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|---|--|--|----------------------------------|--|--------------|
| <b>Description of course</b>  |  |  |                                  |  |              |
| Code of course  | <b>1160-TRTSEM-MSA-0206</b>  |  |                                  |  |              |
| Name of course  | <b>Design of Multimodal Transport Nodes</b>  |  |                                  |  |              |
| Version of course   | 2021/22  |  |                                  |  |              |
| <b>A. Place of the course in system of studies</b>  |  |  |                                  |  |              |
| Level of education  | Second-cycle degree  |  |                                  |  |              |
| Form and mode of studies  | Full-time studies  |  |                                  |  |              |
| Field of studies  | Transport  |  |                                  |  |              |
| Profile of studies  | General academic profile   |  |                                  |  |              |
| Specialization  | Transport systems engineering and management   |  |                                  |  |              |
| Place of teaching of course   | Warsaw University of Technology, Faculty of Transport, Division of Transportation Systems Engineering and Logistics                                  |  |                                  |  |              |
| Place of realization of course  | Not applicable   |  |                                  |  |              |
| Coordinator of course   | Roland Jachimowski, Ph.D., DSc., Division of Transportation Systems Engineering and Logistics, Warsaw University of Technology, Faculty of Transport |  |                                  |  |              |
| <b>B. General characteristic of the course</b>  |  |  |                                  |  |              |
| Group/Block of courses  | Specialization subject   |  |                                  |  |              |
| Level of course   | Intermediate level   |  |                                  |  |              |
| Type of course  | Compulsory subject   |  |                                  |  |              |
| Language of course  | English  |  |                                  |  |              |
| Location of the course in the study plan – nominal semester   | 2  |  |                                  |  |              |
| Location of the course in the academic year   | Summer semester  |  |                                  |  |              |
| Preliminary requirements - formal   | None.  |  |                                  |  |              |
| Limit of students   | Lecture: 100, laboratory: 10   |  |                                  |  |              |
| <b>C. Effects of education and manner of teaching</b>   |  |  |                                  |  |              |
| Purpose of course   | Acquiring knowledge of designing multimodal transport nodes. The student has the ability to design elements of multimodal transport nodes.           |  |                                  |  |              |
| <b>Effects of education with reference to the learning outcomes for the area and field of study</b> |  |  |                                  |  |              |
| <b>No. effect</b>   | <b>Description of the effect</b>   | <b>Reference to the characteristics of learning outcomes</b> |                                  | <b>Reference to the learning outcomes in the program</b> |              |
| <b>Assumed learning outcomes in terms of knowledge</b>  |  |  |                                  |  |              |
| W01   | Knows and understands the problem of the functioning of multimodal transport nodes.  | I.P7S_WG.o<br>I.P7S_WK                                       | Tr2A_W09<br>Tr2A_W12             |  |              |
| W02   | Knows and understands the principles of assessing multimodal transport nodes.  | I.P7S_WG.o<br>I.P7S_WK                                       | Tr2A_W10<br>Tr2A_W12             |  |              |
| W03   | Knows and understands the principles of the multimodal transport nodes designing.  | I.P7S_WG.o   | Tr2A_W10                         |  |              |
| <b>Assumed learning outcomes in terms of skills</b>   |  |  |                                  |  |              |
| U01   | Can develop a model of a multimodal transport node.  | I.P7S_UW.o.<br>III.P7S_UW.o                                  | Tr2A_U06<br>Tr2A_U14             |  |              |
| U02   | Is able to simulate the flow of passengers in the area of a multimodal transport node.   | I.P7S_UW.o.<br>III.P7S_UW.o                                  | Tr2A_U06<br>Tr2A_U15             |  |              |
| U03   | Can make a model of a variant organization of a multimodal node.   | I.P7S_UW.o.<br>III.P7S_UW.o                                  | Tr2A_U06<br>Tr2A_U13<br>Tr2A_U14 |  |              |
| <b>Assumed learning outcomes in the field of social competences</b>                                 |  |  |                                  |  |              |
| –   | –  | –  | –                                |  |              |
| <b>Form of didactic studies and number of hours</b>   | <b>Lecture</b>   | <b>Exercise</b>  | <b>Laboratory</b>                | <b>Project</b>   | <b>Other</b> |
| On a weekly plan  | 1  | 0  | 1                                | 0  | 0            |
| Throughout the semester   | 15   | 0  | 15                               | 0  | 0            |

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| Treści kształcenia – oddzielnie<br><i>Contents of education - separately for each form of didactic studies</i> | <p><i>Wykład:</i><br/><i>Lecture:</i><br/><i>Basic definitions regarding multimodal transport. Multimodal transport in logistics systems. Classification of multimodal transport nodes. Conditions for the location of multimodal transport nodes. Principles of shaping multimodal transport nodes. Design principles for multimodal transport nodes. Practical examples of solutions for multimodal transport nodes.</i></p> <p><i>Laboratory:</i><br/><i>Laboratory classes using software for the passengers traffic stream simulation in the area of a multimodal node.</i></p>   |
| Teaching methods   | <p><i>Lecture:</i><br/><i>Multimedia presentation of the lecture content.</i></p> <p><i>Laboratory:</i><br/><i>Students perform exercises independently on computers equipped with a tool for simulating logistics processes. Lecturer validate the task performed by students during the laboratory.</i></p>  |
| <b>Methods of verification of effects of education</b>   |  |
| <b>No. effect</b>  | <b>Methods of verification</b>   |
| <b>Assumed learning outcomes in terms of knowledge</b>   |  |
| W01  | <i>Lecture - 1-2 open-ended questions or 2-4 test questions regarding this effect, it is required to give a correct answer to at least one open-ended question (or at least half of each of the open questions) and fully for at least half of the test questions.</i>   |
| W02  | <i>Lecture - 1-2 open-ended questions or 2-4 test questions regarding this effect, it is required to give a correct answer to at least one open-ended question (or at least half of each of the open questions) and fully for at least half of the test questions.</i>   |
| W03  | <i>Lecture - 1-2 open-ended questions or 2-4 test questions regarding this effect, it is required to give a correct answer to at least one open-ended question (or at least half of each of the open questions) and fully for at least half of the test questions.</i>   |
| <b>Assumed learning outcomes in terms of skills</b>  |  |
| U01  | <i>Preparation of a simulation model of passenger service in a multimodal transfer node during the passing test. Passing the report from laboratory classes.</i>   |
| U02  | <i>Preparation of a simulation model of passenger service in a multimodal transfer node during the passing test. Passing the report from laboratory classes.</i>   |
| U03  | <i>Preparation of a simulation model of passenger service in a multimodal transfer node during the passing test. Passing the report from laboratory classes.</i>   |
| <b>Assumed learning outcomes in the field of social competences</b>  |  |
| –  | –  |
| <b>Methods of evaluation</b>   | <p><i>Lecture:</i><br/><i>Assessment carried out in the form of open questions. In the case of distance learning, multiple-choice test and oral answer to questions possible.</i></p> <p><i>Laboratory:</i><br/><i>Laboratory classes are credited on the basis of reports and a test on the computers of the last classes.</i></p> <p><i>Integrated degree:</i><br/><i>Average of the partial grades.</i></p>   |
| <b>Exam</b>  | <i>Yes</i>   |
| <b>Literature</b>  | <p><i>Basic literature:</i></p> <ol style="list-style-type: none"> <li>1) Edwards B.: Sustainability and the design of transport interchanges, 2011.</li> <li>2) Bryniarska Z., Zakowska L.: Multi-criteria evaluation of public transport interchanges. <i>Transportation Research Procedia</i>, 2017, 24, 25-32.</li> <li>3) Hernandez S., Monzon A., de Oña R.: Urban transport interchanges: A methodology for evaluating perceived quality. <i>Transportation Research Part A: Policy and Practice</i>, 2016, 84, 31-43.</li> <li>4) Lois D., Monzón A., Hernández S.: Analysis of satisfaction factors at urban transport interchanges: Measuring travellers' attitudes to information, security and waiting. <i>Transport policy</i>, 2018, 67, 49-56.</li> </ol> |

Card of Course **Design of Multimodal Transport Nodes**

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|   | <p><i>Supplementary literature:</i></p> <p>1) Public Transport – Guidelines for land use and development. Department of Transport, Melbourne. <a href="http://www.vicroads.vic.gov.au">www.vicroads.vic.gov.au</a>.</p> <p>2) Vuchic V.R.: Design of Outlying Rapid Transit Areas. Transportation Research Record 505, 1974.</p> <p>3) Transport for London, Intermodal Transport Interchange for London, Best Practice Guidelines, Issue 1, 2001.</p> <p>4) Monigl J., Berki Z., Szekely A.: NICHES+ Guidelines for implementers of Passenger Friendly Interchanges, 2010.</p> <p>5) Guidelines for the Location and Design of Bus Stops, TCRP Report 19. TEXAS TRANSPORTATION INSTITUTE, 1996.</p> |
| <i>Website of the course</i>  | –  |
| <b>D. Student's activity</b>  |  |
| <i>Number of ECTS credits</i>   | 3  |
| <i>Number of hours of student's work to achieve effects of education</i>                  | 87 hours, including: work on lectures 15 hours, work on laboratories 15 hours, studying the literature of the subject 10 hours, consultations 3 hours (including consultations in the laboratory 2 hours), preparation for tests 10 hours, preparation of laboratory reports outside class hours 24 hours, preparation for a test in the laboratory 10 hours.  |
| <i>Number of ECTS credits on the course with direct participation of academic teacher</i> | 1.5 ECTS (33 hours, including: work on lectures 15 hours, work on laboratories 15 hours, consultation 3 hour)  |
| <i>Number of ECTS credits on practical activities on the course</i>                       | 2.0 ECTS (51 hours, including: work on laboratories 15 hours, consultations in the laboratory 2 hours, preparation of laboratory reports outside class hours 24 hours, preparation for a test in the laboratory 10 hours)  |
| <b>E. Additional information</b>  |  |
| <i>Notes</i>  | As long as it does not cause changes in the relationship of a given subject with the directional effects in the content of education, changes may be introduced on an ongoing basis, taking into account the latest scientific achievements.   |
| <i>Date of last edition</i>   | 2021-02-15 11:00   |