Study program: **TRAFFIC AND TRANSPORT ENGINEERING**
Duration of study program: **ONE YEAR**

ECTS credit points: **60**

GOALS OF THE STUDY PROGRAM

Having in mind the fact that transportation services are significant benchmarks in the development scheme of a country, their influence on structure and function of social, economic and political systems is direct. This is the way it necessary for a traffic engineer to foresee the problems, not only as a planner, an organizer or a designer but also as traffic and transport expert.

The new millennium is marked by the massive integration of human systems and technology appliance. In this context, road and transport engineering and experts deriving from this research area would have to undergo changes if they want to integrate into the modern society.

Precisely in this idea, we located the source of our effort to establish updated and modern Second cycle of university studies taught in English.

Specific objectives *of Second cycle studie* are as follows:

- Providing efficient education of engineers in the area of road and air traffic and transport, with professional expertise in accordance with the needs of R. Macedonia and the wider region;
- Enabling graduates to organize, design and implement contemporary traffic and transport systems in the area of planning, safety, management, and logistics;
- Developing transferable skills and abilities of the research methods, problem identification, logistic analysis, selection of solutions and communication of ideas and demonstrating the value of interdisciplinary approach;
- Accomplishing greater efficiency and high rate of exam passing and providing a high level of quality.

The wider objective of Second cycle academic studies is establishing an educational system compatible with the international standards.

Traffic and Transport Department is prepared to cope with any possible demand changes occurring on the national, regional or international level in order to educate well trained young and ambitious professionals.

The Second cycle academic studies sustainability could easily be realized if we also have in mind the international relations of the Faculty with other universities in the region - Belgrade, Zagreb, Ljubljana, Maribor, Sofia etc. This also presents an opportunity for staff and student mobility.

Learning outcomes (specific qualification descriptors)

Knowledge and understanding

Shows the thorough knowledge and understanding in scientific research fields and areas acquired in the second cycle and relate to:

- Knowledge of applying the theoretical and practical fundamental knowledge of engineering, computer sciences and technologies for transport and traffic engineering activities;
- Shows the competencies to describe and discus about complex traffic and transport tasks;
- Possess the ability to follow current scientific researches and developments as well as the broader multidimensional concept of the traffic system;
- He/she follows a modern tendency of the transport systems development.

Applying knowledge and understanding

- Qualified for the study of complex tasks under consideration, showing elements of insight, and can apply knowledge and understanding in a way that indicates a professional approach to the job or profession;

- Shows the competence in identifying, analyzing and solving problems inrelated scientific fields studied in the second cycle. He/she is capable of finding and reliance arguments within the field and areas of study.

Communication skills

- Possess the ability for communication through reports and oral presentation, using appropriate terminology from the field of traffic and transport systems;
- Develops the ability to share and discuss with the experts and public community about theoretical and practical issues in the field of traffic and transport systems;
- The ability for teamwork and active cooperation, by sharing responsibilities and tasks.

Learning skills

- Take the initiative to identify the needs for further knowledge acquisition and learning in the area of traffic and transport systems, with a high degree of independence;
- Estimates of the need for continuous upgrading his/her knowledge and skills.

Courses

I semester

*Mathematical methods in traffic (6 **ECTS**)*

Course objectives and acquired competencies: Upgrading the skills of students with advanced topics in statistics. Introducing students to the mathematical methods from selected chapters of mathematical programming, selected methods of modeling and simulation and its application in research in traffic.

*Modeling and simulation (6 **ECTS**)*

Course objectives: Introducing students to the meaning and importance of modeling and simulation of dynamic systems.

Acquired competences: The ability for modeling and simulation of dynamic systems and their application in solving real traffic problems.

The mandatory courses should be selected by the students in consultation with their mentor from the list shown bellow (two courses should be selected)

*Traffic management and control II (6 **ECTS**)*

Course objectives and acquired competencies: An integrated approach towards traffic management and control. Capability for an integrated approach towards traffic management and control problems using modern and sophisticated techniques and tools.

*Traffic Flow Modelling (6 **ECTS**)*

Course objectives: Getting knowledge about the methods for traffic flow modelling, as an advanced tool for setting, analysis and solving of numerous problems in traffic and transport engineering.

Acquired competencies: Ability and skills for application of methods for modelling as well as using of various types of models.

*Advanced Technologies in Public Transport (6 **ECTS**)*

Course objectives: The main objective of this course is to familiarize students with advanced systems and technologies applied in modern public transport - their characteristics, contribution to the improvement of the functioning, quality of service and productive work.

Acquired competences: Acquisition of skills, knowledge and use of scientific approach to solving problems related to planning and designing the systems of public transport at all three levels of planning: urban transport system, public transport mode and at individual design elements for at project level for public transport with particular emphasis on the application of modern advanced systems and technologies in public transport.

*Logistics Systems (6 **ECTS**)*

Course objectives: To comprehend the characteristics of logistics systems in terms of coordination among the processes of transport, distribution, and storage.

Acquired competences: Competences in understanding the formulation and the evaluation of various logistics systems in the transportation, industry, distribution, and warehousing.

*Ecological vehicles (6 **ECTS**)*

Course objectives and acquired competencies: Awarding knowledge of the ways for cleaning motor vehicles exhaust emissions with engines with internal combustions, like the implementation of alternative fuels for reducing pollution of air.

*Software expertise of road accidents (6 **ECTS**)*

Course objectives: The aim is to familiarize students with software packages for the simulation of road accidents.

Acquired competences: Ability to apply PC CRASH at solving real collisions of vehicles.

*Models in traffic planning (6 **ECTS**)*

Course objectives and acquired competencies: The main objective of this course is to familiarize students with the models in traffic planning and their application.

*Goods transport centers (6 **ECTS**)*

Course objectives: To understand the need for establishing and developing the distribution centers (CTC), and also, the purpose, structure and the need for establishing a network of commodity transport hubs. To develop the ability to create possible solutions for locating and spatial commodity transport centers in the country, according to the European Network of commodity transport hubs.

Acquired competencies: Ability to carry out tasks related to the functioning of the CTC, their internal order, and planning of commodity flows and information centers.

*Transport Investment Appraisal (6 **ECTS**)*

Course objectives and acquired competencies: To gain confidence that students understand the principles of valuation of investments that are relevant to the transport sector, including both principle: financial evaluation and analysis of costs and benefits.

*Construction of Motor Vehicles (6 **ECTS**)*

Course objectives and acquired competencies: Introduction with the constructive characteristic of main systems and devices of motor vehicles, and with the concept of their links in the structure of the motor vehicles.

*Theory of shocks and collisions (6 **ECTS**)*

Course objectives: To prepare students to gain extended knowledge of the theory of shocks and collisions relevant to engineers - masters in the field of traffic and transport, necessary for further implementation in practice.

Acquired competences: The student applies advanced methodologies for applying the basic equation and the general laws of the theory of shocks and collisions. By using literature identifies and is able to analyze and solve problems with practical application of existing laws for changing the amount of movement and the moment of the amount of movement of the material system during shock and collision. Is able to prepare, present and discuss project task with a professional approach to the work.

*Urbanism and Traffic 2 (6 **ECTS**)*

Course objectives: Strengthening the knowledge of the physical and functional structure of the city, its morphology, for urban analysis and synthesis, for the characteristics of traffic-transport subsystems and street matricis in terms of sustainability and integration.

Acquired competences: Acquiring with a skill for conducting a scientific approach to the process of preparing planning and design documentation, in terms of analysis of urban functions, morphological elements of a city, street network, block, street corridor, urban settings and urban development.

*Air quality management systems (6 **ECTS**)*

Course objectives: introducing the structure of air quality management and control systems; studying and analyzing the functional characteristics of the components of these systems, as well as their significance and contribution in the process of reduction of air pollution from traffic exhaust emissions.

Acquired competences: The students will be qualified for creation of emission inventory, selection and application of air quality models, integration of the modeled results with GIS, identification of measures for traffic control and management and assessment of their impact on air pollution, development of action plans and strategies for reduction of traffic air pollution.

*Aircrafts Reliability (6 **ECTS**)*

Course objectives: To familiarize students with the theory of reliability and with the necessary knowledge for the application of this theory in determining the reliability of aircraft systems and components.

Acquired competences: Ability to practically apply the acquired knowledge in the calculation of the reliability of aircraft components and systems.

*Guidance of Air Traffic Safety (6 **ECTS**)*

Course objectives and acquired competencies: The main purpose of the course is to familiarize students with problems related to air safety, in view of guidance of the aircraft safety, in view of guidance of the aircraft safety from the perspective of the legislation and operational parameters in the process of technological exploitation of transport aircraft as a central system of the air traffic. Ability to solve practical problems in the field of Guidance of Air traffic safety in accordance of requirements and recommendations.

*Transportation models in air traffic (6 **ECTS**)*

Course objectives and acquired competencies: To acquire theoretical and practical knowledge of the issues of planning, organization of air transport and exploitation of aircraft. Ability to implement transport models for dimensioning, planning and development of the air traffic handling capacities.

*Railway transport logistics (6 **ECTS**)*

Course objectives: The aim of this course is to familiarize students with current research directions in railway logistics.

Acquired competences: Students will be able to follow modern trends and master the skills of planning, preparation and conduct of scientific research projects in order to improve logistics in rail transport.

Elective course of broad interest for the study program from the FTS (one course should be selected)

*Methodology of Scientific and Professional work (6 **ECTS**)*

Course objectives and acquired competencies: Acquiring knowledge about the principles of scientific/professional methodology and elements of scientific/professional work.

*Assessment of Workplace Safety (6 **ECTS**)*

Course objectives and acquired competencies: Ability and skills of re-examining the current state of the workplace safety system into production or service system. Planning, assessment, and management of risks at the workplace and into the work environment. Acquiring knowledge that enables the quality establishment of a workplace system into production or service system.

*Causes and Effects of Climate Changes (6 **ECTS**)*

Course objectives and acquired competencies: The goal of the course is to introduce the students with the causes of climate change, the generation of greenhouse gases and their effects on the environment and human health.

*Specific Terms of the Design of Environment Protection (6 **ECTS**)*

Course objectives and acquired competencies: Introducing the students to specific problems in the preparation and design of special environmental projects.

*Signal Processing (6 **ECTS**)*

Course objectives and acquired competencies: Acquiring knowledge about mathematics basics and methods for discrete signals processing.

*Electrical Vehicles (6 **ECTS**)*

Course objectives and acquired competencies: The main goal is to introduce the students to the latest developments in the design and automated management of hybrid cars and electric vehicles.

*Business Leadership (6 **ECTS**)*

Course objectives and acquired competencies: Ability, necessary knowledge, and skills in leadership in order to form students' positive attitudes regarding the need for leadership in the improvement and development of organizations by practicing elements of leadership.

*Business Lobby (6 **ECTS**)*

Course objectives and acquired competencies: Ability, necessary knowledge, and skills in business negotiation and form students' positive attitudes regarding the needs for negotiation as a form of negotiation and cooperation with business partners and clients.

II semester

Elective courses should be selected by the students in consultation with their mentor (two courses should be selected)

*Road Infrastructure Planning (6 **ECTS**)*

Course objectives: Potentiation of active and creative role of various procedures of evaluation in the process of road network development and exploitation.

Acquired competencies: Selection and application of appropriate methodology for road network evaluation as well as preparation of the feasibility studies.

*Planning of Sustainable Urban Transport Systems (6 **ECTS**)*

Course objectives: The main objective of the course is to familiarize students with the elements of sustainable urban transport systems and meet the challenges, problems and possible solutions for the construction of such systems.

Acquired competences: Acquisition of skills, knowledge and ability to use a scientific approach to solving problems related to the planning and design of sustainable urban systems in modern cities.

*Victimology of Road Traffic Accidents (6 **ECTS**)*

Course objectives: To prepare students with knowledge of the importance of victim in the road traffic accident.

Acquired competences: To enable students with knowledge and ability to perform the quantification of responsibility and contribution of the victim to the occurrence of road traffic accident.

*English language 1 (6 **ECTS**)*

Course objectives and acquired competencies: Broadening of lexical knowledge, recognition, interpretation and use of technical terms, competence for accurate use of grammatical constructions typical for ESP, use f learnt lexical and grammatical material in professional and business communication and further training, upgrading the linguistic competence, professional and business communication skills and academic writing ability.

*Sustainable development in spatial planning (6 **ECTS**)*

Course objectives and acquired competencies: Study and adoption of processes and methods for applying the concept of sustainable spatial regional planning. Traffic planning on the region level. Eco - aspects in planning their future treatment in national plans to be sufficiently in the line with EU practice.

*Road Traffic Safety Management (6 **ECTS**)*

Course objectives and acquired competencies: To provide students with the knowledge and skills to understand and analyze complex Road Traffic Safety Management System

*Logistics in the Maintenance of Motor Vehicles (6 **ECTS**)*

Course objectives: The main objective of this course is to familiarize students with the methods and techniques of logistic planning and management of maintenance of motor vehicles.

Acquired competences: Ability to organize and to perform various levels of organization of logistics processes in the process of motor vehicles maintenance.

*Application of biomechanics in traffic and transport (6 **ECTS**)*

Course objectives and acquired competencies: Introducing students of second cycle degree structure and parts of the human body, their behavior in traffic accidents familiarizing with the application of biomechanics in traffic and transport.

*Airports and Airport Traffic (6 **ECTS**)*

Course objectives and acquired competencies: To gain detailed theoretical and practical knowledge of the management of airport infrastructure, technical, technological, traffic and personnel capacities as well as the guidance and control of traffic on the airport operational areas. To gain the ability to organize and ensure the operation of the airport traffic in terms of regular, orderly and safe air traffic.

*Aviation Security (6 **ECTS**)*

Course objectives and acquired competencies: To acquire theoretical and practical knowledge of the issues of physical and operational and technical security and protection within ant diversion of those involved in the air transport. Acquiring the ability to identify, recognize and differentiation processes, procedures, systems, measures and activities to provide (security) in air traffic.

*Modeling of railway processes (6 **ECTS**)*

Course objectives: The aim of this course is to familiarize students with advanced methods and tools required for modeling of the processes related to rail transport and to be able to

create systems to support decision-making for various traffic processes by applying mathematical, statistical, graphics and calculations.

Acquired competences: Students will be capable of simulation and modeling of processes in railway transport and to govern with skill capable of correct choice of advanced methods and techniques of decision-making models, comparison of results, evaluation of projects and anticipating traffic.

Railway traffic capacity optimization (6 ***ECTS****)*

Course objectives: The aim of this course is to familiarize students with current research directions and ways of solving the problems of planning and control of rail.

Acquired competences: Students will be able to follow modern trends and master the skills of planning, preparation and conduct of scientific research projects in order to improve the systems for planning and control of the railway traffic.