DESCRIPTION OF THE COURSE

Name of the course: **Selected Chapters of Mechanics**	Code: **MpTMT01**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: **4**

LECTURER(S):

Assoc. Prof. Eng. Raycho Raychev, PhD (FME), tel.: 032659623,
e-mail: rpraichev@tu-plovdiv.bg
Assist. Prof. Eng. Ivanka Delova (FME), tel.: 032659623, e-mail: ivankadelova@tu-plovdiv.bg
Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course goal is to present to the students knowledge in analytical mechanics, oscillations in distributed parameters systems, non-linear oscillations and mechanical impact. The educations in these chapters will give the students the opportunity to solve problems in analysis and synthesis of oscillating systems having distributed parameters, nonlinear systems and systems subjected to impact loading, as well as systems in automotive technology.

OBJECTIVES OF THE COURSE: The course includes basic concepts of analytical mechanics, oscillations of systems with distributed parameters, nonlinear vibration and impact. It will educate the students the concepts in analytical mechanics, oscillations in distributed parameters systems, non-linear oscillations and mechanical impact. The basic principles of linearization of non-linear systems are studied, as well as questions concerning stress and strain emerging during impact.

DESCRIPTION OF THE COURSE: The course includes basic elements of analytical mechanics, oscillations of systems with distributed parameters, nonlinear systems and mechanical impact. It deals with basic concepts, principles and methods for the occurrence, distribution and measurement of the oscillation. The basic methods of linearization of nonlinear systems and issues related to strains and tensions that arise in impact.

PREREQUISITES: Basic knowledge in Mechanics, Calculus and Physics is necessary.

TEACHING METHODS: Lectures and laboratory work.

METHODS OF ASSESSMENT: Written exam during the exam session.

TEACHING LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Белниколовски, Б., Избрани глави от динамиката, ТУ-София, 2004.

DESCRIPTION OF THE COURSE

Name of the course: **Strength of Structures**	Code: **MpTMT02**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: **4**
Course project (CP)		

LECTURER(S):

Assoc. Prof. Eng. Pepo Yordanov, PhD (FME), tel.: 032659514, e-mail: piyordanov@tu-plovdiv.bg

Assist. Prof. Eng. Stiliyana Taneva, PhD (FME), tel.: 032659524, e-mail: s.taneva@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course, the students will deepen knowledge in the field of materials behavior in vehicles. It will be useful for design and maintenance of vehicles. It will be of special interest in assessment in connection with failure of structures.

DESCRIPTION OF THE COURSE: The main topics concern: Modelling of structural elements, Models for plastic deformation, Thermal and residual stresses, Stress concentration, High cycle fatigue, Low cycle fatigue, Fatigue under random loading, Low and high temperatures, Constructive materials - deformation and strength parameters.

PREREQUISITES: Strength of materials, Finite Element Method.

TEACHING METHODS: Lectures, using slides and software SolidWorks, laboratory exercises in computer laboratories.

METHOD OF ASSESSMENT: Exam at end of semester (80%), laboratories (20%)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Върбанов, Х., Теория на еластичността, София, Техника, 1976; 2. Самуль, В., Основы теории упругости и пластичности, Москва, Высшая школа, 1970; 3. Соколовский, В., Теория пластичности, Москва, Высшая школа,, 1969; 4. Мэнсон, С., Температурные напяжения и малоцикловая усталость, Москва, Машиностроение, 1974; 5. Фролов, К. И др., Расчет термонапряжений и прочости роторов и корпусов турбин, Москва, Машиностроение, 1988; 6. Haibach, E. Betriebsfestigkeit, Dusseldorf, VDI-Vertlag, 1989..

DESCRIPTION OF THE COURSE

Name of the course: **Automatic Transmissions in Automotive Machinery**	Code: **MpTMT03**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW) Course project (CP)-**optional**	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof. Eng. Krasimir Ambarev, PhD (FME), tel.: 032 659 575,
e-mail: kambarev@tu-plovdiv.bg
Assist. Prof. Eng. Stiliyana Taneva, PhD (FME), tel.: 032 659 524, e-mail: s.taneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Aim of the course is to enlarge the knowledge of the students in field of automatic transmissions for vehicles and their control systems.

DESCRIPTION OF THE COURSE: The main topics concern: Basic principles and tendency in progress of vehicle automatic transmissions; with constructions and working performances of their elements and modern systems of transmissions.

PREREQUISITES: Mechanics, Basics of Electrical Engineering and Electronics, Theory of Mechanisms and Machines, Construction of Automobile, Automotive Transmissions

TEACHING METHODS: Lectures, using slides, laboratory works with protocols. Through the optional course project, students consolidate their knowledge acquired from the lecture material, which is applied in practice in the analysis and design of an automatic or automated (semi-automatic) automotive transmission.

METHOD OF ASSESSMENT: Written exam at end of semester (80%), laboratories (20%). The optional course project is assessed separately.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Аврамов В. П., Е. Е. Александров, Основы автоматики транспортных машин., К., Виша школа.1986.; 2. Гигов, Б. И. Автоматични трансмисии., ТУ-София, 2008.; 3. Илиев Л. А., Електронни системи за автоматично управление на автомобилите и автомобилните двигатели., С., Техника, 1977.; 4. Петров В. А., Автоматические системы транспортных машин., М., Машиностроение. 1976.; 5. Поляк Д. Г., Есеновский-Лашков Ю. К., Электроника автомобильных систем управления., М., Машиностроение. 1987.; 6. Сига Х., Мидзутани С., Введение в автомобильную электронику., Перевод с японского., М., Мир, 1989.;7. Трайков Б., Електроника в автомобила., С., Техника, 1981.; 8. Харитонов С. А., Автоматические коробки передач., М., АСТ-Астрель, 2003.; 9. Förster H. J., Automatische Fahrzeuggetriebe, Springer 1991.; 10. www.sae.org, www.bosch.de, www.zf.com, www.autofieldguide.com, www.avtoreview.ru.

DESCRIPTION OF THE COURSE

Name of the course: **Modelling and Testing of Transport Machinery**	Code: **MpTMT04**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – LW – 30 hours	Number of credits: **5**

LECTURER(S):

Assoc. Prof. Eng. Krasimir Ambarev, PhD (FME), tel.: 032 659 575,
e-mail: kambarev@tu-plovdiv.bg
Assist. Prof. Eng. Yordan Stoyanov, PhD (FME), tel.: 032 659626, e-mail: yordan.stoyanov@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course purpose in "Modelling and Testing of Transport Machinery" is to train students in the modeling and testing of transport equipment.

DESCRIPTION OF THE COURSE: Modern methods for forklift trucks's dynamic balance, transport equipment, etc. are studied. During the training, students use modern software products for modelling of vehicles and their testing in SolidWorks. They will build mathematical models in Matlab environment and display graphs for the dynamic properties of the vehicle including traction calculation, force and power balance, dynamic characteristics, etc.

PREREQUISITES: Basic knowledge of mathematics, physics, mechanics, internal combustion engines, automotive technology, transport technology and organization, traffic safety, etc. is required.

TEACHING METHODS: Lectures delivered with the help of visual materials, boards, slides and videos. Laboratory exercises carried out according to a guide and protocols developed by the students and checked by the teacher.

METHOD OF ASSESSMENT: Exam

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
D. Semov, N. Ivanov, D. Lozanov. Automobiles, tractors and trucks. Technology. Sofia. 1992. D. Semov, N. Ivanov, D. Lozanov. Automobiles, tractors and trucks. Technology. Sofia. 1992. D. Lyubenov, S. Kostadinov. Traffic safety - exercise manual, Printing base at the "A. Kanchev" University, 2015. Zh. Gelkov, D. Lyubenov. Traffic safety, Printing base at the "A. Kanchev" University, 2014. D. Simeonov, V. Pencheva. Interaction of modes of transport, Printing base at the "A. Kanchev" University, Ruse, 2001, p. 308

DESCRIPTION OF THE COURSE

Name of the course: **Suspension and Comfort in Automotive Machinery**	Code: **MpTMT05**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **5**
Course project (CP) **-optional**		

LECTURER(S):
Prof. Eng. Valyo Nikolov, PhD (FME), tel.: 032 659 594, e-mail: vnikolov@tu-plovdiv.bg
Assist. Prof. Atanasi Tashev, PhD (FME) тел.: (+359 32) 659 626, e-mail: atanasi.tashev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to be deepen their knowledge in the field of automotive suspension and trends in the development of modern systems. The studied issues will allow quickly and competently solving the problems related to the peculiarities of the different types of suspensions. Additionally, knowledge is provided in the field of design and control of vehicle suspension systems

DESCRIPTION OF THE COURSE: The main topics concern: Behaviour of the vehicle over time, taking into account the relationship between units and the impact of the road, and subsequent decisions that the designer must take when designing a particular type of suspension. The issues of the movement of the transport machines, related to their smoothness and stability, and the principles of building active and semi-active systems for their improvement are considered. The necessary attention is paid to the road surface, as a source of disturbing impacts, as well as the optimal choice of design parameters.

PREREQUISITES: Mathematics, Mechanics, Strength of Materials, Theory of Machines and Mechanisms, Design of Internal Combustion Engine, Construction of Automobile.

TEACHING METHODS: Lectures, using slides, laboratory works with protocols and optional course project with defence.

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

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Кунчев Л.П., Ръководство за лабораторни упражнения по динамика на автомобилната техника, ТУ-София, 1998; 2. Ротенберг Р.Б., Подвеска автомобиля, Москва, Машиностроение,1972; 3. Savaresi S.M., at al. Semi-Active Suspension Control Design for Vehicles, Butterworth-Heinemann, 2010; 4. Honghai L., Huijun G., Ping L., Handbook of Vehicle Suspension Control Systems, IET, 2014; 5. Rill G., Road Vehicle Dynamics Fundamentals and Modeling, CRC Press, 2011; 6. Goodarzi, A., Khajepour, A. Vehicle Suspension System Technology and Design. Synthesis Lectures on Advances in Automotive Technology, Morgan & Claypool Publishers, 2017.

DESCRIPTION OF THE COURSE

Name of the course: **Process Control Systems in Internal Combustion Engines**	Code: **MpTMT06**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **4**
Course project (CP) - **optional**		

LECTURER(S):

Assoc. Prof. Eng. Krasimir Ambarev, PhD (FME), tel.: 032 659 575,
e-mail: kambarev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Mastering of the modern internal combustion engines (ICE) process management systems and acquiring of practical experience for their maintenance, adjustment and diagnostic.

DESCRIPTION OF THE COURSE: The subject deals with problems, related to process control in internal combustion engines (ICE): fuel dosing; exciting of electric discharge between the electrodes of the spark plugs and lead angle of ignition or fuel injection control; air ratio adjustment within a range, ensuring reduction environment in the first stage of a three-component catalytic neutralizer of exhaust gas toxic substances and quantity control of the air transferred to the second stage for securing oxidizing environment therein; quantity control of the of recycled exhaust gases and of the activated carbon regeneration air, absorbing the fuel evaporated from the reservoir; control of the turbo-compressor operation of ICE with super-filling, of the gasdistribution phases, valve passage section, degree of compression, ICE driving torque, etc. The algorithm of functioning of these systems, the construction and characteristics of the controlled devices are studied..

PREREQUISITES: "Theory of internal combustion engines", "Design of internal combustion engines", "Basics of Electrical Engineering and Electronics", "Electrical Equipment of Transport".

TEACHING METHODS: Lectures using multimedia, slides and others materials. Laboratory works for which reports are made and the reports are checked by the teacher.

METHOD OF ASSESSMENT: Written exam at the end of semester

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Димитров П. И. Електрически и електронни си-стеми на ДВГ (Системи за управление на процесите в ДВГ). Печатна база на ТУ - София, 1998; 2. Димитров П. И., Системи за управление на процесите в двигателите с вътрешно горене (Първа част – двигатели с принудително възпламеняване на гонивната смес), Издателство и печат – ТУ София, 2014; 3. Дмитриевский Е.В., Обозов А.А., Новиков М.А. Электронное управление двигателями внутреннего сгорания, Учебное пособие. — Брянск: БГТУ, 2018; 4. Ouyang G. et al. Common Rail Fuel Injection Technology in Diesel Engines, Wiley, 2019

DESCRIPTION OF THE COURSE

Name of the course: **Modelling of ICE Processes**	Code: **MpTMT07.1**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **4**
Course project- **optional**		

LECTURER(S):

Assoc. Prof. Eng. Krasimir Ambarev, PhD (FME), tel.: 032 659 575,
e-mail: kambarev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective from the curriculum training of students to obtain Master's degree, specialty Transport Machinery and Technology, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Aim of the course is to make the students well grounded in mathematics modeling and study processes in ICE. Obtaining knowledge can found apply in investigating, development and created a new construction decision in ICE.

DESCRIPTION OF THE COURSE: The course includes physical base, mathematics modelling and study processes of exchange the gases, air fuel mixture and combustion. The course pay attention to problems connected whit dynamic of gases in inlet and exhaust manifold, modeling and study processes of injection the fuel in diesel engine. Investigate specification of processes of heat exchanger and formation toxicity components in combustion chamber in ICE.

PREREQUISITES: Thermodynamics and Heat Transfer, Fluid Mechanics, Mechanics, Theory of internal combustion engines, Design of internal combustion engines.

TEACHING METHODS: Lectures using multimedia, slides and others materials. Laboratory works for which reports are made and the reports are checked by the teacher.

METHOD OF ASSESSMENT: Continuous assessment during the semester. Course project with separate assessment.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Петриченко, Р.М., Физические основы внутрецилиндровых процессов ДВС, Ленинград, ЛГУ, 1988; 2. Кухарёнок Г.М., Петрученко А.Н., Гершань Д.Г. Рабочий процесс двигателей при работе на альтернативных топливах, Минск: БНТУ, 2017; 3. Петриченко, Р.М., В. В. Основский, Рабочие процесы поршевных машин, Машиностроение, Ленинград, 1972; 4. Чуян Р. К., Методы математического моделирования двигателей летательных аппаратов, Машиностроение, Москва, 1988;. 5. Чистяков В. К., Динамика поршневых и комбинированных двигателей внутреннего сгорания, Машиностроение, Москва, 1989; 6. Heywood J.B., A text book on Internal Combustion engine fundamentals. McGraw-Hill International edition, 1988, 7. Isermann, Rolf, Engine Modeling and Control - Modeling and Electronic Management of Internal Combustion Engines, Springer, 2014, 8. Lakshminarayanan P.A and Aghav Y.V., Modelling diesel combustion, Springer, 2010, 9. Merker G.P. et all, Simulating combustion, Springer, 2006, 10. Ramos J.I., Internal combustion engine modeling, Hemisphere publishing corporation, 1989

DESCRIPTION OF THE COURSE

Name of the course: **Diagnostics of Internal combustion engines**	Code: **MpTMT07.2**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **4**
optional course project		

LECTURER(S):

Assoc. Prof. Eng. Krasimir Ambarev, PhD (FME), tel.: 032 659 575,
e-mail: kambarev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective from the curriculum training of students to obtain Master's degree, specialty Transport Machinery and Technology, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to make the students well grounded in the field of diagnostics of internal combustion engines (ICE), incl. and diagnostics of the control systems of the petrol and diesel internal combustion engines.

DESCRIPTION OF THE COURSE: The course includes the diagnostics of internal combustion engine control systems. The course pays attention to problems connected whit the diagnosis of faults in the fuel and ignition systems of internal combustion engines

PREREQUISITES: Theory of internal combustion engines, Design of internal combustion engines, Systems of Internal Combustion Engines, Process Control Systems in Internal Combustion Engines.

TEACHING METHODS: Lectures using multimedia, slides and others materials. Laboratory works for which reports are made and the reports are checked by the teacher.

METHOD OF ASSESSMENT: Continuous assessment during the semester. Course project with separate assessment.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Мигаль В.Д., Системы контроля и диагностика автомобиля, Учебное пособие . — Харьков Майдан, 2017. 2. Скачко С.А., Скачко К.С., Диагностика систем управления двигателем. Пособие для начинающих специалистов, 2006, 3. Рокош У., Бортовая диагностика, За рулем, 2013, 4. Käppler W.D. Smart Vehicle Handling – Test und Evaluation in der Fahrzeugtechnik, Springer Vieweg, Kraftfahrzeugtechnik, 2015, 5. Krützfeldt M.S. Verfahren zur Analyse und zum Test von Fahrzeugdiagnosesystemen im Feld, Springer Vieweg, 2015, 6. Reif K. Ottomotor-Management - Steuerung, Regelung und Überwachung, Springer, 2014

DESCRIPTION OF THE COURSE

Name of the course: **Synthesis of complex planetary gears**	Code: **MpTMT08.1**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW) Course project (CP)-**optional**	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **3**

LECTURER(S):
Assoc. Prof. Eng. Krasimir Ambarev, PhD (FME), tel.: 032 659 575,
e-mail: kambarev@tu-plovdiv.bg
Assist. Prof. Eng. Stiliyana Taneva, PhD (FME), tel.: 659 524, e-mail: s.taneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Aim of the course is to enlarge the knowledge of the students, to extend and deepen their knowledge on the principles and methods for kinematic analysis and synthesis of complex planetary gears with two or three degrees of flexibility.

DESCRIPTION OF THE COURSE: The main topics concern: Perspectives for use of planetary gears, basic concepts, classification. Kinematics and Statics of planetary mechanisms – fundamental equation of kinematics of three link mechanisms, internal torques of the basic link mechanisms and friction torques in the control elements; Definition of efficiency; Plan of angular velocities of the basic link mechanisms for determining the internal ratio of three link mechanisms, on the friction torques of the control elements and synthesis of planetary gear with two degrees of flexibility; Solid geometric synthesis of epicyclic gear mechanism with three degrees of flexibility; Relationship between the angular velocities of the basic link of planetary gears with three degrees of flexibility through zero straight lines; Analytical and graphical study of relations and control; Plan of angular velocities of planetary mechanism with three degrees of flexibility by introducing the connecting links and their angular velocities of planetary gears with three degrees of flexibility, and building kinematical schemes of plan angular velocities zero straight lines available to all links, as well as the zero straight lines of the leading link and clutches; Determination of the basic kinematic and force parameters; Replacing two or more three link mechanisms by complex four and five link mechanisms; One way (overrunning) clutch as a control element of planetary gears.

PREREQUISITES: Mechanics, Theory of Mechanisms and Machines, Machine Elements, Automotive Transmissions

TEACHING METHODS: Lectures, using slides and laboratory work with protocols. In the optional course project, the students make kinematic analysis and synthesis of complex planetary gears with two or three degrees of flexibility.

METHOD OF ASSESSMENT: Written exam at end of semester (80%), laboratories (20%). The optional course project is assessed separately.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Кацов Д., Синтез на сложни планетни предавки, ТУ-София, филиал Пловдив, 1996; 2. Кацов Д., Анализ и синтез на сложни планетни предавки, Пловдив, 2009. 3. Кацов Д. А., Димитров Й. Н. Колесни и верижни машини, ТУ-София, филиал Пловдив, 2005; 4. Кацов Д. А., Петров Ц. Автомобилна техника – II част – ръководство, ТУ-София, филиал

Пловдив, 2004; 5. Носов Н. А. и др. Расчет и конструирование гусеничных машин, Москва, “Машиностроение”, 1972.

DESCRIPTION OF THE COURSE

Name of the course: **Vehicle Control and Driving Systems**	Code: **MpTMT08.2**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW) Course project (CP)-**optional**	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **3**

LECTURER(S):

Assoc. Prof. Eng. Krasimir Ambarev, PhD (FME), tel.: 032 659 575,
e-mail: kambarev@tu-plovdiv.bg
Assist. Prof. Eng. Stiliyana Taneva, PhD (FME), tel.: 032 659 524, e-mail: s.taneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Aim of the course is to enlarge and deepen the students' knowledge in the field of electronic systems, which help to improve the performance and driving safety of the vehicle. The students acquire practical skills to solve specific problems in engineering practice.

DESCRIPTION OF THE COURSE: The main topics concern: Types, purpose, structure and operation of modern electronic vehicle control and driving systems, their application and development opportunities in this subject area.

PREREQUISITES: Physics, Mechanics, Theory of Automobile, Construction of Automobile, Design of Internal Combustion Engines, Process Control Systems in Internal Combustion Engines

TEACHING METHODS: Lectures, using slides and laboratory work with protocols. Optional course project consultations.

METHOD OF ASSESSMENT: Written exam at end of semester (80%), laboratories (20%). The optional course project is assessed separately.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Димитров, С., Л. Кунчев, Н. Павлов. Системи за контрол и управление на автомобила. ТУ-София, 2017; 2. Димитров, С., К. Неделчев. Системи за контрол и управление на автомобила. Ръководство за лабораторни упражнения. ТУ-София, 2013.

DESCRIPTION OF THE COURSE

Name of the course: **Electric Vehicles**	Code: **MpTMT09.1**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **3**
Course project - **optional**		

LECTURER(S):

Assoc. Prof. Eng. Krasimir Ambarev, PhD (FME), tel.: 032 659 575,
e-mail: kambarev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective course from the curriculum training of students to obtain Master's degree, specialty Transport Machinery and Technology, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course "Electric Vehicles" is to acquaint students with specific design of electric vehicles and vehicles with hybrid drive, the types of rechargeable batteries and the advantages and disadvantages of different types of drives and their control.

DESCRIPTION OF THE COURSE: The course presents different structures and schemes of electric and hybrid vehicles, the control methods of propulsion and principles for their design and calculation. Examine new and alternative sources of electrical energy and clean technologies.

PREREQUISITES: Basic knowledge in Automotive Theory, Design of Automobile, Electrical Engineering and Electronics is necessary.

TEACHING METHODS: Lectures using multimedia, slides and others materials. Laboratory works for which reports are made and the reports are checked by the teacher.

METHOD OF ASSESSMENT: Written exam, Course project defence..

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
Евтимов И., Р. Иванов. Електромобили. Русе, ИК при РЩ „А. Кънчев", 2011, 2. Пересада С.М., Пушкар М.В. Основи мехатроніки, Навчальний посібник. – Київ: Національний технічний університет України «Київський політехнічний інститут імені Ігоря Сікорського» (КПІ ім. Ігоря Сікорського), 2020, 3. Чудов В.И., Свойкин В.Ф., Тетерин Н.М. Перспективы развития электромобилей, Учебное пособие — Сыктывкар: Сыкт. лесной институт (СЛИ), 2018, 4. Щетин В. А. И др. Электромобиль. Москва, „Машиностроение", 1987., 5. Ютт В.Е., Морозов В.В., Соколов Л.А. и др. Современные источники тока и зарядные станции для электромобилей, Учебное пособие. — М.: Московский автомобильнодорожный государственный технический университет (МАДИ), 2017

DESCRIPTION OF THE COURSE

Name of the course: **Trucks and buses**	Code: **MpTMT09.2**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **3**
Course project- **optional**		

LECTURER(S):

Assoc. Prof. Eng. Krasimir Ambarev, PhD (FME), tel.: 032 659 575,
e-mail: kambarev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective course from the curriculum training of students to obtain Master's degree, specialty Transport Machinery and Technology, 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 acquire the necessary amount of knowledge on issues related to the layout of trucks and buses, their components and units, design calculation.

DESCRIPTION OF THE COURSE: Main topics: Classification of trucks and buses. Layout of trucks and buses. Dynamic calculation. Engines for trucks and buses. Transmissions of trucks and buses. Braking system for trucks and buses. Retarders, intarders and pritarders.

PREREQUISITES: Basic knowledge in Automotive Theory, Construction of Automobile, Electrical Engineering and Electronics is necessary.

TEACHING METHODS: Lectures using multimedia, slides and others materials. Laboratory works for which reports are made and the reports are checked by the teacher.

METHOD OF ASSESSMENT: Written exam, Course project defence..

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
Петров В. А., Автоматические системы транспортных машин., М., Машиностроение. 1976, 2. Ackerman H. Natural Gas-powered Cars and Trucks, New York: Nova Science Publishers, Inc., 2015, 3. Bennett S., Norman I.A. Heavy duty truck systems, 5th edition. Delmar; Cengage Learning, 2011, 4. Friedemann A.J. When Trucks Stop Running: Energy and the Future of Transportation, Cham Heidelberg New York Dordrecht London: Springer, 2016, 5. McCallen R., Browand F., Ross J. (Eds.). The Aerodynamics of Heavy Vehicles: Trucks, Buses, and Trains, Springer-Verlag Berlin Heidelberg, 2004, 6. Renault Trucks. Аппараты тормозных систем автомобилей Midlum, Kerax, Premium, Magnum.

DESCRIPTION OF THE COURSE

Name of the course: **New trends in the development of transport equipment**	Code: **MpTMT10.1**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW))	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **3**
Course project- **optional**		

LECTURER(S):
Prof. Eng. Valyo Nikolov, PhD (FME), tel.: 032 659 594, e-mail: vnikolov@tu-plovdiv.bg
Assist. Prof. Eng. Atanasi Tashev, PhD (FME), tel.: (+359 32) 659 626, e-mail: atanasi.tashev@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory for training of students to obtain Master's degree, specialty Transport Equipment and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of the course "New trends in the development of transport equipment" is to familiarize students with current methods and tools for developing products in transport technology. Upon completing the course, students will understand the key steps in developing products for the automotive industry, as well as the approaches used to analyse defects in the production environment. The acquired knowledge will enable students to integrate seamlessly into the automotive industry and quickly adapt to the processes of developing and manufacturing new products.

DESCRIPTION OF THE COURSE: The course covers the following main topics: Product Development Models for the Automotive Industry: Waterfall, Agile, and V-Model development approaches, including functional safety; Advanced Product Quality Planning: Methods for product and process development and their verification.Quality Management: Risk assessment, production control plans, and analysis of failures caused by design and manufacturing defects and their impact on product functionality.

PREREQUISITES: For successful comprehension and study of the course content, students require basic knowledge in "Automotive Design," "Internal Combustion Engine Design," "Information and Communication Technologies," and "Internet Technologies.".

TEACHING METHODS: The lecture material is based on contemporary literature sources focused on trends in modern transport technology. Special attention is given to the specific requirements of the automotive industry regarding product development methods. Lectures are delivered with the aid of visual materials, computer, and projection equipment. During laboratory exercises, problems derived from the lecture content are addressed, and numerical computer analyses of specific problems are performed using software tools.

METHOD OF ASSESSMENT: The achievement of the course objectives is assessed through a final examination at the end of the respective semester. If a student chooses to complete a course project, it is presented to and evaluated by the instructor. The final grade is then determined as follows: 30% from the course project and 70% from the exam.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Chrysler LLC, Ford and General Motors, Advance product quality planning and control plan (APQP) Second Edition, 2008.

2. International Standard, ISO26262 Road vehicles - Functional Safety, Second edition, 12-2018.
3. Automotive Industry Action Group (AIAG) & Verband der Automobilindustrie (VDA), Failure Mode and Effects Analysis FMEA Handbook, 2019.
4. Advanced Innovative Engineering (AIE), 8D Problem solving process, UK.
5. Crolla, D., Automotive Engineering – Powertrain, Chassis System and Vehicle Body, ELSEVIER, UK, 2009.
6. General Motors Corporation, GMW3172 Handbook, EDSON, 2006.
7. Six Sigma Academy International, Basic Statistics, USA, 2006.

DESCRIPTION OF THE COURSE

Name of the course: **Electric and Forklift trucks**	Code: **MpTMT10.2**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW))	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **3**
Course project- **optional**		

LECTURER(S):

Prof. Eng. Valyo Nikolov, PhD (FME), tel.: 032 659 594, e-mail: vnikolov@tu-plovdiv.bg

Assist. Prof. Yordan Stoyanov, PhD, e-mail: yordan.stoyanov@tu-plovdiv.bg

Technical University of Sofia, Branch Plovdiv

Assist. Prof. Eng. Atanasi Tashev, PhD (FME), tel.: (+359 32) 659 626, e-mail: atanasi.tashev@tu-plovdiv.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective course from the curriculum training of students to obtain Master's degree, specialty Transport Machinery and Technology, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The main goal of the course is to provide students with knowledge of the principles and methods by which the design of the forklift as a whole, its systems, including the ability to analyze existing structures, geometric and strength sizing of specific units and aggregates.

DESCRIPTION OF THE COURSE: Classification and application of forklift. Specifications. Construction of forklift. Power transmission. Manage the bridge. Steering system. Braking system. Lifting systems. Lift system - low lifter. Horizontal load transfer system. Interchangeable work equipment. Hydraulic system. Electrical system of electric trucks..

PREREQUISITES: The course is provided by the courses studied in the bachelor's degree.

TEACHING METHODS: The training course is carried out through lectures using multimedia and laboratory exercises with protocols, practical exercises in a real base in a car service and a course project with description and defence.

METHOD OF ASSESSMENT: Exam (80%), course project (20%)..

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Velev N. Cars, tractors and trucks. Sofia, Zemizdat, 1983, 2. Spasov V. Engineering logistics. Sofia, Tehnika, 2012, 3. Mihailov E. Operation, maintenance and repair of electric trucks and forklifts. Sofia, Tehnika, 1975.

DESCRIPTION OF THE COURSE

Name of the course: **Design of Transport Machinery**	Code: **MpTMT11.1**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW) Course project (CP**)-optional**	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **3**

LECTURER(S):
Prof. Eng. Valyo Nikolov, PhD (FME), tel.: 659 594, e-mail: vnikolov@tu-plovdiv.bg
Assist. Prof. Eng. Stiliyana Taneva, PhD (FME), tel.: 659 524, e-mail: s.taneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Aim of the course is to enlarge the knowledge of the students, to extend and deepen their knowledge of design and calculation of transport machinery (automobiles, wheeled and tracked machines) and their aggregates (assemblies and systems).

DESCRIPTION OF THE COURSE: The main topics concern: Purpose, requirements, classification and basic parameters of transport machinery – cars, truck, tractors and forklifts Arrangement of special wheeled machines; Power transmission; Traction calculations of wheeled tractor; Arrangement of wheeled and crawler tractors; Power take-off to auxiliary equipment of transport machinery and to tractor implements.

PREREQUISITES: Mechanics, Strength of materials, Machine elements, Theory of Automobile, Strength of Structures, Modeling and testing of transport machinery

TEACHING METHODS: Lectures, using slides and laboratory work with protocols. In the optional course project, the students fulfill: traction calculation of wheeled tractors and design and calculations of assemblies and systems of transport machinery.

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (80%), laboratories (20%). The optional course project is assessed separately.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Кацов Д. А. Проектиране и конструиране на верижни и колесни машини, Пловдив, 2010 (записки); 2. Кацов Д. А., Димитров Й. Н. Колесни и верижни машини, ТУ-София, филиал Пловдив, 2005; 3. Димитров Й. Н. и др. Ръководство по проектиране, конструиране и изчисляване на АТК, София, “Техника”, 1980; 4. Димитров Й. Н. Автомобилна техника. Теория, София, “Тракия-М”, 2000. 5. Морчев Е. Проектиране и конструиране на автомобила, София, “Техника”, 1983

DESCRIPTION OF THE COURSE

Name of the course: **Computational Analysis of Transport Machinery**	Code: **MpTMT11.2**	Semester: **2**
Type of teaching: Lectures (L) Laboratory work (LW) Course project (CP)-**optional**	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **3**

LECTURER(S):
Prof. Eng. Valyo Nikolov, PhD (FME), tel.: 659 594, e-mail: vnikolov@tu-plovdiv.bg
Assist. Prof. Eng. Stiliyana Taneva, PhD (FME), tel.: 659 524, e-mail: s.taneva@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Aim of the course to help students deepen and expand their theoretical knowledge and practical skills in solving complex problems for structural analysis of Finite Element Method.

DESCRIPTION OF THE COURSE: The main topics concern: Analysis of vibrations in elastic bodies. Modal analysis of vibrations. Nonlinear problems. Problems having material nonlinearity. Problem having geometric nonlinearity. Contact problems. Heat transfer problems. Thermal stress analysis. Composite materials. Stress and strain analysis in orthotropic laminates.

PREREQUISITES: Mechanics, Strength of materials, Machine elements, Theory of Automobile, Strength of Structures, Modeling and testing of transport machinery

TEACHING METHODS: Lectures, using slides and laboratory work with protocols. In the optional course project, the students fulfill: traction calculation of wheeled tractors and design and calculations of assemblies and systems of transport machinery.

METHOD OF ASSESSMENT: Two assessments at mid and end of semester, which are formed based on solving a problem for analyzing a structure of transport machinery (80%) and from the skills shown by the student during the laboratory works (20%). The optional course project is assessed separately.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Стойчев Г. Метод на крайните елементи. Якостен и деформационен анализ, София, 2000, 2. Павлова Ю., Б. Банков, Изчисляване на строителни конструкции по метода на крайните елементи, София., Техника, 1989, 3. Тенчев Р. Метод на крайните елементи. Ръководство за работа с COSMOS/M (Ver.1.65 –1.75), София, ТУ, 1998, 4. Cook R., D. Malkus, M. Plesha, Concepts and Applications of Finite Element Analysis, John Wiley & Sons, New York, 1989, 5.Ташев М., П. Йорданов, Инженерен анаализ с Метод на крйните елементи, Из-во „Екс-Прес, Габрово, 2012.

DESCRIPTION OF THE COURSE

Name of the course: **Technical operation of automobiles**	Code: **MpTMT12.1**	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. Silviya Salapateva, PhD (FME), tel.: 032 659613, e-mail: sisisal@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective course from the curriculum training of students to obtain Master's degree, specialty Transport Machinery and Technology, Professional orientation 5.5 Transport, Shipping and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The objectives of the course is to acquaint the students with the advanced methods of automotive vehicle diagnostics, maintenance and repair..

DESCRIPTION OF THE COURSE: Issues of the structure of management of the technical condition of vehicles, analysis and assessment of types of maintenance work, spare parts and labor input are considered. The effectiveness of technical operation is assessed in two aspects - from the point of view of a transport company and from the point of view of car repair shops. Issues of workforce distribution, spare parts supply system and warehouses, quality control, guarantees, responsibilities of workers and personnel are also considered.

PREREQUISITES: Basic knowledge of vehicle maintenance and repair, technology and organization of road transport and operating materials is required.

TEACHING METHODS: Lectures and laboratory exercises. In the laboratory exercises, an analysis of the types of work, the cost of spare parts and consumables and labor in maintaining a group of cars is carried out. The efficiency of service units is assessed.

METHOD OF ASSESSMENT: Through a continuous assessment, which is formed in total from the grades of two tests during the semester and successfully defended protocols of the laboratory exercises.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Симеонов Е. Ц., Трайков Б. В. Ръководство за лабораторни упражнения по “Надежност, диагностика и поддържане на автотранспортни средства”, София, Печатна база на ТУ-София, 1990 г.; 2. Крамаренко Г. В. Техническая эксплуатация автомобилей, Москва, Транспорт, 1983 г.; 3. Стойков С., Джонев Г., Технология на ремонта на автомобилите. София. Техника, 1991 г.; 4. Джонев Г., Дидикозян А. Ръководство за лабораторни упражнения по ремонт на автотранспортните средства, ТУ- София, 1989 г.; 5. Джонев Г., Дидикозян А. Ремонт на автомобила, трактора и кара, ТУ- София, 1984 г.; 6. Шадричев В. А. Основи на технологията на автомобилостроенето и ремонт на автомобилите. София, Техника, 1981 г.

DESCRIPTION OF THE COURSE

Name of the course: **Modeling and optimization in road transport**	Code: **MpTMT12.2**	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. Silviya Salapateva, PhD (FME), tel.: 032 659613, e-mail: sisisal@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective course from the curriculum training of students to obtain Master's degree, specialty Transport Machinery and Technology, Professional orientation 5.5 Transport, Shipping and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of studying the discipline is to form professional knowledge and acquire practical skills for solving production tasks in road transport.

DESCRIPTION OF THE COURSE: The main tasks when studying the discipline are: mastering and using the apparatus of mathematical modeling of production processes in road transport based on the methods of mathematical programming; getting acquainted with the methods for designing road transport systems for delivering goods and calculating the need for transport vehicles; clarifying the role, status and prospects for the development of economic-mathematical methods in the organization of road transport in market conditions, taking into account the material, technical - operational and organizational constraints..

PREREQUISITES: For the successful perception and study of the course content by students, basic knowledge of Mathematics, Information and Communication Technologies, Technology and Organization of Road Transport is necessary.

TEACHING METHODS: To conduct the lectures, a multimedia projector, computer equipment and Internet connectivity are required. To conduct the laboratory exercises, an auditorium with the necessary workstations, equipped with computers with Microsoft Office installed, Internet connectivity, a multimedia projector are required.

METHOD OF ASSESSMENT: Through a continuous assessment, which is formed in total from the grades of two tests during the semester and successfully defended protocols of the laboratory exercises.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Салапатева С., Моделиране и оптимизиране в автомобилния транспорт, Лекции – записки, Пловдив, 2021; 2. Банина Н.В., Економико-математическое моделирование транспортных процессов – лабораторный практикум, Иркутск, 2017; 3. Геронимус Б. Л., Економико-математические методы в планировании на автомобильном транспорте: учебное мособие, Издательство „Транспорт“, Москва, 1982; 4. Драгомиров Н., Информационни системи и технологии в логистиката, Издателски комплекс на УНСС, София, 2015; 5. Атанасов Б., Милкова Т., Количествени методи в логистиката, Издателство „Наука и икономика, Варна, 2011.

DESCRIPTION OF THE COURSE

Name of the course: **Automotive hydro and pneumatic systems**	Code: **FaMpTMT01**	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):
Prof. Eng. Valyo Nikolov, PhD (FME), tel.: 032 659 594, e-mail: vnikolov@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, 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 acquire the necessary amount of knowledge in theory and working processes in hydro and pneumatic systems which is used in automotive technology.

DESCRIPTION OF THE COURSE: The main topics concern: Vane pumps. Torque converters. Co-operation of torque converters with internal combustion engines. Axial fans. Piston and diaphragm pumps and power cylinders. Gear and vane pumps. Radial rotary and piston pumps and motors. Reciprocating compressors.

PREREQUISITES: The course is provided by the courses studied in the bachelor's degree..

TEACHING METHODS: Lectures, using slides, laboratory works.

METHOD OF ASSESSMENT: Continuous assessment.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Вълков Д. Хидродинамични предаватели. София, Техника, 1979. 2. Грозев Г. и др. Хидро- и пневмомашини и задвижвания. София, Техника, 1990. 3. Нарбут А. Гидротрансформаторы. Москва, „Машиностроение”, 1966. 4. Roger F.C. Hydraulic control systems. Wiley, ISBN 13: 9781119416494, 2020. 5. Qin Z. Basics of hydraulic systems. CRC, ISBN 13: 9781138484665, 2018.

DESCRIPTION OF THE COURSE

Name of the course: **Electric Powertrain of Vehicles**	Code: **FaMpTMT02**	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):
Prof. Eng. Valyo Nikolov, PhD (FME), tel.: 032 659 594, e-mail: vnikolov@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Master's degree, specialty Transport Machinery and Technologies, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to acquaint students with the elements of electric powertrain, their function and design, their life cycle, standards and procedures for homologation, etc.

DESCRIPTION OF THE COURSE: The main topics concern: CAN-BUS data bus, electronic control systems in hybrid and electric cars, kinetic energy recovery systems, electronic systems for security and safety, modern types of batteries and supercapacitors.

PREREQUISITES: Electrical Engineering and Electronics, Theory of Automobile, Construction of Automobile.

TEACHING METHODS: Lectures, using slides, laboratory works with protocols and optional course project with defence.

METHOD OF ASSESSMENT: Continuous assessment.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Alam, M., Ahmad, A., Khan, Z., Rafat, Y. et al., A Bibliographical Review of Electrical Vehicles (xEVs) Standards SAE Int. J. Alt. Power. 2018; 2. Regulation No 100 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of vehicles with regard to specific requirements for the electric power train; 3. https://www.iso.org; 4. https://www.sae.org/standards; 5. https://standards.ieee.org; 6. http://www.jari.or.jp