Course Unit Descriptor

Study Programme: Traffic Engineering		
Course Unit Title: Geographic Information System in Traffic		
Course Unit Code: S1595		
Name of Lecturer(s): Kranjac Mirjana		
Type and Level of Studies: Master level		
Course Status (compulsory/elective): compulsory		
Semester (winter/summer): Summer		
Language of instruction: English		
Mode of course unit delivery (face-to-face/distance learning): Face-to-face		
Number of ECTS Allocated: 4		
Prerequisites: None		
Course Aims: The main goal is to acquire the basic knowledge about geo information systems (GIS), to gain knowledge about the development and analysis of GIS related applications, especially in relation to traffic and telecommunications. Additional goal is learning about techniques and tools for processing, managing and controlling geographic data, GIS technology, principles on which global positioning satellite systems and inertial navigation systems work, technology for electronic data exchange in postal traffic, radio frequency identification technology, and other applications in traffic. Understanding the advantages of integrating systems for object positioning with geo information systems.		
Learning Outcomes: Knowledge about basic principles of GIS including structure and quality of data. Theoretical basis and practical experience about GIS in traffic and telecommunications, as well as practical knowledge about GPS functioning related to object positioning and errors in measurement and positioning. Another outcome is the knowledge about new technology for acquisition, collecting, storing and processing images and data, integration of GPS and GIS systems, as well as knowledge about analysis and display of spatial data.		
Syllabus: Introduction to GIS. Applications. Sources of GIS data. Data and image acquisition. Analysis of spatial data (methods, examples). Data types and structures. Representation of geo information data and information with main applications. Sensor information and GIS. Visualization of data with maps. GIS concepts. Use of program software. GIS: maps and spatial information. Interpolation techniques with GIS. Cartography. Cartographic concepts. Thematic mapping. Satellite images and their processing. The role of remote sensing and GPS. Positioning, visibility and availability of satellites in GPS systems. Position determination, signal error, and stochastic models in GPS systems. Formulating a problem of evaluating the state of linear (discrete and continuous) stochastic systems. Kalman filter. Fundamentals of theory of determining the state of nonlinear stochastic systems. Extended Kalman filter. Kalman filtering and its application to real GPS/INS problems. Differential GPS. GPS inertial navigation and integration. Application of GPS in traffic and transportation. Basic GIS theory. Integration of GPS and GIS systems. Electronic data exchange. Radio frequency identification. Optical text recognition		
Required Reading: Relevant literature in English TBD		
Weekly Contact Hours: 5	**Lectures: 2**	**Practical work: 2**
Teaching Methods: Lectures, auditory and computer practice.		
Knowledge Assessment (maximum of 100 points):		

Pre-exam obligations	points	**Final exam**	points
Lecture attendance	5	Written part of the exam	40
Exercise attendance	5		
Project task	20		
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			