

HIGHER SCHOOL OF TRANSPORT "TODOR KABLESHKOV", SOFIA, BULGARIA			
FACULTY „TRANSPORT MANAGEMENT"			
Nº	COURSE	ANNOTATION	ETCS
1	Transport Planning and Forecasting	<i>The course objective is to obtain a thorough knowledge of economic instruments for planning and objectively and accurately measuring the impact of future realization of business decisions.</i>	8
2	Marketing of Transport Services	<i>The aim of the course is to obtain theoretical knowledge and practical skills in the field of marketing. The curriculum includes: basic elements, scope, theoretical and practical aspects of marketing, and the possibilities for their application in solving practical problems.</i>	4
3	Investment Projects Management	<i>This course is based on the methodological principles of the development of investment projects. Students acquire knowledge and skills for feasibility studies, development, implementation, financing and management of investment projects.</i>	5
4	Economic Activity Analysis	<i>The course aims to acquaint students with the analytical function of economic and accounting information together with the main indicators for analysis, their interpretation and basic methods and principles of economic analysis.</i>	4
5	Economics of Enterprise	<i>Students acquire knowledge of basic economic characteristics of the enterprise, the legal framework regulating the economy of the firm, organization of the main processes in the enterprise, the nature and management of efficiency and competitiveness and categories associated with them.</i>	7
6	Management of Transport Power Systems	<i>The course objective is to give students the necessary theoretical knowledge for the organization, management and economic problems of the energy subsystem in transport companies. Students acquire knowledge of the dynamically changing characteristics of economic categories for assessing the degree of utilization of resources in transport and its energy subsystem.</i>	3
7	Fundamentals of Management	<i>The course objective is to form knowledge in the field of management by reviewing the historical development of management theory, analyzing the main elements of management systems, analysis of internal and external factors and their influence on the behavior of economic systems.</i>	7
8	Economic History	<i>The study course is designed to provide students with knowledge in the economic development of the world and Bulgaria in the new and modern history. The course is to contribute to increasing general knowledge of students and building skills to analyze economic problems by comparing their conditions in different historical periods.</i>	3
9	European Economic Integration	<i>The aim of the course is to acquaint students with the main aspects of the European economic integration tracing the stages of the formation of the European Union and focusing on the integration processes in economic sectors. The topics in the syllabus examine the development of monetary relations, community legislation, funding policy, labour market, social issues, etc.</i>	4
10	Buisness English	<i>The course in English is to achieve the development of receptive and productive skills of students related to listening, speaking, reading and writing, reinforcement of basic grammatical categories and familiarizing students with cultural values and achievements of the English community. The training is conducted by the system "New Headway" - Pre-Intermediate, Oxford University Press 2000</i>	7
11	Transport Activity Management	<i>The aim of the course is to form the necessary knowledge of transport as a major sector of</i>	4

		<i>the economy, the modes of transport as well as basic rules for their effective management in a market-oriented economy.</i>	
12	Fundamentals of Logistics	<i>The main objectives of the course are to introduce students to the basics of logistics and logistics activities in delivering change and conversion of resources in the logistics chain. The curriculum includes: analysis of the units /subsystems/ providing of material flows and their structure, the management of logistic activities, quality management and information services to logistics.</i>	7
13	Design and Management of Logistics Chains	<i>The main objective of the course is to familiarize students with the structure and elements of the logistics chain, modelling and analyses of different phases, logistics systems and circuits in general.</i>	6
14	Transportation Systems Simulation	<i>The main objectives of the course are to obtain sufficient theoretical knowledge and practical skills allowing creating imitation models to plan experiments and analyse the results.</i>	8
15	Transport Technical Operation and Safety	<i>The main objective of the course is the study of the fundamental tenets and principles of technical operation and safety in operation in transport. By studying this course students have the opportunity to acquire basic knowledge about the methods and tools for the study of safety factors on which it depends, and regulations related to the provision of transport safety.</i>	10
16	Systems Reliability and Safety	<i>The main objectives of the course are to acquaint students with the most relevant aspects of the theory of reliability and safety of systems. The problems associated with general methodological issues of reliability and safety performance of the reliability and safety of systems, methods of analysis, evaluation and prediction of these indicators, as well as their relationship to the qualitative performance of the systems.</i>	5
17	Ecology	<i>The aim of the course is to familiarize students with basic concepts, laws and environmental issues, possible environmental pollution originating from industry, energy and transport, control of environmental pollution, ways to reduce pollution and norms. The ecology curriculum introduces students to possible negative impacts of the different modes of transport on the environment and humans.</i>	4
18	Fundamentals of Reliability Theory	<i>The main objectives of the course are to acquaint students with the basic theory of reliability. The curriculum includes topics on: random events and variables in reliability, indicators of reliability of recoverable and unrecoverable technical objects, physics and mathematical modelling of failures and others.</i>	5
19	Urban Transport	<i>The main objectives of the course are to introduce students to the transport problems of modern cities, the characteristics and application of the types of Public/ Urban transport and the basic methods, tools and systems for the organization and regulation of urban traffic. The curriculum includes topics on: transport problems of the modern city, needs for services, organization and automobilization, types of public transportation and participation in urban transport, transport network, traffic and pedestrian flows, waiting and parking.</i>	6
20	Transportation Systems Simulation	<i>The main objectives of the course for the students are to gain sufficient theoretical knowledge and practical skills enabling them to create imitation models, plan experiments and analyze the results. The curriculum includes topics on: the nature of the European transport policy, transport management, EU directives in this area and the development of mobile technologies.</i>	8
21	Financial Engineering and Project Management	<i>The main objectives of the course are for students to obtain sufficient theoretical knowledge and practical skills enabling them to create imitation models, plan experiments and analyze</i>	6

		<i>the results. The curriculum allows students to learn the fundamental tenets and principles of imitation modeling, to solve specific tasks and problems. Students shall acquire knowledge and skills in the modeling of random variables and the proper definition of the tasks in the field of industrial management and to solve them by means of imitation modeling. The study material dealing with issues affecting the computational aspects of simulation modeling and drawing simulation models for the operation of complex technological systems in the field of production, transport and logistics. For preparation of the models and performance experiments are made using specialized language for simulation modeling - GPSS (General Purpose Simulation System).</i>	
22	Traffic Forecasting	<i>The main objectives of the course are that students to obtain sufficient theoretical knowledge and practical skills enabling them to create imitation models, plan experiments and analyze the results. The curriculum allows students to learn the fundamental tenets and principles of imitation modeling, to solve specific tasks and problems. Students shall acquire knowledge and skills in the modeling of random variables and the proper definition of the tasks in the field of industrial management and to solve them by means of imitation modeling. The study material dealing with issues affecting the computational aspects of simulation modeling and drawing simulation models for the operation of complex technological systems in the field of production, transport and logistics. For preparation of the models and performance are made experiments using specialized language for simulation modeling - GPSS (General Purpose Simulation System).</i>	5
23	Technology and Organization of Transport	<i>The objective of the course is to provide students with advanced knowledge and practical skills in the field of transportation/transport technology and organization of transport systems. Students gain knowledge in the general and specific transport technology elements and the foundations of the organization of the work in different modes, including public transport and implementation of passenger and freight transportation in combined and multimodal transport. Special attention is paid to the railway transport which is the fundamental in Bulgaria, with its complex organization and social functions.</i>	8
24	Urban Transport Operation and Safety	<i>The main objective of the course is to acquaint students with the specifics of the operation in companies engaged in urban passenger transport, as well as technical, technological and psychophysical bases ensuring traffic safety. The curriculum includes topics on: basics of operational activity (quantitative and quality indicators of passenger transportation, population mobility and formation of passenger flows, rolling stock necessary for their utilization, organization of drivers' work, development of vehicle movement schedules) and fundamentals of traffic safety in urban transport (major and specific factors affecting road safety, technical, technological and operational requirements for each element of the system forming traffic safety, safety systems of train movement in the underground, types and use of technical funds in the underground).</i>	6
25	Rail Traffic Safety	<i>The main objectives of the course are to acquaint students with the legal requirements for the management and safe operation of the train and shunting movements in the operating conditions of the railways. The curriculum includes topics on: safe organization, user acceptance and control, passing and sending trains at and between stations, procedure and manner of operation in extreme situations, technical and operational requirements for safe train movement and shunting</i>	6

		<i>through appropriate systems of station safety equipment, and interconnection to the direct action of the head on the movement in accordance with the schedule of trains and regulations for the operation and provision of railway safety.</i>	
26	Computer Office Applications	<i>The main objectives of the course are to introduce students to the basic package applications needed in the work of the transport office. The curriculum includes topics on: general overview and introduction to the work of the Multi-graphical operating systems (Windows, Linux, etc.) familiar with the work of a Microsoft programs including Word, Excel, Access, PowerPoint, etc., work with alternative applications on other operating systems such as Star Office, K Office and others, operation with other utilities for processing graphics and animated images (Photoshop, programs for animations and video, etc.).</i>	6
27	Occupational Safety and Health in Transport	<i>Study of the course aims to familiarize students with the basic rules, instructions and other normative documents regulating the issues of technical safety and reliability of transport on labour safety and environmental protection in the operational divisions of transport. To acquire knowledge and skills, to be able to guide and steer control issues technical safety and labour protection in accordance with regulations, instructions and regulations and documents. The curriculum includes topics on: labour legislation, occupational accidents, occupational diseases and coaching, specific requirements in technical safety and labour protection.</i>	4
28	Vehicle Safety. Investigation and Analysis of Road Accidents	<i>Objectives of the training course are connected to "safety of transport vehicles", investigation and analysis of accidents, organization of traffic safety, national and international regulations and the structure of traffic control safety. The course provides knowledge for expert evaluation and analysis of road traffic accidents (RTA) with motor vehicles.</i>	5
29	Railway Technical Operation and Traffic Safety	<i>The main objective of the course is to acquaint students with the specifics of the operation and ensuring traffic safety in rail transport. The curriculum includes topics on: regulations, instructions and other regulations related to technical operation and ensuring safety of train movement and shunting.</i>	4
30	Road Transport Technology and Organization	<i>The course is designed to acquaint students with the basics, general principles and characteristics of technology, organization and management of the movement of road transport Attention is directed to the examination of passenger, freight and public transport, their interaction and participation in transport schemes. Special attention is given to the organization and social functions of public transport. In equal volumes are considered road passenger transport and freight transport.</i>	6

HIGHER SCHOOL OF TRANSPORT "TODOR KABLESHKOV", SOFIA, BULGARIA
FACULTY "TELECOMMUNICATIONS AND ELECTRICAL EQUIPMENT IN TRANSPORT"

Nº	COURSE	ANNOTATION	ETCS
1	Electrical Engineering (Circuit Theory) I part	<i>Basic Concepts, Resistive Circuits, Ohm's law (for passive and active section of the circuit), Kirchhoff's laws, Nodal and Loop Analysis Techniques, Additional Analysis Techniques (Network Theorems), Capacitance and Inductance, Magnetic Field and Circuits, Structural Matrices, AC Steady-State Analysis, Magnetically Coupled Networks, Variable-Frequency Network Performance, Three-Phase AC Systems, Two-Port Networks, Nonsinusoidal Waveforms. DC and AC PSpice Analysis Using Schematic Capture. The total workload of the course is 105 academic hours, including 75 hours of lectures and 30 hours of laboratory exercises. Laboratory classes are held in specialized laboratories capable of experimental and analytical study, and individual work of students. Self-study of students includes an individual project in the field of his/her programme.</i>	8
2	Electrical Engineering (Circuit Theory) II part	<i>Study of the course aims to familiarize students with the basic phenomena, relationships, laws and methods for the study of transients (The Laplace Transform, Application of the Laplace Transform to Circuit Analysis), circuits with distributed parameters and fundamental differential dependence of the electromagnetic field, in view of their use in specific electrical and electronic devices and systems. The curriculum consists of 3 modules. The students are introduced to the methods for the study of transients in linear circuits, and in some special cases of the nonlinear circuits. They receive a general knowledge of the theory of electromagnetic field. The lectures are illustrated with examples of real devices. Transient PSpice Analysis Using Schematic Capture. The total workload of the course is 60 academic hours, including 45 hours of lectures and 15 hours of laboratory exercises. Laboratory classes are held in classrooms and specialized laboratories capable of experimental and analytical study. Self-study of students includes an individual project in the field of his/her programme.</i>	6
3	Electrical and Electronic Measurements	<i>The curriculum consists of 2 modules. In the first study the processing methods of measurement results, electromechanical transducers and instruments for measuring electrical quantities. The second one includes electronic and digital transmitters and apparatus for measuring electrical, magnetic and non-electrical quantities. The total workload of the course is 75 academic hours, including 45 hours of lectures and 30 hours of laboratory exercises. Laboratory exercises provide an opportunity to consolidate the theoretical knowledge from lectures and to develop skills in handling electrical equipment used in laboratories.</i>	5
4	Electrical Engineering and Electronics <i>For Bachelor's programmes: Railway Engineering, Automotive Engineering, Logistics and Building Machines</i>	<i>Study of the course aims to familiarize students with the Basic Concepts, Resistive Circuits, Ohm's law (for passive and active section of the circuit), Kirchhoff's laws, Nodal and Loop Analysis Techniques, Capacitance and Inductance, AC Steady-State Analysis, Variable-Frequency Network Performance, Magnetically coupled Networks, Three-Phase AC Systems, Analysis of nonlinear circuits in DC, Transients in linear circuits. Electromechanical transducers and instruments, Measurement of electrical and non - electrical quantities. Conductivity of semiconductors. Diodes. Transistors. Bipolar transistor with insulated gate (IGBT). Thyristors. Uncontrolled and Controlled single-phase and three-phase rectifiers. Inverters. Impulse voltage converters. The total workload of the course is 75 academic</i>	6

		<i>hours, including 45 hours of lectures and 30 hours of laboratory exercises.</i>	
5	Electrical Engineering and Electronics <i>For Bachelor's programmes: Technology and Management of Transport, Industrial Management</i>	<p><i>Study of the course aims to familiarize students with the Basic Concepts, Resistive Circuits, Ohm's law (for passive and active section of the circuit), Kirchhoff's laws, Nodal and Loop Analysis Techniques, AC Steady-State Analysis, Variable-Frequency Network Performance, Three-Phase AC Systems, laws and methods for the study of transients.</i></p> <p><i>Electromechanical transducers and instruments for measuring electrical and non-electrical quantities are considered. Single phase transformer, Electrical Machines DC, Synchronous machine, Three-phase induction motor - structure and principle of action. Transmission of electricity. Types of electrical networks. Transmission losses of electricity.</i></p> <p><i>Conductivity of semiconductors. Diodes, Transistors and Thyristors- Characteristics and principle of operation. Uncontrolled single-phase and three-phase rectifiers. Controlled single-phase and three-phase rectifiers. The total workload of the course is 60 academic hours, including 45 hours of lectures and 15 hours of laboratory exercises.</i></p>	5
6	Measuring, control and diagnostics of computer and telecommunication systems	<p><i>The course aims to train students for the methodology specifics and technique of measurement in Telecommunication & Signalling Equipment (T&SE) parameters of signals, systems and devices for measuring, testing and control of T&SE for railways.</i></p> <p><i>In the curriculum are four separate modules:</i></p> <ol style="list-style-type: none"> <i>1. Measurement methods and tools in telecommunications safety and security systems.</i> <i>2. Computer measurements and remote control facilities.</i> <i>3 Technical diagnostics Systems. Basic concepts and issues. Process optimization of maintenance.</i> <i>4. Collection, processing and analysis of information about the reliability in operation.</i> <p><i>In the first module is planned to study the methods of measurement and evaluation of measurement uncertainty, the parameters and characteristics of the measuring instruments. Special attention is paid to information and measuring systems with digital and computerized instrumentation organization in the automation of measurements and processing of the results.</i></p> <p><i>The second module explores special T&SE meters for measuring analog and digital tracts circuits and communication networks. The methods for testing and calibration of instruments, metrological norms and standards in the field of communications are studied.</i></p> <p><i>The third module introduces students to the issues of control and diagnosis of technical systems and in particular T&SE and consider maintenance of renewable systems, methods and tools for their organization, methods of optimization processes of technical maintenance on various criteria: safety, economy, spare parts, the optimal time of the inspections, repairs.</i></p> <p><i>The Fourth module treats the fundamentals of mathematical statistics and methods for determining the empirical reliability characteristics of T&SE objects obtained by collecting data during operation.</i></p> <p><i>For students to have the necessary knowledge of "Analogue and pulse technique", "Electrical Measurements", "Power Engineering", "Digital and Microprocessor technique", "Electrical interlocking", " Train movements automatic control".</i></p> <p><i>Laboratory exercises are conducted in laboratories "Repair, maintenance and diagnosis" and "Terminal and office equipment".</i></p>	7
7	Power Electronics	<i>Objectives of the course are:</i>	6

		<ol style="list-style-type: none"> 1. Study the working principles and main characteristics of semiconductor components - diodes, transistors , thyristors and integrated circuits. 2. Understanding the basic parameters of the electronic amplifiers and the impact of feedback on their performance. 3. Understanding the basic regimes of analog and digital integrated circuits . 4. Learning schemes converting electrical energy - controlled and uncontrolled rectifiers, inverters and regulators of the direct and alternating voltage. <p>This subject introduces students to the principles of basic semiconductor devices - diodes, transistors, thyristors and integrated circuits. On the basis of these elements are considered construction of analog circuits and selection of operational modes. Particular attention is paid to the schemes for conversion of electrical energy that are widely used in transport equipment: controlled and uncontrolled single-phase and three-phase semiconductor rectifiers, dependent and independent inverters, DC and AC voltage regulators. The specifics in series and parallel connection of power semiconductor devices are analyzed. Laboratory exercises could be conducted in the laboratory using models, stands and control measuring technique.</p>	
8	Automatic Control Systems	<p>The aim of the course is to form the necessary knowledge about the different types of systems for automatic control of traction rolling stock and other installations.</p> <p>Study of the basic principles of automatic control is included, for example the main control open loop and closed loop schemes and types of dynamics units. Types of devices, sensors, speedometers etc. are analyzed. Systems for automatic and indirect control on rolling stock and traction substations are reviewed. Principles of programming and operation of microcontrollers are discussed.</p>	5
9	Electrical Equipment	<p>This study course is designed to form a basic knowledge of the fundamental parameters, characteristics and methods for the design of electrical equipment used in the fields of energy, industry and transport.</p> <p>The main types of electrical equipment in industrial and repairers enterprises, station installations for power supply of electric transport and electrical equipment of rolling stock for rail and public transport are analyzed. The main characteristics and design methods of the components of the electrical equipment are discussed - electric power equipment, protection devices, equipment for control and electrical drive automation.</p>	6
10	Electric drives	<p>Study of the course is to form a basic knowledge of the fundamental questions of the general theory of electrical and its automatic control.</p> <p>The curriculum consists of 3 modules. These include static and dynamic characteristics of electric motors with direct and alternating current, as well as issues related to the selection of motors. The main types of electric production mechanisms in general industrial use, as well as mechanisms used in energy supply and transport. Particular attention is paid to electric and management of electric vehicles for AC and DC During the seminars and laboratory exercises are examined analytically and experimentally the main points of the theoretical material in order to give students the practical knowledge and skills. Provision of stable knowledge is supported by assigning tasks for self-fulfilment.</p> <p>For the learning process the following subjects need to be studied: Electrical Engineering, Power Electronics, Electrical, Applied Mechanics, Electrical machinery, electrical apparatus, automatic control systems.</p>	7

11	Control and Protection of Electric Drive Vehicles	<p>The aim of the course is to form the necessary knowledge of the theory of control on electrical vehicles. The basic principles of control on electrical drives are reviewed.</p> <p>The control systems and protection devices installed in electric locomotives, trams, trolleybuses, underground trains are analyzed.</p> <p>The principal control systems and protection of European high-speed railway transport are examined.</p>	8
12	Systems for Control and Protection of Electric Vehicles	<p>The course is designed to provide fundamental knowledge and practical skills in contemporary control systems and protection of electric vehicles. The theoretical content of the course is illustrated with real objects. A real modern electric vehicle is used in training of students. It was designed, assembled and tested by a team of teachers and students from the Department of Electric Power Supply and Electrical Equipment. The electric vehicle provides also opportunity for research in development and use of this new and promising means of transport. A solar panel is mounted on the roof of this electric vehicle to ensure electricity for its own power needs. This technical solution also increases the run of the electric vehicle. Another power-saving solution is applied to the use of supercapacitors, a product of modern nanotechnology. They could give a large amount of electric power for a short time, and to assume it on a generating mode. Supercapacitors outperform all types of rechargeable batteries known up to now.</p> <p>Laboratory classes are held in classrooms and specialized laboratories capable of experimental and analytical study and individual work of students.</p>	7
13	Advanced Systems for Control and Protection of Propulsion Networks	<p>Study Course is designed to provide fundamental knowledge and skills for the management, control and protection of traction stations and substations in public and railway transport powered by direct or alternating current.</p> <p>The basic principles of operation of the devices is examined – current and voltage sensors, programmable logic controllers and communication networks.</p> <p>Laboratory classes are held in labs with the possibility of experimental and analytical study of various objects and individual work of students.</p>	6
14	Advanced Systems for Control and Protection of Electric Drive Vehicles	<p>Study Course is designed to provide fundamental knowledge and practical skills in contemporary control systems and protection of electric drive vehicles. The control systems and protection devices installed in contemporary trams, trolleybuses, underground trains are discussed. The basic principles of operation of mostly used devices are examined – current and voltage sensors, encoders and other sensors are reviewed. The principles of vector control on asynchronous drives are examined.</p>	6
15	High Efficient Energy-saving Devices and Technologies	<p>Study Course is designed to form a basic knowledge of the fundamental parameters , characteristics of high-performance devices and technologies for improving the quality of manufactured and used electricity related to power electric transportation.</p> <p>The curriculum consists of three modules. They introduce the theory of the basic processes and phenomena influencing parameters used electricity, research and implementation of modern technologies to increase the energy parameters of the energy supply system of transport and electric vehicles. The main principles and methods in research and design of these devices are examined analytically and experimentally the main points of the theoretical material in order to give students the practical knowledge and skills. Formation of stable knowledge is supported by assigning tasks for self-fulfilment.</p>	6
16	Electric Car Power Sources	<p>Study Course is designed to form a basic knowledge of the different types of power sources.</p>	6

		<p>The main types of batteries used in electric vehicles - lead acid, nickel -metal hydride, nickel -cadmium, lithium-ion, lithium-ion iron phosphate, lithium -polymer and others. Students study the theoretical and technical parameters and characteristics of different types of rechargeable batteries. Separate special attention to modes - charge, discharge, etc.</p> <p>The course covers the main types of fuel cells used to power electric current. Studied theoretical issues, and construction and operation of CNG and hydrogen fuel cells</p> <p>Attention is drawn to the new technologies applied to the storage of hydrogen and other gases used for electricity production.</p>	
17	Power Supply and Electrical Equipment Design	<p>The aim of the course is to obtain the necessary knowledge about the organization, technology and design requirements of equipment for electrical and electrical equipment.</p> <p>The curriculum consists of two modules. In these studies the key issues of the organization stages normative technical and technological requirements for the design of facilities for electricity and electrical equipment. In seminars theoretical material is complemented with practical problems relating to the selection of design solutions, machinery equipment and facilities design. Obtaining permanent knowledge is supported by the award of individual tasks independent solution. In the course was developed and coursework.</p> <p>For the learning process needs to be studied following subjects: Electrical Engineering I and II, Electrical networks and systems, Modes of power systems, Relay Protection.</p> <p>Lectures with a school group, and tutorials and laboratory classes are held in rooms and labs by individual work of students.</p>	6
18	Contemporary Trends in Development of Electric Transport	<p>Study Course is designed to form a thorough knowledge of the structure and characteristics of the main types of electric transport and modern applications, innovations and trends in an electric equipment.</p> <p>The curriculum consists of three modules. They are familiar with the organization, characteristics and parameters of the main types of electric vehicles for AC and DC, as well as methods for sizing. They discuss current technical application meeting the requirements to modernize the electrics and the management of electric vehicles for AC and DC . Related to the construction of highly efficient and reliable transport system. During the seminars explore analytically and experimentally the main points of the theoretical material in order to give students the practical knowledge and skills. Formation of stable knowledge is supported by assigning tasks for self-fulfilment.</p> <p>Absorption of the material needs to be studied following subjects: Theoretical Electrical Engineering, Power Electronics, Electrical, Applied Mechanics, Electrical machinery, electrical apparatus, automatic control system, electric drives.</p>	10
19	AC Propulsion Electric Drives	<p>Study of the course is to form a thorough knowledge of the main types of AC traction electric drives.</p> <p>The curriculum consists of three modules. They include the production of basic circuits of power converters for use in electric vehicles with AC drives. Are considered in detail modes of synchronous and asynchronous electric drives. Prepare various characteristics of AC drives, and design methods. In seminars theoretical material is supplemented by consideration of practical solutions. Laboratory class students explore physical models of AC electric drives, eliminating all the main characteristics.</p> <p>For the learning process following subjects need to be studied: Electrical machinery, electrical appliances, electrical equipment, power electronics.</p>	6

20	High-speed Electric Transport	<p><i>Study of the course is to form a fundamental knowledge in the management, construction of road and rolling stock for high traffic, electricity, automation and motion control of the stock. Addressed and questions about diagnosis and operation of high-speed movement of electric transport.</i></p> <p><i>The curriculum consists of three modules – "Electrified high-speed lines", "Electrical transport in high-speed traffic" and "Management and operation of high-speed electric transportation". The first module covers peculiarities of high- power lines, overhead lines and current collection at high speeds. Second module addresses issues associated with determining the optimum technical speed, the parameters of high-speed traffic with electric locomotives for suburban and urban traffic, trains, magnetic and air bag systems. The third module covers, automatic control and diagnosis of trains and rail without rail traffic and their use in the European rail network.</i></p> <p><i>The learning process needs the study of the following subjects: Electricity, Electrical part of power plants, electrical machinery, electric equipment, operation of electric locomotives, electric transport.</i></p>	4
21	E-Business	<p><i>E-business is defined as a process of using information and communication technologies for business by transforming their role. The course in E-Business presents the latest information technologies providing possibility to do business through Internet.</i></p> <p><i>The nature, specificity and mechanisms of effective information search on Internet as well as the prerequisites for using the Internet in business are examined. The main characteristics of the Internet economy and the fundamental principles of e-business are outlined. The patterns of e-business and manifestation of e-commerce as well as the approaches to the Internet trade architecture are analyzed. Special attention is given to the two classes of systems for e-business: Business-to-Business (B2B) and Business-to-Customer (B2C).</i></p> <p><i>The course examines issues of what Internet magazine and its architecture are, the characteristics of the electronic shopping system, how to plan and build an online store, how to choose appropriate software for e-commerce, what the rules for detecting e-shops are, what the administration of the store includes, etc.</i></p> <p><i>The possibilities of Internet payments and commercial banking services on the Internet and online payment system in Bulgaria are presented.</i></p> <p><i>The syllabus presents the infrastructure of e-business, planning and construction of a Web site for e-business. The essence, principles and forms of Internet marketing are cleared. Systems of Customer Relations Management (CRM software) and ERP integrated management systems are presented.</i></p> <p><i>The status of e-business and e-government in Bulgaria are also analyzed.</i></p> <p><i>Information security and protection occupy a special place in business. In this aspect the course examines the basic methods of protecting company secrets and the corporate Web server through firewalls, capabilities to protect costumers' transaction as well as the widely used means of encryption, including electronic signature and electronic certificates.</i></p> <p><i>It is provided to perform a case study during the course to give opportunity to students to apply knowledge acquired on the basis of real practical problems related to e-business.</i></p> <p><i>The course finishes with current assessment of student learning.</i></p>	6
22	Informatics <i>For Bachelor's programmes: Telecommunications</i>	<p><i>The syllabus includes the following topics: basic concepts of informatics, ways of representing, structuring and using information, operating systems, environments of</i></p>	7

	<p><i>and Signalling, Transportation Engineering, Railway Engineering, Automotive Engineering, Logistics and Building Machines, Power Engineering and Electrical Equipment</i></p>	<p><i>programming and applied systems as well as capabilities and operation of various components in a computer configuration. It studies how to operate a computer in the environment of GUI Windows. Attention is drawn to possibilities of computer networks, especially of the World Wide Web Internet to find and share information.</i></p> <p><i>It emphasizes effective computer data processing, data management and use. To create different types of documents and for data structuring, processing, graphical presentation and analysis, the basic features of application software for computer word processing and spreadsheets are examined. A major highlight is the integration and automation of MS Office applications. Basic concepts of working with presentations are also created.</i></p> <p><i>The course provides students with knowledge in algorithm fundamentals and the theoretical possibility to implement algorithms using a programming language of high level (C++). Learners are introduced to the principles of a structured approach to programming.</i></p> <p><i>The total workload of the course is 90 academic hours, including 30 hours of lectures and 60 hours of laboratory exercises. Power Point presentations are prepared for lectures, which are held in lecture halls equipped with the necessary equipment (computer and multimedia projector). The laboratory classes are held in computer labs with Microsoft Office package and Internet connection.</i></p> <p><i>Tests and quizzes are provided during the course. Self-study of students includes an individual project in the field of his/her programme. The preparation for laboratory classes requires a certain number of workload over the lecture engagement of students.</i></p> <p><i>The course finishes with an exam.</i></p>	
23	<p>Informatics <i>For Bachelor's programmes: Technology and Management of Transport, Industrial Management, Transport Economics</i></p>	<p><i>The syllabus includes the following topics: basic concepts of informatics, ways of representing, structuring and using information, operating systems, environments of programming and applied systems as well as capabilities and operation of various components in a computer configuration. It studies how to operate a computer in the environment of GUI Windows. Attention is drawn to possibilities of computer networks, especially of the World Wide Web Internet to find and share information.</i></p> <p><i>It is emphasized on effective computer data processing, data management and use. To create different types of documents and for data structuring, processing, graphical presentation and analysis, the basic features of application software for computer word processing, spreadsheets and databases are examined. A major highlight is the integration and automation of MS Office applications. Basic concepts of working with presentations are also created. Students can obtain basic ideas of the architecture of business information systems, stages of design, development and implementation as well as of data protection and information security. The total workload of the course is 90 academic hours, including 30 hours of lectures and 60 hours of laboratory exercises. Power Point presentations are prepared for lectures, which are held in lecture halls equipped with the necessary equipment (computer and multimedia projector). The laboratory classes are held in computer labs with Microsoft Office package and Internet connection.</i></p> <p><i>Tests and quizzes are provided during the course. Self-study of students includes an individual project in the field of his/her programme. The preparation for laboratory classes requires a certain number of workload over the lecture engagement of students.</i></p> <p><i>The course finishes with an exam.</i></p>	7
24	<p>Communications and signalling <i>For Bachelor's programmes: Technology and</i></p>	<p><i>The aim of the course is to give students the necessary knowledge for communication, information and security systems, without which there can be run either type of transport</i></p>	5

	<i>Management of Transport and Industrial Management</i>	<p><i>and ensure the safety of vehicle traffic.</i></p> <p><i>The formation of curriculum with emphasis on the purpose of the systems, their ability to provide operational management and safe traffic management in different modes, to increase the throughput of hubs to create an effective organization and interaction between officials engaged in providing the transport process. In order to exploit these opportunities as professionals tomorrow, today students must be familiar with the technical solutions and the specifics of the building systems. First of all the students have to be very good literate users with better use their allocations for scientific engineering service organizational and management tasks.</i></p> <p><i>The total workload of the course is 60 academic hours, including 45 hours of lectures and 15 hours of laboratory exercises.</i></p>	
25	<p>Electric Car Equipment</p> <p><i>For Master's programme: Electric Vehicles</i></p>	<p><i>This study course is designed to form a basic knowledge of the parameters and characteristics of electrical equipment used in contemporary electric vehicles. The main components of the electrical equipment are discussed - electric power equipment, protection devices, equipment for control and electrical drive automation. Electrical equipment of autonomous electric cars and vehicles is analyzed. The curriculum includes static and dynamic characteristics of AC and DC electric motors, as well as issues related to the selection of motors.</i></p> <p><i>The following subjects need to be studied for the learning process: Electrical Engineering, Power Electronics, Electrical Equipment, Electrical machinery, Electrical Apparatuses, Automatic Control Systems, Electrical Drives.</i></p>	7
26	<p>Electrical Apparatuses</p> <p><i>For Bachelor's programme: Power Engineering and Electrical Equipment</i></p>	<p><i>Study Course provides full information on the purpose and types of electrical apparatus. The principles of operation of the relays, circuit breakers, switchgears are discussed. Many types of sensors are also reviewed. The static and dynamic characteristics of many apparatus are examined. Electrical apparatus used in industry, energetics and transport are fully described. In the specialized labs, different types of relays are tested.</i></p>	7
27	<p>Electric Transport</p> <p><i>For Bachelor's programme: Power Engineering and Electrical Equipment</i></p>	<p><i>Study Course is designed to form a fundamental knowledge in the characteristics and parameters of the main types of electric vehicles for AC and DC (electric locomotives for suburban and urban traffic, trains, trams, trolleybuses, and underground trains). Automation and motion control of the rolling stock, as well as the principles of the speed regulation are analyzed. The structure and characteristics of the main types of devices and drives used in the electric vehicles are discussed. The learning process needs the following subjects to be studied: Power Electronics, Electrical Equipment, Electrical Machinery, Electrical Apparatuses, Automatic Control System, Electrical Drives.</i></p>	10
28	<p>Relay Protection</p> <p><i>For Bachelor's programme: Power Engineering and Electrical Equipment</i></p>	<p><i>Study Course provides full information on the purpose and types of protection relays, as well as on their safe handling, commissioning and testing. Relay protection of power lines, transformers, generators, motors and bus systems in power plants and substation in the power system and electrified transport are discussed. In the specialized lab, the operation of the main types of relay protection is tested and examined experimentally.</i></p>	5

**HIGHER SCHOOL OF TRANSPORT "TODOR KABLESHKOV", SOFIA, BULGARIA
FACULTY „ MACHINERY AND CONSTRUCTION TECHNOLOGIES IN TRANSPORT”**

Nº	COURSE	ANNOTATION	ETCS
1	Superstructure and Maintenance of Railway Track	<i>Discipline is an essential and profiling for specialty. It aims to form in depth knowledge of the construction of the superstructure, as one of the two components of the track, the elements of which it is composed, the interaction of the track and rolling stock and the requirements to ensure safe movement of trains. The acquired knowledge will enable self-solving engineering problems associated with the construction and operation of the superstructure and the track as a whole. The curriculum consists of three modules. These include the study of: the requirements for the general solution of the construction of the superstructure and its components, features, including the geometry of the railway superstructure determining strength and other factors and processes without rail joints rail; processes of wear and deformation of the iron time and countering them through a system of road rehabilitation, organization, modern methods, technologies and technological equipment (machinery) the maintenance, repair and inspection of the technical condition of the track . Exercise in the form of course assignments, complement and reflect the practical application of the lecture material. Course is taught in Bulgarian and English language.</i>	11
2	Design and Construction of Railway Track	<i>The course aims to acquaint students in "Transportation Engineering" with the basic principles in the design and construction of railway stations. It explores issues: Classification and location of the stations along the railway line; Position of the stations in plan and longitudinal profile; Track compounds streets and track groups; Subgrade, drainage and superstructure at the stations; Types of stations and junctions. The course is taught through lectures, illustration by drawings, coursework, self study and visits to newly built and into operation stations. The course is taught in Bulgarian and English language.</i>	7
3	Soil Mechanics and Foundation	<i>The course of "Soil Mechanics and Foundation" is a basic discipline for the students in Civil Engineering. The main subject of the study is the interaction between the structure and the ground. The course has two main sections - Soil Mechanics and Foundation Engineering. Soil Mechanics is a specific part of the mechanics, in which the properties of the ground are studied and modeled by the means of classical and applied mechanics. Soil Mechanics is the instrument for calculating all parameters needed by the second section – Foundation Engineering. The Foundation Engineering deals with the size, design and technology by which we do this part of the building structures called foundations and these are in contact with the ground. The course is taught in two semesters – the 3rd one and the 4th one. The first of these is dedicated to the section of Soil Mechanics and more precisely these are the modules of "Physical and mechanical properties of soils", "Bearing capacity of the ground and Slope stability" and "Earth Pressure". During the semester of Foundation Engineering, students learn about "Shallow Foundations", "Retaining structures" and "Deep foundation". Lectures in Soil Mechanics are taught in 30 hours, and there are also laboratory exercises in 15 hours. Foundation Engineering Lectures consist of 45 hours, and the accompanying exercises are in 30 hours, in which students have to prepare a project for a bridge foundation. The exam - written and oral, is conducted at the end of the last semester and it</i>	10

		<i>takes place after a successful completion and presentation of the above-mentioned project.</i>	
4	Transportation Engineering (Maintenance of Roads)	<i>Transportation Engineering is a compulsory course from the final stage of the students' training in the Bachelor's program "Civil Engineering". The course objective is the students to obtain fundamental knowledge about the types of transportation engineering and practical skills for developing key elements of the road and railways projects. After completing this course, students will: Have knowledge of transport infrastructure components and their interaction; Have basic knowledge of road construction and skills for designing key elements of road projects; Have basic knowledge of railway construction and skills for designing key elements of the railway project; Be knowledgeable about the technology for constructing linear transport sites. The lecturers in the course may have scientific specialty in design, construction and maintenance of roads, streets and facilities or design, construction and maintenance of railway lines, stations and facilities.</i>	5
5	Design and construction of roads	<i>The study course is designed to provide knowledge in design and construction of roads that students will practically apply to development of the term project. The syllabus is based on 4 modules. It addresses the main issues in design and construction of roads. The classification principles and methods of design are presented. These methods are based on safety, environmental, economic requirements and the requirement to ensure traffic. A number of topics related to the stages of road construction, modern road building materials and technologies are examined. The course contents give a possibility to solve complex practical infrastructure problems using also other related engineering subjects. Lectures are taught to all students while seminars enable individual work with them.</i>	7
6	Building and Road Construction Machines	<i>The aims of the course "Building and Road Construction Machines" are students to acquire permanent and comprehensive knowledge of lifting, building and road-construction machines, including knowing the types of machines and systems, their purpose and application, structure, operation, basic parameters, methods of calculation and design of basic mechanisms, work equipment systems and the application of machinery in the construction practice. As a result of the training the student has to: Know the types of lifting and construction equipment and systems and their use; Know the basic parameters and methods of their calculation; Know the innovations and best practices applied by the world companies working in the field of construction equipment.</i>	6
7	Mechanization and Automation of Material Handling Processes in Transport	<i>The program aims to present students with new tendencies from mechanization and automation of material handling processes in transport. Lectures are illustrated with multimedia presentations of Power Point. Methodical course of conducting the seminars is built on motivation, orientation and training of students. The teacher motivates students by provoking interest in the specialty sector and future career. There can be assigned student presentations by developing specific topics from the field of material handling processes. The aim is to encourage students to express their own opinion on an issue, develop creative thinking and autonomous decision-making.</i>	7
8	Industrial Logistics: Material Handling Machines, Processes and Systems	<i>In the process of training, students become acquainted with the modern trends applied by the companies that manufacture machinery for material handling machines, processes and</i>	7

		<i>systems using prospectus materials - CD and DVD movies and presentations. The course provides for exercises that follow the theme of the lectures. Laboratory classes are conducted in the frontal method - the laboratory group performs a topic under the guidance of the teacher, and may set different values of output parameters of each student.</i>	
9	Industrial Logistics: Loading/Unloading Equipment	<i>The program Industrial Logistics: Loading/Unloading Equipment aims to acquaint students with the modern Loading/Unloading Equipment for automated high-bay storages, for container terminals and so on. The students will receive information about the industrial electric-truck lifts, container cranes, and systems for loading and unloading.</i>	5
10	Technical Safety of Material Handling and Construction Equipment	<i>The Program "Technical Safety of Material Handling and Construction Equipment" will establish guidelines to prevent or eliminate hazards that can cause injury to workers or damage to property and equipment. The program is intended to address comprehensively the issues of; evaluating and identifying potential deficiencies, evaluating the associated potential hazards, communicating information concerning these hazards, and establishing appropriate procedures, and protective measures for employees. Lectures are illustrated with multimedia presentations of Power Point and movies.</i>	4
11	Transport Infrastructure	<i>The course must study the nature and purpose of the transport infrastructure, the main elements of transport infrastructure facilities of transport infrastructure modes of transport, financing, management and implementation of infrastructure projects. The course should introduce students to the division and classification of railways and roads in the Republic of Bulgaria, the facilities on them, faults and repairs that arise. Learners are introduced to the European transport corridors, the European road and rail network, road and rail network of the Republic of Bulgaria, railways and special features of the infrastructure of water and air transport.</i>	4
12	Transport Equipment	<i>The aim of the training course "Transport Equipment" is the study of basic technical, operational and reliability characteristics of transport equipment, study the structural features of the transport machinery, introduction to traction and dynamic characteristics of Vehicles. In the course " Transport equipment" razgizhdat following topics : Classification of transport equipment technical parameters load (capacity) , key indicators and measures the performance of transport vehicles , the technical characteristics of certain cash handling equipment , operational and reliability indicators and systems maintenance and repair; traction , speed and performance of different types of transport equipment , trends in modern transport equipment - development forecasts. To study the material in this course are required knowledge on mathematics, technical safety and security of labor, materials and technology of materials and theoretical mechanics.</i>	7
13	Brake systems and traction of trains	<i>Objectives of the training course are to provide students with basic knowledge of: the forces acting on the train when it is moving , their causes and factors on which they depend ; methods for determining the speed and mass of the time needed to travel on trains rational power locomotives , structure and operation of the train air brake , mechanical brake system - a device action , requirements and regulation, requirements for the preparation, arrangement and providing trains with brake mass for safe movement. The curriculum consists of two modules. It examines issues related to the forces acting on the train when it</i>	8

		<i>is moving , their causes and factors on which they depend , calculation methods and standardization table of trains , setting speed and time needed to travel the trains as they move in different profiles way , the theory of suspension, the principle of operation of the used brake systems, structure and operation of the major brake calipers , the mechanical part of the brake system , the provision of trains and shunting up with the necessary brake for safe movement of trains.</i>	
14	Electronic systems in cars	<i>The aim of the training course "Electronic vehicle systems" is to familiarize students with the structure and operation of electronic systems in the car, and the trends of development in order to Decrease the harmful effects on the environment and improving traffic safety. It examines the main components that make up the electronic systems of the car - semiconductors, sensors, actuators and more. Formulate requirements to electronic control systems and the principles of their construction. The example is implemented solutions in modern cars. Examine and use the interface they provide.</i>	8
15	Train Traction	<i>Course " Train Traction " is mandatory for students of specialty "Railway" for the degree "Bachelor". It aims to give students basic knowledge related to the theoretical foundations of the movement of trains and also the most important practical questions from the operation of traction rolling stock. In this context, the most important concepts, laws, methods and issues of dynamics and energy of the movement of trains.</i>	4
16	Diesel Locomotives Operation	<i>The aim of the program is familiarizing students with the structure of BDZ EAD , the organization and management of its locomotive economy , as well as the structure, management and locomotive facilities; introduction to the organization of work and rest of the locomotive teams, their composition , rights and obligations ; introduction to the preparation for the operation and maintenance of diesel locomotives from the park of BDZ EAD , as well as the servicing of trains with diesel locomotives ; familiarity with the technology of production, functional properties and types of fuel and oil materials and preparation of water for cooling and heating boilers diesel locomotives.</i>	5
17	Reliability of Vehicles	<i>The objectives of the course " Reliability of Vehicles " are: theoretical study of reliability relevant to the issues of safety and reliability of transport equipment, the study of the physical basis of credibility : the loss of employability, Crack , durability major destructive processes in transport equipment ; utilization of applied statistics for processing of statistical data for the repair and operation of transport equipment, performance evaluation and indicators of reliability , their use and physical interpretation.</i>	5
18	Test and Diagnosis of Railway Equipment	<i>The aim of the course is to acquaint students with: physical principles and technical realization of the transformation of mechanical quantities into electrical signals, types of tests of transport equipment: functional, definite, dynamic strength, post-repair, control, mechanical, electrical and other, some special tests nazhelezopatni vehicles, diagnostics and resource assessment of transport equipment, respectively their systems, assemblies and components. The curriculum consists of four modules. The material in the discipline pursues the formation of a satisfactory basis in engineering students so that they can know and be able to:</i>	10

		<p>1. To solve operational transport problems - the result of design, technology , manufacturing and repair deficiencies - of monitoring, inspections , measurements and tests as required by the UIC and international regulations (MHS) ;</p> <p>2 . To plan, organize and conduct the tests and diagnostics of railway vehicles respectively their individual units and systems ;</p> <p>3 . Choose equipment for measuring, testing and diagnosis;</p> <p>4 . To assess the reliability of the test results and diagnosis ;</p> <p>5 . Develop adequate engineering and organizational events . To use Bulgarian state standards , standardization documents of international rail and others. organizations and national administrations (UIC, ERRI (ORE), DB, SNCF, DIN, GOST , ISD , etc.) .</p> <p>For the course students should have knowledge of : Strength of Materials, Theory and design of railway equipment , railway equipment repair , Metrology and Measuring Equipment , Machine Parts , Electrical . , Mechanics, Mathematics and others.</p>	
19	Brake Systems in Railway Vehicles	<p>The aim of the course is to give students basic information about:</p> <ul style="list-style-type: none"> - The theoretical basis of the processes of friction braking systems of the rolling stock; - Some basic design features of pneumatic equipment of the braking system; - Methods for determining the basic parameters of the braking system; - Methods for solving performance brake problems; - Organization of diagnostics, repair and operation of the braking system; - Methods for determining measures of efficiency of the brake system. 	8
20	Vehicle Safety. Investigation and Analysis of Road Accidents	<p>Objectives of the training course " Vehicle Safety. Investigation and Analysis of Road Accidents "is to provide the necessary knowledge and get students from the" Automotive Engineering "organization of traffic safety, national and international regulations and the structure of traffic control safety. The course provides knowledge for expert evaluation and analysis of road traffic accidents (RTA) motor vehicle.</p>	5
21	Automotive Engineering I	<p>Objectives of the training course "Automotive Engineering." Is to give the knowledge of students in "Automotive Engineering" on the mechanical characteristics of the travelers propellers used in automobile technology (AT), the basic operational characteristics of AT - towing speed brake, energy economy, sustainability, manageability, agility, smoothness and road traffic and performance evaluation of key performance properties of the AT.</p>	8
22	Automotive Repairing and Operation	<p>The aim of the course "Automotive Repairing and Operation" is to acquaint students with the latest requirements for determining the technical condition of cars. Examines the fundamentals of various technological processes that make up the repair and service of cars, their management in order to get the maximum effect in the repair of vehicles. The course " Automotive Repairing and Operation" allowing for the implementation of interdisciplinary training approach, addressing issues of manufacturing technologies, technology, metal and Metal, machine tools and technical diagnostics</p>	12

Practical Training

<i>Nº</i>	<i>COURSE</i>	<i>ETCS</i>
<i>1</i>	<i>Practice in Material Processing</i>	<i>2</i>
<i>2</i>	<i>Practice in Transport Company (auto or/and railway)</i>	<i>2</i>
<i>3</i>	<i>Practice in Mechanical Engineering Company</i>	<i>2</i>
<i>4</i>	<i>Practice in Maintenance Company for Material Handling Equipment</i>	<i>2</i>
<i>5</i>	<i>Practice in Maintenance Company for Construction Equipment</i>	<i>2</i>
<i>6</i>	<i>Practice in Communications and Signalling equipment</i>	<i>4</i>