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## Subject card

| Subject name and code                          | Informatics, PG_00044579                                                                                                                                                                                                                                                            |                                                                                     |                                            |                                     |        |                                                |         |     |  |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------------|--------|------------------------------------------------|---------|-----|--|
| Field of study                                 | Transport                                                                                                                                                                                                                                                                           |                                                                                     |                                            |                                     |        |                                                |         |     |  |
| Date of commencement of studies                | October 2023                                                                                                                                                                                                                                                                        |                                                                                     | Academic year of<br>realisation of subject |                                     |        | 2024/2025                                      |         |     |  |
| Education level                                | first-cycle studies                                                                                                                                                                                                                                                                 |                                                                                     | Subject group                              |                                     |        | Obligatory subject group in the field of study |         |     |  |
| Mode of study                                  | Full-time studies                                                                                                                                                                                                                                                                   |                                                                                     | Mode of delivery                           |                                     |        | at the university                              |         |     |  |
| Year of study                                  | 2                                                                                                                                                                                                                                                                                   |                                                                                     | Language of instruction                    |                                     |        | Polish                                         |         |     |  |
| Semester of study                              | 3                                                                                                                                                                                                                                                                                   |                                                                                     | ECTS credits                               |                                     |        | 3.0                                            |         |     |  |
| Learning profile                               | general academic profile                                                                                                                                                                                                                                                            |                                                                                     | Assessment form                            |                                     |        | assessment                                     |         |     |  |
| Conducting unit                                | Department of Railwa                                                                                                                                                                                                                                                                | Department of Railway Engineering -> Faculty of Civil and Environmental Engineering |                                            |                                     |        |                                                |         |     |  |
| Name and surname                               | Subject supervisor                                                                                                                                                                                                                                                                  |                                                                                     |                                            |                                     |        |                                                |         |     |  |
| of lecturer (lecturers)                        | Teachers                                                                                                                                                                                                                                                                            |                                                                                     |                                            |                                     |        |                                                |         |     |  |
| Lesson types and methods                       | Lesson type                                                                                                                                                                                                                                                                         | Lecture                                                                             | Tutorial                                   | Laboratory                          | Projec | t                                              | Seminar | SUM |  |
| of instruction                                 | Number of study hours                                                                                                                                                                                                                                                               | 15.0                                                                                | 0.0                                        | 30.0                                | 0.0    |                                                | 0.0     | 45  |  |
|                                                | E-learning hours included: 0.0                                                                                                                                                                                                                                                      |                                                                                     |                                            |                                     |        |                                                |         |     |  |
| Learning activity<br>and number of study hours | Learning activity                                                                                                                                                                                                                                                                   | Participation in didactic<br>classes included in study                              |                                            | Participation in consultation hours |        | Self-study                                     |         | SUM |  |
|                                                | Number of study hours                                                                                                                                                                                                                                                               | 45                                                                                  |                                            | 2.0                                 |        | 25.0                                           |         | 72  |  |
| Subject objectives                             | The main aim of the course is to showing IT issues used in the transport. In the course, will be discuss issues : - SQL databases, - information technology, - artificial intelligence, - machine learning, - IoT (internet of things), - Big Data (big data sets), - Data Minning. |                                                                                     |                                            |                                     |        |                                                |         |     |  |

| Learning outcomes                                              | Course outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Subject outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Method of verification                                                                                                                                                                                                                                                                                  |  |  |  |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|                                                                | [K6_U05] able to use IT and<br>graphic techniques typically used<br>for the design, construction,<br>operation and diagnosis of means<br>and systems of transport                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Student can to design the concept<br>of transport database. Student can<br>to transfer the designed concept<br>to a database in SQL. Student can<br>to use the data contained in the<br>database and then it implement in<br>a spreadsheet and conducted<br>analysis using Power Pivot.                                                                                                                                                                                                                                                                                                                                                                                                                                                     | [SU1] Assessment of task<br>fulfilment                                                                                                                                                                                                                                                                  |  |  |  |
|                                                                | [K6_W04] has basic knowledge of<br>informatics, electronics,<br>telecommunications, automation<br>and control, information<br>technologies, computer graphics,<br>geodesy and satellite navigation<br>which is useful for understanding<br>how it can be applied in transport                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | After final the course, the student<br>has knowledge of information<br>technologies supporting the<br>following fields of transport:<br>- transport infrastructure (line,<br>point),<br>- diagnostics,<br>- traffic engineering,<br>- transport security (cybersecurity),<br>- capital and personnel<br>management.                                                                                                                                                                                                                                                                                                                                                                                                                         | [SW3] Assessment of knowledge<br>contained in written work and<br>projects                                                                                                                                                                                                                              |  |  |  |
| Subject contents                                               | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                         |  |  |  |
|                                                                | <ol> <li>Introduction to SQL databases.</li> <li>Concepts: entity, attribute, record, primary key, foreign key.</li> <li>Computer support in the design of infrastructure and rolling stock.</li> <li>Examples of databases in the transport fields.</li> <li>Traffic engineering using IT technology.</li> <li>IT in transport management.</li> <li>Artificial intelligence, machine learning.</li> <li>IoT (Internet of Things).</li> <li>IT in transport safety.</li> <li>Operations on data sets, the use of the JOIN clause in joining tables.</li> <li>Data Minning is used to solve problems in big data analytics.</li> <li>Data analysis in a spreadsheet using Power Pivot.</li> <li>Architecture of database systems. Storage procedure. Transaction.</li> <li>Repetition to the test.</li> <li>Test.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                         |  |  |  |
| Prerequisites<br>and co-requisites                             | The student has knowledge of worki                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ng in a spreadsheet program, eg MS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Excel.                                                                                                                                                                                                                                                                                                  |  |  |  |
| Assessment methods                                             | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Percentage of the final grade                                                                                                                                                                                                                                                                           |  |  |  |
| and criteria                                                   | Project 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 50.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 25.0%                                                                                                                                                                                                                                                                                                   |  |  |  |
|                                                                | Project 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 50.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 25.0%                                                                                                                                                                                                                                                                                                   |  |  |  |
|                                                                | Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 60.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 50.0%                                                                                                                                                                                                                                                                                                   |  |  |  |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ol> <li>Garcia-Molina H., Ullman J., W<br/>Complete manual, Helion 2011</li> <li>Sacha K. software engineering,<br/>Warszawa 2010</li> <li>https://www.postgresql.org/doc:</li> <li>Ligęza A. Data Aggregation and<br/>GROUP BY and HAVING optio</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Iolina H., Ullman J., Widom J. Database systems.<br>e manual, Helion 2011<br>software engineering, Wydawnictwo Naukowe PWN,<br>/a 2010<br>ww.postgresql.org/docs/8.3/index.html access: 1.10.2020 /<br>Data Aggregation and Grouping. Aggregation Functions.<br>BY and HAVING options Lecture materials |  |  |  |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <ol> <li>Dutkiewicz J., Okulewicz J.: Simulation modeling of a suburban<br/>railway line. Prace Naukowe Politechniki Warszawskiej z. 119<br/>2017,</li> <li>Kornaszewski M., Sierociński M.: Network IT systems in Polish rail<br/>transport in the period of political and technological changes.<br/>Prace Naukowe Politechniki Warszawskiej 2014,</li> <li>The process of preparing the train timetable, organization and<br/>management. Autobusy 1805 12/2016,</li> <li>Raport Railway Business Forum: Problems of Polish railways in<br/>the field of IT 2010 Poznań,</li> <li>Rudowski M.: Contemporary IT solutions and trends versus current<br/>challenges at PKP, Problemy Kolejnictwa zeszyt 175, czerwiec<br/>2017.</li> </ol> |                                                                                                                                                                                                                                                                                                         |  |  |  |
|                                                                | eResources addresses Adresv na platformie eNauczanie                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                         |  |  |  |
| Example issues/<br>example questions/<br>tasks being completed | Design a date base concept, in transport security, in MS SQL Server Studio.Explain the terms: entity, attribute, record, foreign key, primary key.What is the "having" selection clause used for?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                         |  |  |  |
| Work placement                                                 | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                         |  |  |  |