



Subject card

|   |  |  |                                     |            |   |         |     |
|---|--|--|-------------------------------------|------------|---|---------|-----|
| Subject name and code                       | Seminar on modern traffic modeling methods and road technologies, PG_00059875  |  |                                     |            |   |         |     |
| Field of study                              | Civil Engineering  |  |                                     |            |   |         |     |
| Date of commencement of studies             | February 2023  | Academic year of realisation of subject  |                                     |            | 2023/2024   |         |     |
| Education level                             | second-cycle studies   | Subject group  |                                     |            | Optional subject group  |         |     |
| Mode of study                               | Full-time studies  | Mode of delivery   |                                     |            | at the university   |         |     |
| Year of study                               | 1  | Language of instruction  |                                     |            | Polish  |         |     |
| Semester of study                           | 2  | ECTS credits   |                                     |            | 3.0   |         |     |
| Learning profile                            | general academic profile   | Assessment form  |                                     |            | assessment  |         |     |
| Conducting unit                             | Department of Transportation Engineering -> Faculty of Civil and Environmental Engineering   |  |                                     |            |   |         |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   | dr hab. inż. Jacek Oskarbski   |                                     |            |   |         |     |
|   | Teachers   | dr hab. inż. Jacek Oskarbski<br>dr inż. Jacek Alenowicz  |                                     |            |   |         |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture  | Tutorial                            | Laboratory | Project   | Seminar | SUM |
|   | Number of study hours  | 0.0  | 0.0                                 | 0.0        | 0.0   | 30.0    | 30  |
| E-learning hours included: 0.0              |  |  |                                     |            |   |         |     |
| Learning activity and number of study hours | Learning activity  | Participation in didactic classes included in study plan   | Participation in consultation hours |            | Self-study  | SUM     |     |
|   | Number of study hours  | 30   | 5.0                                 |            | 40.0  | 75      |     |
| Subject objectives                          | To familiarise Students with transport issues using methods of graph theory, queue theory, computer simulations. To familiarise Students with modern methods of road technology.   |  |                                     |            |   |         |     |
| Learning outcomes                           | Course outcome   | Subject outcome  |                                     |            | Method of verification  |         |     |
|   | [K7_U08] Is able to evaluate technical condition of a road, to design its pavement and choose proper construction technology using mechanistic methods and material investigations | The selection of modern road technology tools.   |                                     |            | [SU5] Assessment of ability to present the results of task<br>[SU4] Assessment of ability to use methods and tools<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU2] Assessment of ability to analyse information<br>[SU1] Assessment of task fulfilment |         |     |
|   | [K7_W06] has expanded knowledge about traffic theory, planing of road networks and junctions design, regarding economy, safety and environmental aspects                           | Analysis of the use of graph theory for modelling transport networks. An analysis of the application of traffic task allocation models and traffic distribution models to the transport network. |                                     |            | [SW2] Assessment of knowledge contained in presentation<br>[SW1] Assessment of factual knowledge  |         |     |
|   | [K7_W07] has expanded knowledge of theory of road and airport pavements, pavement maintenance, advanced methods of material testing and construction technologies                  | Analysis of modern road technology tools.  |                                     |            | [SW2] Assessment of knowledge contained in presentation<br>[SW1] Assessment of factual knowledge  |         |     |
|   | [K7_U07] is able to design elements of road network, to apply the rules of traffic organisation and control, taking into account economy, safety and environmental factors,        | The choice of tools for analysing and evaluating the transport system depends on the type of model used.   |                                     |            | [SU5] Assessment of ability to present the results of task<br>[SU4] Assessment of ability to use methods and tools<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU2] Assessment of ability to analyse information<br>[SU1] Assessment of task fulfilment |         |     |

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| Subject contents   | Transport system models. Distribution of flows in transport networks. Transport system environment. Forecasting the development of transport systems. Dynamics of transport processes. Definitions: transport network, transport process. Graph representation of the transport network. Transport process models model elements, structure, traffic streams. Modelling and dependencies in vehicle traffic flows. Basic characteristics of distributions of random variables used in the description of the traffic process. Macroscopic, mesoscopic and microscopic traffic models Trip generation models. Spatial distribution models. Trip distribution models. Models of traffic distribution in a transport network. Macroscopic, meso and microscopic traffic modelling software packages. Modern technologies in road engineering. Use of modern road technologies in the design and construction of road surfaces. |   |                               |
| Prerequisites and co-requisites                          |   |   |                               |
| Assessment methods and criteria                          | Subject passing criteria  | Passing threshold   | Percentage of the final grade |
|  | Development of the report and presentation of the issue   | 100.0%  | 100.0%                        |
| Recommended reading                                      | Basic literature  | 1. Gniadenko B. W., Kowalenko I. N.: Wstęp do teorii obsługi masowej. PWN, Warszawa 1971. 2. Koźniewska I., Włodarczyk M.: Modele odnowy, niezawodności i obsługi. PWN, Warszawa 1978. 3. Leszczyński J. Modelowanie systemów i procesów transportowych, Oficyna wydawnicza Politechniki Warszawskiej, 1999. 4. Sienkiewicz P.: Inżynieria systemów. MON, Warszawa 1983. 5. Smalko Z.: Modelowanie eksploatacyjnych systemów transportowych. ITE, Radom 1996. 6. Woropay M., Knopik L., Landowski B.: Modelowanie procesów eksploatacji w systemie transportowym. Biblioteka Problemów Eksploatacji. ITE, Bydgoszcz-Radom 2001. |                               |
|  | Supplementary literature  | Scientific articles on traffic modelling and modern road technologies.  |                               |
|  | eResources addresses  | Adresy na platformie eNauczanie:  |                               |
| Example issues/ example questions/ tasks being completed | Modelling traffic flows. Modelling of movement in networks. Graphical representation of transport system and process. Graphical representation of the transport network. Stream distribution models of transport network traffic costs, traffic congestion, minimum cost stream distribution and equilibrium distribution. Traffic flow simulation. Simulation models. Modern road technology methods.  |   |                               |
| Work placement   | Not applicable  |   |                               |