DESCRIPTION OF THE COURSE

Name of the course: **Mathematics III**	Code: **MAT31**	Semester: **3**
Type of teaching: Lectures (L) Tutorials (T)	Hours per semester: L – 30 hours T– 30 hours	Number of credits: **6**

LECTURER(S):
Assoc. Prof. Vasil Petrov, PhD (FME), tel.: 032 659 680, e-mail: vasil_petrov@tu-plovdiv.bg
Assist. Prof. Radka Koleva, PhD (FME), tel.: 032 659 651, e-mail: rkoleva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialties Mechanical Engineering and Instrumentation, Mechatronics, Computer Modelling and Mechanical Engineering, Professional orientation 5.1 Mechanical engineering; specialties Transport Machinery and Technology, Aeronautical Engineering, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Familiarization the students with basic parts of the mathematical analysis and neighbour mathematical disciplines necessary for application disciplines.

DESCRIPTION OF THE COURSE: The main topics concern: Series, function series and Fourier series. Some notions and basic theorems from the field theory – stream, divergence, circulation, rotation of the vector field, Theorems of Green, Gauss and Stokes. Theorem for the independence of the integral from the path; Function of one complex variable – limit of function, continuity, derivative of function of one complex variable, analytic function. Cauchy-Riemann conditions (equations), conformal mapping. Integration in the complex domain – linear integral, Cauchy integral theorem, Cauchy integral formula and formula for derivatives. Power series expansion of general analytic function (Taylor series). Classification of the isolated singularities and definition of Laurent series and residues. Theorem for the residues. Application of residues to evaluation of real integrals; Foundations of the operational calculus – Laplace transform – basic properties and theorems. Applications – solving some classes differential and integral equations.

PREREQUISITES: Very good training in Mathematics I and II.

TEACHING METHODS: Lectures and Tutorials.

METHOD OF ASSESSMENT: Written examination.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: : 1. Колектив на ИПМИ, Висша математика, части III и IV, Техника, 1986, 2. Колектив на ИПМИ, Избрани глави от математиката, Модули I – V, ТУ–София, 1993, 3. Колектив на ИПМИ, Сборник от задачи по висша математика, IV част, 1979, 4. Маринов М.С. Аналитични функции. Редове на Фурие. Интегрални трансформации, ТУ–София, 1996.

DESCRIPTION OF THE COURSE

Name of the course: **Mechanics II**	Code: **MEC02**	Semester: **3**
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: **7**

LECTURER(S):
Assoc. Prof. Eng. Raycho Raychev, PhD (FME), tel.: 0895581138,
e-mail: rpraichev@tu-plovdiv.bg
Assist. Prof. Eng. Chavdar Pashinski, PhD (FME), tel.: 0878302513, e-mail: pashinski@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialties Mechanical Engineering and Instrumentation, Mechatronics, Computer Modelling and Mechanical Engineering, Professional orientation 5.1 Mechanical engineering; specialties Transport Machinery and Technology, Aeronautical Engineering, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course builds engineering and technical culture in students and develops knowledge and skills for independent work and engineering assessment of various types of technical problems. The exercises expand the practical knowledge and skills in the studied discipline.

DESCRIPTION OF THE COURSE: The main topics concern: Basic concepts and laws in dynamics. Dynamics of free and non-free particle - differential equations of motion. Straight and inverse task; Mechanical vibrations - free undamped and damped vibrations. Vibrations in environments with and without resistance. Dynamics of the relative motion of particle; Dynamics of mechanical systems - differential equations of motion. Geometry of masses; General theorems of dynamics; Dynamics of an ideal rigid body - translational, rotational and planar motion.

PREREQUISITES: Mathematics, Physics.

TEACHING METHODS: Lectures, using slides. Laboratory exercises are performed in a computer class using specialized software. Course work description and defence.

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

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. **1.** С. Бъчваров, Механика II част, София, 2011; А. Писарев, Ц. Парасков, С. Бъчваров, Курс по теоретична механика II част, Техника, 1975; И. Иванов, Техническа Механика, изд. Христо Г. Данов, 1974.

DESCRIPTION OF THE COURSE

Name of the course: **Strength of materials**	Code: **MEC03**	Semester: **3**
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 45 hours LW – 30 hours	Number of credits: **7**

LECTURER(S):
Assoc. Prof. Eng. Pepo Yordanov, PhD (FME), tel.:032 659 514, e-mail: piyordanov@tu-plovdiv.bg
Assoc. Prof. Eng. Raycho Raychev, PhD (FME), tel.: 032 659 623, e-mail: rpraichev@tu-plovdiv.bg
Assist. Eng. Ivanka Delova, (FME), tel.: 032 659 623, e-mail: ivankadelova@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialties Mechanical Engineering and Instrumentation, Mechatronics, Computer Modelling and Mechanical Engineering, Professional orientation 5.1 Mechanical engineering; specialties Transport Machinery and Technology, Aeronautical Engineering, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The students must acquire knowledge in stress-strain analysis of parts and structures which is needed for studying of special subjects as well as learn practical methods for strength design of beams and bars.

DESCRIPTION OF THE COURSE: The main topics concern: Main principles and hypothesis; Geometrical characteristics of plane figures; Internal forces in straight beams, and planar frames; Design in case of: pure tension (compression), pure bending, unsymmetrical bending, combination of bending and tension (compression), bending and shearing (transverse loading), pure torsion, bending and torsion; State of stress at a point; Hooke's law; Conditions for strength in case of complex stress; Buckling of compressed bars; Materials fatigue; Introduction to computer methods in engineering.

PREREQUISITES: Mathematics, Physics, Material science, Mechanics.

TEACHING METHODS: Lections and laboratory work according to the classical method and/or multimedia presentations. Course work description and defence.

METHOD OF ASSESSMENT: During the semester, the defense of correctly solved tasks from the course work is evaluated. Exam consisting of two problems and two theoretical questions.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1.Н. Николов, Съпротивление на материалите, Авангард Прима, София, 2017 ISBN 978-619-160-831-7. 2. Р. Стефанов, П. Йорданов, Зл. Златанов, Съпротивление на материалите – ръководство за решаване на задачи, Пловдив, 2007, ISBN – 978-954-8779-93-7. 3. П. Йорданов, Р. Стефанов, М. Ташев, Съпротивление на материалите – задачи за самостоятелна подготовка, Пловдив, 2007, ISBN – 978-954-8779-95-1, 4. Р. Стефанов, П. Йорданов, Курсови задачи по съпротивление на материалите, ТУ - София, филиал Пловдив, 2002, ISBN 954-8779-32-3. 5. М. Ташев, П. Йорданов, Инженерен анализ с метода на крайните елементи, Екс-Прес, Габрово, 2012, ISBN – 978-954-490-350-3.

DESCRIPTION OF THE COURSE

Name of the course: **Engineering Graphics**	Code: **ENG02**	Semester: **3**
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30 hours LW – 45 hours	Number of credits: 6

LECTURER(S):
Assist. Prof. Eng. Adelina Vasileva, PhD (FME), tel.: 659 590, e-mail: adelina.bogoeva@ tu-plovdiv.bg
Assist. Eng. Nikolai Paitakov (FME), tel.: 659 590, e-mail:-
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialties Mechanical Engineering and Instrumentation, Mechatronics, Computer Modelling and Mechanical Engineering, Professional orientation 5.1 Mechanical engineering; specialties Transport Machinery and Technology, Aeronautical Engineering, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The Engineering Graphics course aims to develop students' spatial thinking and technical culture. It provides the necessary minimum of knowledge for building and reading the images of machine-building products in the technical drawings. The student acquires knowledge and skills in mechanical engineering, making his own design drawings and text documents of the products in compliance with all important requirements of the standards in this field, necessary for the next design disciplines in engineering training.

DESCRIPTION OF THE COURSE: The main topics concern: Basic positions of the graphical representation of geometric objects on a plane. Types of design. Monge design. Mutual position of geometric objects. Transformation of projections. Depiction of lines, surfaces and bodies. Plain sections. Intersection of surfaces and bodies. Axonometric design. Standardization of graphic information. Technical drawings. Design documents of the details. Accuracy of dimensions and surfaces of details. The theory and practice of Engineering Graphics are considered together with a course on Tolerances and Assemblies. The methods for depiction of details and assembled units and for execution of their design and text documents in compliance with over 150 standards of ESKD are covered. The principles and methods of geometric and functional sizing of the products are considered, incl. with the application of the main types of tolerances and joints. Students will acquire skills for developing a set of working design documentation, as well as for the implementation of the basic documents of a set of design documentation. More in-depth skills are created for the application of the current CAD systems in the automated execution of a detailed and assembled drawing of a set of documentation.

PREREQUISITES: Knowledge and methods are used in the discipline "Mathematics" on the basis of which methods are developed for solving problems in the field of applied geometry and engineering graphics.

TEACHING METHODS: Lectures, assisted by drawings, slides, boards. Laboratory exercises. Course work in which specific problems in the field of applied geometry are solved.

METHOD OF ASSESSMENT: Continuous assessment, point system of control works, course work.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1.Сандалски Б., П. Горанов, Г. Динев, И. Николова Основи на конструирането и CAD, София, СОФТТРЕЙД, 2008; 2. Туджаров Б., Е. Тодорова, Д. Колева, М. Янчева

“Ръководство за упражнения и курсова работа по Основи на конструирането и CAD I, София, СОФТТРЕЙД, 2008; 3. Инженерна графика А. Стоев, Е. Златанова, П. Горанов 2004; 4. Тихомир Гр. Василев „Справочник по технически чертежи“, Steno ISBN: 978-954-449.

DESCRIPTION OF THE COURSE

Name of the course: **Internet Technologies**	Code: **CCE24**	Semester: **3**
Type of teaching: Lectures (L) Tutorials (T)	Hours per semester: L – 15 hours T– 15 hours	Number of credits: **3**

LECTURER(S):
Assoc. Prof. Maria Marinova, PhD (FEA), tel.: 032 659 728, e-mail: m_marinova@tu-plovdiv.bg,
Assist. Prof. Veselka Dimitrova, PhD, tel.: 659 754, e-mail:vpetrova@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialties Mechanical Engineering and Instrumentation, Mechatronics, Computer Modelling and Mechanical Engineering, Professional orientation 5.1 Mechanical engineering; specialties Transport Machinery and Technology, Aeronautical Engineering, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is for students to get acquainted with and use Internet technologies. Understand the network structure of the Internet, the ISO model, the basic protocols used such as HTTP, TCP / IP, Internet addresses and the name system; applications for cooperation and exchange of information, Internet services, means of protection.

DESCRIPTION OF THE COURSE: The main topics concern: Internet Basics – Internet Network structure; network standards, ISO Model, HTTP, TCP/IP, Internet Addressing, Internet Domain Name Server, WWW, Client and Servers; Electronic Mail Basics; World Wide Web and Website Development – Web pages, Web Browsers, Web Servers, Search Engines, Proxy Servers, Website Designing, Website Publishing, Website Hosting, Website Security; Internet collaboration – Mailing List, Social Networking, Web Conferencing, Webinars, Online Education; Internet Security – Firewall Security, Data Encryption; Internet Web Programming – HTML, CSS, Java Script, PHP, ASP etc.

PREREQUISITES: Information and Communication Technologies.

TEACHING METHODS: Lectures, Lectures, using slides, case studies. Tutorials.

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (72%), laboratories (28%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Кирил Боянов, Компютърни мрежи. Интернет, „Котларски - Диков“, София, 1998, ISBN 954-9713-01-7; 2. Любен Боянов, Кирил Боянов, Христо Турлаков и др. Компютърни мрежи и телекомуникации; Авангард Прима; 2014, ISBN: 9786191602575; 3. Internet technologies overview

http://user.engineering.uiowa.edu/~ie181/Documents/Section1-Text.pdf; 4. Learn Internet Technologies https://www.tutorialspoint.com/internet_technologies/index.htm.

DESCRIPTION OF THE COURSE

Name of the course: **Sport**	Code: **SPR03**	Semester: **3**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW) Self-Study (SS)	Hours per semester: L – 0 hours T – 0 hours LW – 0 hours SS – 30 hours	Number of credits: **1**

LECTURER(S):

Sen. Lect. Daniel Vladimdirov, PhD (FEA), Tel.: 032 659 646, E-mail: danielv@tu-plovdiv.bg,

Sen. Lect. Petar Doganov, PhD (FEA), E-mail: pdoganov@tu-plovdiv.bg,

Sen. Lect. Boris Spasov, PhD (FEA), E-mail: boris_spassov@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialty „Mechanical Engineering and Instrumentation“, „Mechatronics“, „Computer Modelling and Mechanical Engineering“, Professional orientation 5.1 Mechanical engineering; „Transport Machinery and Technology“, „Aeronautical Engineering” Professional orientation“ 5.5 Transport, Navigation and Aviation, „Intelligent systems and artificial intelligence“, „Industrial Management“, „Graphic Design and Printing“, Professional qualification 5.13 General Engineering, Professional 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 – 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 – 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 and “Pass grade.

INSTRUCTION LANGUAGE: Bulgarian

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

DESCRIPTION OF THE COURSE

Name of the course: **Machine elements**	Code: **MEC04**	Semester: **4**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 45 hours T-15 hours LW – 30 hours	Number of credits: **7**
Course project (CP)	Code: **MEC07**	Брой кредити: **3**

LECTURER(S):
Assist. Prof. Eng. Valeri Bakardzhiev, PhD (FME), tel.: 032 659 519,
e-mail: bakardzhiev@tu-plovdiv.bg
Assist. Prof. Eng. Dimitar Dimitrov, PhD (FME), tel.: 032 659 517,
e-mail: ddimitrov_tu@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialty „Mechanical Engineering and Instrumentation“, „Mechatronics“, „Computer Modelling and Mechanical Engineering“, Professional orientation 5.1 Mechanical engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course has a constructive focus and aims to acquaint students with the elemental basis of modern machines, as well as to form knowledge and skills for functional and robust calculation, selection and construction of machine elements.

DESCRIPTION OF THE COURSE: The main topics concern: General purpose machine elements are studied, such as detachable and non-detachable joints, elastic elements, axles and shafts, sliding and rolling bearings, clutches, mechanical gears. The basic principles of the construction of machine-building products are presented, based on criteria for operability, load-carrying capacity, durability and economy.

PREREQUISITES: Engineering Graphics, Mechanics, Strength of materials**,** Material science.

TEACHING METHODS: Lectures delivered with the help of a multimedia projector and visual materials. Laboratory works for consolidation of theoretical knowledge by example calculation of specific machine elements and experimental determination of their functional characteristics.

METHOD OF ASSESSMENT: Written exam (in the form of a test) for all who successfully defended the protocols from the laboratory works. Course project with description, defence and assessment.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Димчев Г., Захариев К., Машинни елементи, ч.1,2,3. София, Софтрейд 2004; 2. Лефтеров. Л., И. Димитров, П. Йорданов. Машинни елементи. София, Техника, 1994; 3. Николов Н. и др.: Ръководство за конструктивни упражнения по машинни елементи. София, Техника 1992; 4. Арнаудов К.Б., И.П.Димитров, П.В.Йорданов, Л.С.Лефтеров, Машинни елементи, С. Техника, 1980; 5. Mott, R. L., Vavrek, E. M., Wang, J., 2018, Machine elements in mechanical design - Sixth Edition, Pearson Education, ISBN 10: 0-13-444118-4, NY. 6. Budynas, R. G., et al, Mechanical Engineering Design - 10th Edition, McGraw-Hill Education, New York, ISBN 978-0-07-339820-4. 7. Курс: Машинни елементи I и II част (tu-plovdiv.bg).

DESCRIPTION OF THE COURSE

Name of the course: **Hydro and Pneumatic Drive**	Code: **MEC08**	Semester: **4**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof. Atanas Dimitrov Nachev, PhD, (FME), 659 514, e-mail: anachev@tu-plovdiv.bg
Assist. Prof. Emil Toshkov PhD, tel.:-, e-mail: emtoshkov@tu-plovdiv.bg
Assist. Prof. George Djurkov (FME), tel.: 032 659 622, e-mail: george.djurkov@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 „Mechatronics“, Professional orientation 5.1 Mechanical engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Teaching both practical skills and theoretical training needed for understanding and further research in the field of applied mechanics. The course aims to acquaint students with the devices, principle of operation, purpose and characteristics of hydraulic and pneumatic elements and drive systems in mechanical engineering and technology. Special attention is paid to applications in mechatronic systems.

DESCRIPTION OF THE COURSE: The main topics concern: Introduction to hydraulic and pneumatic drives, advantages and disadvantages, areas of application; Hydraulic and pneumatic volumetric machines; Basic elements of hydraulic and pneumatic drives; Purpose, design features and action of - hydraulic chokes; pressure regulators; flow regulators; distributors; hydraulic accumulators; cylinders; tanks; filters; taps and other auxiliary hydraulic devices. Knowledge is also given on basic schematics for controlling and regulating the speed of hydraulic cylinders and hydraulic motors providing a certain sequence or synchronization of movements. Issues related to the construction, calculation and operation of hydraulic elements and drive systems are also considered. The basic principles in reading and synthesis of hydraulic and pneumatic schematics for drives are presented. Part of the laboratory exercises are used for practical activities of a student on a test stand for pneumatic drives.

PREREQUISITES: Mathematics, Physics, Mechanics.

TEACHING METHODS: Lectures, using slides, case materials and examples from the Internet, laboratory works, work in teams, protocols - preparation and defense.

METHOD OF ASSESSMENT: Written exam (70%), and laboratory work (30%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. S. Tabakova, S. Radev, Fluid Mechanics, Sofia, TU-Sofia, 2011.(in Bulgarian); 2. Grozev, G., Stoyanov, S., Gezhgulov, G., Hydro- and pneumatic machines and drives, Sofia, Tehnika, 1990; 3. Komitovski, M., Elements of hydro-pneumatic drive, Sofia, Tehnika, 1985; 4. Moskov, N. Lazarov, S., Manual for laboratory exercises in hydropneumatic drive and control, Sofia, Tehnika, 1981, 1986; 5. Kondakov, LA, Nikitin, GA, Prokofiev, VN Скрицкин, В.Я. Sosonkin, VL Machine-building hydraulic drive, Moscow, Mashinostroene, 1978.

DESCRIPTION OF THE COURSE

Name of the course: **Electrical Signals and Measurements**	Code: **EEA22**	Semester: **4**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L 30 hours LW 15 hours	Number of credits: **3**

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

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialty Mechatronics , 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 be familiar with the basics of signal theory and modern converters of mechanical and geometric quantities, which are used in tools and control systems, control and measurement and automation.

DESCRIPTION OF THE COURSE: The main topics concern: The basics of signal theory and their application in measuring technology. The types of measuring signals, their metrological features, modulation and demodulation of signals, quantization, sampling and coding of signals, signal filtering are considered. The most frequently used basic and constructive schemes of measuring transducers of physical-mechanical quantities are considered, systematized by physical principle of transformation - electroresistive, electromagnetic, galvanomagnetic, piezoelectric, capacitive, photoelectric, pneumatic characteristics of the field and others, their application.

PREREQUISITES: Physics, Electrical Engineering and Electronics.

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

METHOD OF ASSESSMENT: Exam.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

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DESCRIPTION OF THE COURSE

Name of the course: **Theory of Machines and Mechanisms**	Code: **MEC09**	Semester: **4**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorial (T) Course work (CW)	Hours per semester: L – 30 hours T- 0 hours LW – 15 hours	Number of credits: 4

LECTURER(S):

Assoc. Prof. Eng. Raycho Raychev, PhD (FME), tel.: 032 659 623,
e-mail: rpraichev@tu-plovdiv.bg
Assist. Prof. Ivan Tashev, PhD (FME), tel.: 032 659 590, e-mail: ivan.tashev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculium for training of students to obtain Bachelor's degree, specialty „Mechatronics“, Professional orientation 5.1 Mechanical engineering; 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Its main goal is to make the transition from general scientific to constructive and technological knowledge, giving students the necessary knowledge about the nature of mechanical systems and their construction. The course increases the engineering and technical culture of students and helps to develop creative and inventive thinking in the design and improvement of various technical means..

DESCRIPTION OF THE COURSE: The main topics concern: Structural, geometric, kinematic, kinetostatic and dynamic analysis and synthesis of mechanisms and machines. The realization of the desired law of motion, generation of a given trajectory, regulation and control of the movements of mechanical systems for various machines, devices and devices are also studied. .

PREREQUISITES: Mathematics, Physics, Mechanics.

TEACHING METHODS: Lectures conducted with the help of visual materials, real devices, models and models of mechanisms. Laboratory exercises, carried out according to a plan with teaching and methodological guidance, on real stands, equipped with modern systems for registration and computer processing of the measured parameters. Students develop protocols that they defend in front of the teacher.

METHOD OF ASSESSMENT: Point system of exam questions or tests, course work and protocols.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Минчев, Н., Живков, В., Енчев, К., Стоянов, П. Теория на механизмите и машините. София, Техника, 1991, 434 с.; 2. Erdman, A., G., Sandor, G. N. Mechanism Design: Analysis and Synthesis. Prentice-Hall Inc., New Jersey, Vol. 1, 1984, 2-nd Edition, 1991, ISBN 0-13-569872-3.; 3.Shigley, J. E., and J. J. Uicker Jr. Theory of Machines and Mechanisms. McGraw-Hill Book Company, Inc., New York, 1995, 710 p., ISBN 0-07-056930-4.; 4. Chen, F. Y. Mechanics and Design of CAM Mechanisms. Pergamon press, N.Y., 1982, 523 p., ISBN 0-08-028049-8.; 5. Suh, C. H., Radcliffe, C.W. Kinematics and Mechanisms Design. John Willey& Sons, Inc., New York, 1978, 434 p., ISBN 0-471-01461-3.; 6. Левитский, Н. И. Теория механизмов и машин. Москва, Наука, 1990, 592 с.; 7. Вригазов, А., Милков, М., Павлов, Ст. Теория на механизмите и машините. С., 1993, 310 с., ISBN 954-438-038-8.; 8. Uicker J. J., Jr., G. R. Pennock, J. E. Shigley, Theory of Machines and Mechanisms (third ed.), Oxford University Press, New York, 2004, p.734, ISBN 0-19-515598-X.; 9. Machinery’s Handbook, John M. Amiss,

Franklin D. Jones, Henry H. Ryffel, Industrial Press New York, 2012; 10 CAM DESIGN HANDBOOK, Harold A. Rothbart, 2004 by The McGraw-HIll Companies, Inc.

DESCRIPTION OF THE COURSE

Name of the course: **Analog and Digital Circuits**	Code: **EEA23**	Semester: **4**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T)	Hours per semester: L – 30 hours T – 15 hours LW –15 hours	Number of credits: **5**

LECTURER(S):
Prof. Eng. Galidiya Petrova, PhD (FEA), tel.: 032 659 719, e-mail: gip@tu-plovdiv.bg
Assist. Prof. Eng. Ivan Maradzhiev, PhD (FEA), tel.: 032 659 776, e-mail: iv_mar@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialty „Mechatronics“, 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 have basic knowledge on theoretical and practical aspects of analog and digital electronic and pulse circuits together with their functional purpose and modes of operatior.

DESCRIPTION OF THE COURSE: The main topics concern: Amplifier circuits with op amps; Power amplifiers; Current-controlled voltage sources and voltage controlled current sources; Linear and non-linear computing circuits (summers, integrators, differentiators, logarithmic amplifiers, analog multipliers, analog comparators, etc.); Power supply circuits; Logical function and methods for description and minimization; Basic elements of digital electronics, combinatorial circuits - multiplexer, decoders, code converters, binary adders, digital comparators. Main types of flip-flops: RS, D, JK, T. Synchronous and asynchronous flip-flops. Applications of sequential elements: registers, shift registers, counters, etc. Practical consideration of sequential logic design; Indicator elements and digital circuits for their control; Design and working principles of relaxation circuits, mono-vibrators and multi-vibrators.

PREREQUISITES: Physics, Electrical Engineering and Electronics.

TEACHING METHODS: Lectures using multimedia presentations, seminars and laboratory exercises with protocols containing experimental results.

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

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Михов Г., И. Пандиев. Аналогова и цифрова схемотехника, Изд. ТУ-София, 2009, ISBN: 978-954-438-802-7, 2. Доневска Л., Д. Стаменов, И. Пандиев, К. Аспарухова, П. Якимов Ръководство за семинарни упражнения по аналогова схемотехника, Изд. ТУ-София, 2003, ISBN: 954-438-351-4, 3. Михов Г., Цифрова схемотехника за бакалавър-инженер по Електроника, ИПК на ТУ-София, 1998 г.; 4. Гриша Спасов, Галидия Петрова, Атанас Костадинов, “Учебник по цифрова и микропроцесорна техника“, ТУ-София, ISBN: 978-619-167-007-9, 2012.

DESCRIPTION OF THE COURSE

Name of the course: **Practicum**	Code: **PRC02**	Semester: **4**
Type of teaching: Lectures (L) Laboratory work (LW) Self-Study (SS)	Hours per semester: L – 0 hours LW – 0 hours SS – 60 hours	Number of credits: **2**

LECTURER(S):

Assoc. Prof. Angel Lenegerov, PhD (FME), tel: 032 659 613 e-mail: anlen@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialties Mechanical Engineering and Instrumentation, Mechatronics, Computer Modelling and Mechanical Engineering, Professional orientation 5.1 Mechanical engineering; specialties Transport Machinery and Technology, Aeronautical Engineering, Professional orientation 5.5 Transport, Navigation and Aviation, specialties Industrial Management, Graphic Design and Printing, Professional orientation 5.13 General Engineering, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Introducing to students with metal cutting machines, metal cutting tools, devices, metal processing by cutting.

DESCRIPTION OF THE COURSE: The main topics concern: Studying provided in the curriculum subjects at the end of the course students will be able to design processes of some of the most complex products in engineering.

PREREQUISITES: Material Science, Mechanics, Practicum (PRC01).

TEACHING METHODS: Protocols for the results of research (observations).

METHOD OF ASSESSMENT: Oral examination on the subject withdrawn by the student.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Хаджийски П. Програмиране и настройване на металорежещи машини с ЦПУ, С., ТУ, 2005, Събчев П. М. Металорежещи инструменти, Техника, С., 1982, Палей М. М. Технология производства приспособления, пресформ и щанц. Машиностроение, М., 1971.

DESCRIPTION OF THE COURSE

Name of the course: **Sport**	Code: **SPR04**	Semester: **4**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW) Self-Study (SS)	Hours per semester: L – 0 hours T – 0 hours LW – 0 hours SS – 30 hours	Number of credits: **1**
Course project (CP)	Code: -	Number of credits: **0**

LECTURER(S):

Sen. Lect. Daniel Vladimdirov, PhD (FEA), Tel.: 032 659 646, E-mail: danielv@tu-plovdiv.bg,

Sen. Lect. Petar Doganov, PhD (FEA), E-mail: pdoganov@tu-plovdiv.bg,

Sen. Lect. Boris Spasov, PhD (FEA), E-mail: boris_spassov@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curricula for training of students to obtain Bachelor's degree, specialty „Mechanical Engineering and Instrumentation“, „Mechatronics“, „Computer Modelling and Mechanical Engineering“, Professional orientation 5.1 Mechanical engineering; „Transport Machinery and Technology“, „Aeronautical Engineering” Professional orientation“ 5.5 Transport, Navigation and Aviation, „Intelligent systems and artificial intelligence“, „Industrial Management“, „Graphic Design and Printing“, Professional qualification 5.13 General Engineering, Professional 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 – 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 – 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 and “Pass grade.

INSTRUCTION LANGUAGE: Bulgarian

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