inter-phase surface: geometry and border conditions of motion, heat and diffusion flow; transport phenomena in materials manufacturing and processing.

PREREQUISITES: Materials Science and Technology of Materials – Part III and IV.

TEACHING METHODS: Lectures and laboratory work visualised by slides, foil, tabloids and samples.

METHOD OF ASSESSMENT: Three marks on test-papers in the beginning, the middle and the end of the semester (25 %), laboratory work (25 %).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Дойчев К. Металургичн топлотехника. Част 1, С., Техника, 1980; 2. Попов М., Л. Панов. Хидро и газодинамика, София, Техника, 1980; 3. Лойцянский Г. Механика жидкости и газа, Москва, Наука, 1973; 4. Г. Шлихтинг. Теория пограничного слоя, Москва, Наука, 1974; 5. Сендов С. Тепло- и масопренасянае. С., Техника, 1983; 6. Милчев В. и др. Топлотехника. С., Техника, 1989; 7. Берд Р. и др. Явления переноса, М., Химия, 1974; 8. Генчев Г. и др. Механика на флуидите, София, ТУС, 1991; 9. Callister W. Fundamentals of Materials Science and Engineering, John Wiley and Sons, 2005; 10. Kou S. Transport phenomena in materials processing, John Wiley and Sons, N. Y., 1996. Bird, R. Transport phenomena, 2nd ed.

DESCRIPTION OF THE COURSE

Name of the course: Ensuring the manufacturability of mechanical engineering products	Code: BMpMTT11.1	Semester: 2
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: 3

LECTURER(S):

Assoc. Prof. Eng. Angel Lengerov, PhD (FME), tel.: 659 624, e-mail: anlen@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master's degree, Professional orientation 5.1 Mechanical Engineering, Field 5 Technical Sciences..

AIMS AND OBJECTIVES OF THE COURSE: After completing the course, students should be able to understand the methods for assessing and ensuring the manufacturability of the design of mechanical engineering products. It is necessary to develop skills and habits necessary for mechanical engineers carrying out design and technological activities.

DESCRIPTION OF THE COURSE: General information on the manufacturability of the design of products, basic indicators of the manufacturability of mechanical engineering products, as well as the starting blanks for their production. Assessment of the influence of the manufacturability of the design of parts on labor productivity. Assessment of the manufacturability of the design of parts during assembly, control and testing of products.

PREREQUISITES: Manufacturing technologies, Technological equipment

TEACHING METHODS: Lectures, using slides, case studies, seminars, protocols.

METHOD OF ASSESSMENT: Written examination.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Pashov St.K. Technology of mechanical engineering, part 2. IPK TU - Sofia, 1993; 2. Pashov St., P. Hadzhiyski. Technology of mechanical engineering part 1. IPK TU - Sofia, 1997. ISBN 954-438-203-8; 3. Patarinski P. Technology of mechanical engineering part II and III, S., Technika, 1979; 4. Gatev G.K., V.I. Georgiev. Manual for laboratory exercises in mechanical engineering technology. Sofia, "Technika", 1987; 5. Edited by Pashov St. K. Handbook of the technologist of mechanical processing, volume 1. S., "Technika", 1989; 6. Edited by Pashov St. K. and P. Petkov. Handbook of the technologist of mechanical processing, volume 2. S., "Technika", 1990

DESCRIPTION OF THE COURSE

Name of the course: Metal Cutting Automatic Devices and Systems	Code: MpMTT11.2	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 3

LECTURER(S):

Assoc. Prof. Eng. Iliya Chetrokov, PhD (FME), tel. +359 32 659 616;
e-mail: chetrokov@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master's degree.

AIMS AND OBJECTIVES OF THE COURSE: The course aims at giving the future students knowledge about the principles of the manufacture of metal cutting automatic devices, types of automatic devices, control systems and their management.

DESCRIPTION OF THE COURSE: The course extends the knowledge of the constructions, exploitation and setting the metal cutting machines and systems. The types of motion and their realization mechanisms, the types of automatic devices and the composing of the cyclograms for their operation, analysis and synthesis of the automatic device control, design of control the mill-cogs are discussed. The issues of automatic and semi-automatic devices with centralized and consecutive control are discussed. Automatic devices and automated systems for semi-batch production are discussed at the end of the course.

PREREQUISITES: Studying the following subjects from the Bachelor's course: Metal Cutting Machines – Part I and II, Drive and control of Production Equipment.

TEACHING METHODS: Lectures and laboratory work supported by slides, video tapes and written statements.

METHOD OF ASSESSMENT: Written examination.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Караколов Л. Металорежещи автомати, София, Техника, 1982; 2. Мишев Г. Металорежещи машини, Пловдив, 2000; 3. Любенов Ал., С.Сяров, П.Петков. Ръководство за лабораторни упражнения по металорежещи машини, София, Техника, 1988.

DESCRIPTION OF THE COURSE

Name of the course: Modern methods of thermo-chemical treatment	Code: MpMTT11.3	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 3

LECTURER(S):

Assoc. Prof. Eng. Georgi Levicharov, PhD (FME), tel.: 659 624, e-mail: glevi@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory optional course for students majoring in Mechanical Engineering Equipment and Technologies, Master's degree.

AIMS AND OBJECTIVES OF THE COURSE: The subject aims at acquainting students with the most popular methods of changing metals and their alloys.

DESCRIPTION OF THE COURSE: The students gradually become acquainted with the processes of vacuum and thermo-chemical treatment of metals and their alloys. The vacuum diffusion metallization as a basic method for forming layers is considered. Special attention is paid to the ion type implantation, the laser treatment and the detonation gas method, as processes, causing changes in the structure and the surface properties of the materials.

PREREQUISITES: Required knowledge in Physics, Chemistry, Materials Science and Heat Processing from the Bachelor's course.

TEACHING METHODS: Lectures and laboratory work supported by tabloids, slides, written statements, etc.

METHOD OF ASSESSMENT: Written examination.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Мичев В., В. Тошков, М. Димитров, Химико-термично обработване на стомани. София, Техника, 1981. 2. Кънев М. и др. Вакуумно метализиране. С., Техника 1986. 3. Конрад Х., Р. Крапиц, Електротехнология, превод от немски, С., Техника, 1990. 4. Бучков Д., В. Тошков, Йонно азотиране. С., Техника, 1990.

DESCRIPTION OF THE COURSE

Name of the course: Optimisation Methods in Technological Preparation of Production	Code: MpMTT12.1	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 3

LECTURER(S):

Assoc. Prof. Eng. Iliya Chetrokov, PhD (FME), tel. +359 32 659 616;

e-mail: chetrokov@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Optional subject in the curriculum for the major “Mechanical Engineering Equipment and Technologies”, Master’s degree.

AIMS AND OBJECTIVES OF THE COURSE: After completing the course the students should be familiar with the basic principles and methods of manufacturing standards of the technological process and to optimize its structure.

DESCRIPTION OF THE COURSE: Basic topics: Structure and stages of the technological preparation of the production (TPP); Standardizing the processes of TPP; Optimization problems of the technological process design; Optimization by linear programming; Optimization by non-linear programming; Optimization by dynamic programming; Multi-criteria optimization.

PREREQUISITES: Higher Mathematics; Materials Cutting; Metal Cutting Machines; Technological Equipment; Technology of Machine Building; Industrial Management.

TEACHING METHODS: Lectures visualized by slides and laboratory work with written statements about the results from the researches (the observations).

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

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Георгиев. В., И. Бачкова, Т. Кузманов, С. Салапатева, И. Четров. Оптимизационни методи при технологичната подготовка на производството, Издателство „Екс-прес”, Габрово, 2009. ISBN 978-954-490-055-7. 2. Цонков С. Управление на сложни производствени системи. С., “Техника”, 1989; 3. Синхг М., А. Титли. Системи декомпозиция, оптимизация и управление. М. “Машиностроение”, 1986; 3. Георгиев В., Ст. Пашов. Технология на машиностроенето. ТУ-София, Филиал Пловдив, 2003.

DESCRIPTION OF THE COURSE

Name of the course: Kinematics and Strength Calculations of Metal Cutting Machines	Code: MpMTT12.2	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 3

LECTURER(S):

Assoc. Prof. Eng. Angel Poparov, PhD (FME), tel.: 359 32 659 617, e-mail: poparan@abv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Optional subject in the curriculum for the major “Mechanical Engineering Equipment and Technologies”, Master’s degree.

AIMS AND OBJECTIVES OF THE COURSE: The subject aims at giving the students knowledge about the new trends in the development and the construction of metal cutting machines.

DESCRIPTION OF THE COURSE: The course expands the students’ knowledge about the new trends in the development of metal cutting machines – machines with parallel kinematics, the high-speed cutting machines, and the combine machines. The new constructions, bodies, guiding and spindles of metal cutting machines, the new drive and control of the machines are discussed. The calculations of the main machine meetings are given.

PREREQUISITES: Studying the following subjects from the Bachelor’s course: Machine tools – Part I and II, Control of Production Equipment.

TEACHING METHODS: Lectures and laboratory supported by slides, video tapes and written statements.

METHOD OF ASSESSMENT: Written examination.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1.Weck M. Konstruktion von Spindel-Lager-Systemen fuer die Hochgeschwindig-keitsMaterialbearbeitung, Expert Verlagq 1989 2.Schulz H. Hochgeschwindigkeitsfraesen metallischer und nichtmetallischer Werkstoffe, Carl Hauser Verlag Muenchen Wien, 1989.

DESCRIPTION OF THE COURSE

Name of the course: Theory of Welding Processes	Code: MpMTT12.3	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: 3

LECTURER(S):

Assoc. Prof. Eng. Georgi Levicharov, PhD (FME), tel.: 659 624, e-mail: glevi@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Optional subject in the curriculum for the major “Mechanical Engineering Equipment and Technologies”, Master’s degree.

AIMS AND OBJECTIVES OF THE COURSE: To extend the theoretical knowledge of the students about the welding of the materials.

DESCRIPTION OF THE COURSE: Basic topics: Diffusion processes and basic objectives; Welding arc: construction, cathode and anode processes; Processes in the pole of the arc; Self-regulation; Temperature field in a solid body, disk, flat layer and pole of heating by point source; Convection and evaporation in the welding pool; Liquation and pores; Constitutional supercooling; Initial crystallization; Grain growth; The effect of the welding mode on the structure; Phase transformations in the weld metal; Hot cracks; Zone of partial melting; Heat affected zone in low alloy and stainless steels, Al- and Ni-alloys.

PREREQUISITES: Materials Science, Technology of Materials – Part III and IV.

TEACHING METHODS: Lectures and laboratory visualized by tabloids, slides, folio and samples.

METHOD OF ASSESSMENT: Three marks on test-papers in the beginning, the middle and the end of the semester (25 %), laboratory work (25 %).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Прохоров, Н. Физические процессы в металлах при сварке, М. Металлургия, 1976; 2. Ленивкин, В. и др. Технологические свойства сварочной дуги в защитных газах, М., Машиностроение, 1989; 3. Лившиц, Л., Хакимов, А. Металловедение сварки и термическая обработка сварных соединений. М., Машиностроение, 1989; 4. Петров, Г., Тумарев, А. Теория сварочных процессов. М., Высшая школа, 1977; 5. Фролов, В. и др. Теоретические основы сварки. М., Высшая школа, 1970; 6. Багрянский, К. Теория сварочных процессов. М., Машиностроение, 1968; 7. Kou, S. Welding metallurgy. John Wiley & Sons, N. Y., 1987; 8. Kou, S. Transport phenomena in materials processing, John Wiley and Sons, N. Y., 1996; 9. Callister W. Fundamentals of Materials Science and Engineering, John Wiley and Sons, 2005.