**Course description**

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| **Generic information** |
| Head of Course | Dr. sc. Neven Grubišić |
| Course | Traffic Engineering and Microsimulation |
| Study Programme | Technology and Organization of Transport |
| Type of Course | Obligatory |
| Year of Study | 2. |  |
| Estimated Student Workload and Methods of Instruction | ECTS coefficient of Student Workload | 5 |
| Number of Hours (L+E+S) | 45+30+0 |

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| **1. GENERAL COURSE DESCRIPTION** |
| *1.1. Course Objectives*  |
| To gain knowledge of the methods and engineering techniques, analytic and microsimulation tools used by traffic engineers in solving operational traffic problems |
| *1.2. Prerequisites for Course Registration*  |
| None |
| *1.3. Expected Learning Outcomes*  |
| 1. To explain main parameters of traffic stream and compare relationships between them
2. To calculate traffic capacity, v/c ratio and level of service
3. To identify and manage conflict traffic flows
4. To design the main elements of transport network, select values and attributes for objects for a given urban area with at least one intersection using the programming manual
5. To assign traffic flows by transport modes and vehicle categories for a given traffic volumes within transport network
6. To set-up signal controllers in simulated environment for the target intersection, depending on the traffic flow parameters
7. To test traffic behavior of observed network and compare the results in minimum three time periods and for minimum two traffic scenarios using micro-simulation
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| *1.4. Course Outline*  |
| Traffic stream parameters: traffic flow, speed, headway, spacing. Traffic behavior, vehicle dynamics, road geometry. Type and structure of traffic stream, uninterrupted and interrupted traffic stream. Relation between parameters. Applied statistic in traffic engineering. Volume and capacity, v/c ratio, level of service. Data collection, traffic counts and measurements. Management of traffic flow. Intersections and intersection traffic control. Signal controllers, signal programming and management. Definition and purpose of traffic microsimulations. Vissim simulator. Design of transport network. Modeling of turns and routes, traffic composition and vehicle class distribution. Private and public transport objects and attributes. Intersection control and management: conflict area, priority rules, safety gaps. Set-up and adjustment of signal controllers and signal phasing. Evaluation of results. Calibration and validation. Data collection and measurement objects. Simulation configuration, initiation and control.  |
|  *1.5. Modes of* *Instruction*  | [x] Lectures[ ]  Seminars and workshops [x]  Exercises [ ]  E-learning[x]  Field work | [ ]  Practical work [ ]  Multimedia and Network [ ]  Laboratory[ ]  Mentorship[x]  Other SW.SIMULATOR\_\_\_\_\_\_\_\_\_ |
| *1.6. Comments*  | Lectures and assignments are performed in a specialized classroom |
| *1.7. Student Obligations*  |
| Students are required to attend classes regularly and actively participate in lab exercises.  |
| *1.8. Assessment1 of Learning Outcomes*  |
| Course attendance | 2,5 | Class participation | 0,5 | Seminar paper |     | Experiment |     |
| Written exam | 0,5 | Oral exam | 0,5 | Essay |     | Research |     |
| Project |     | Continuous Assessment |     | Presentation |     | Practical work | 1 |
| Portfolio |     |  |     |  |     |  |     |

1 **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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| *1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam*  |
| *Attending classes*Class attendance: Learning outcomes 1-7: 10 pts*Activity during assignments*Interactive participation in the design of the basic elements of roads, intersections and traffic signs: Learning outcomes 1-4: 20 pts*Practical works on simulator*Results and their interpretations obtained for key traffic measurements: Learning outcomes 5-7: 40 ptsMaximum of 70 credits or 70% of total score during teaching process is available. Maximum of 30 credits or 30% of total score may be earned during final exam. *Examples of evaluation by individual learning outcome:*1. Calculate the speed and density of traffic flow for a given road section and given time intervals, compare and analyze results (I1)
2. In the given example, explain the dynamics of the relationship between the volume and capacity of the road with respect to time interval of measurements (I2)
3. Calculate the amount of conflict points based on vehicle movements at the intersection (I3)
4. Using a computer program, draw the main elements of traffic network (I4)
5. Based on intersection survey data, define the vehicle composition, assign traffic volumes to approach lanes and compose routes and movements for vehicles and pedestrians (I5)
6. Set-up signal groups and adjust signal cycle and signal phases for target intersection for a given volume of traffic, change distribution of flow and adjust signal time intervals (I6)
7. Create scenarios of traffic flow for a given section of roadway, allocate detectors and export results using a microsimulation tool (I7)

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| *1.10. Main Reading*  |  |  |
| 1. Dadić, I., Kos, G., Ševrović, M.: Teorija prometnog toka, Sveučilište u Zagrebu, Fakultet prometnih znanosti, Zagreb, 2014.2. Šraml, M., Jovanović, G.: Mikrosimulacije u prometu (radni udžbenik s primjenom VISSIM-a), Univerza v Mariboru, Fakulteta za gradbeništvo, Maribor, 2014. |
| *1.11. Recommended Reading*  |  |  |
| 1. Roess, R., McShane, W., Prassas, E: Traffic Engineering, Prentice Hall, New Jersey, 1998. |
| *1.12. Number of Main Reading Examples*  |  |  |
| *Title*  | *Number of examples*  | *Number of students*  |
| Dadić, I., Kos, G., Ševrović, M.: Teorija prometnog toka, Sveučilište u Zagrebu, Fakultet prometnih znanosti, Zagreb, 2014 | accessible online | 40 |
| Šraml, M., Jovanović, G.: Mikrosimulacije u prometu (radni udžbenik s primjenom VISSIM-a), Univerza v Mariboru, Fakulteta za gradbeništvo, Maribor, 2014. | accessible online | 40 |
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| *1.13. Quality Assurance*  |
| The quality is monitored in accordance with ISO 9001 standard carried out at the Faculty of Maritime Studies. The results of passed exams are analyzed once a year and proper measures taken.  |