



## Subject card

|   |  |  |   |                                     |  |            |     |
|---|--|--|---|-------------------------------------|--|------------|-----|
| Subject name and code                       | Mathematical Statistics, PG_00044533   |  |   |                                     |  |            |     |
| Field of study                              | Transport  |  |   |                                     |  |            |     |
| Date of commencement of studies             | October 2023   |  | Academic year of realisation of subject   |                                     | 2023/2024  |            |     |
| Education level                             | first-cycle studies  |  | Subject group   |                                     | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |            |     |
| 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   |                                     | exam   |            |     |
| Conducting unit                             | Department of Railway Engineering -> Faculty of Civil and Environmental Engineering  |  |   |                                     |  |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   |  | dr inż. Kamila Szwaczekiewicz   |                                     |  |            |     |
|   | Teachers   |  | mgr inż. Patrycja Jerzyło<br>mgr inż. Anna Gobis<br>dr inż. Kamila Szwaczekiewicz |                                     |  |            |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture  | Tutorial  | Laboratory                          | Project  | Seminar    | SUM |
|   | Number of study hours  | 30.0   | 15.0  | 0.0                                 | 0.0  | 0.0        | 45  |
|   | 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  | 45   |   | 5.0                                 |  | 25.0       | 75  |
| Subject objectives                          | The aim of the subject is to familiarize students with the methods of statistical data analysis such as estimation, hypothesis testing, Anova, regression and correlation.   |  |   |                                     |  |            |     |
| Learning outcomes                           | Course outcome   |  | Subject outcome   |                                     | Method of verification   |            |     |
|   | [K6_U06] able to plan and conduct simple laboratory and operational experiments and simulations in the area of transport; able to interpret the results and formulate conclusions  |  | The use of a statistical apparatus to describe problems in transport.             |                                     | [SU1] Assessment of task fulfilment<br>[SU2] Assessment of ability to analyse information                            |            |     |
|   | [K6_W01] has basic knowledge of mathematical analysis, algebra, calculus of probability and operational research required for describing and solving transport problems  |  | Performing statistical analysis of the Data Mining type                           |                                     | [SW1] Assessment of factual knowledge  |            |     |
| Subject contents                            | Random measures. Random variables. Discrete and continuous (one- and multi-dimensional) distributions of random variables. Independence of random variables. Functions of random variables. Methods of mathematical statistics in estimation. Verification of statistical hypotheses, statistical tests. Regression and correlation. |  |   |                                     |  |            |     |
| Prerequisites and co-requisites             | Knowledge of subjects: Mathematics   |  |   |                                     |  |            |     |
| Assessment methods and criteria             | Subject passing criteria   |  | Passing threshold   |                                     | Percentage of the final grade  |            |     |
|   | Written exam   |  | 60.0%   |                                     | 60.0%  |            |     |
|   | Test during the semester   |  | 50.0%   |                                     | 40.0%  |            |     |

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| Recommended reading  | Basic literature   | <p>J. Greń, Statystyka matematyczna. Modele i zadania PWN Warszawa 1982.</p> <p>J. Jakubowski, R. Sztencel Wstęp do teorii prawdopodobieństwa, Script, Warszawa 2001.</p>   |
|  | Supplementary literature   | <p>G.M. Fichtenholz, Rachunek różniczkowy i całkowy, t. 1, 2 i 3 Wydawnictwo Naukowe PWN, Warszawa 2002 (t. 1 i 2), 2003 (t. 3).</p> <p>M. Fisz, Rachunek prawdopodobieństwa i statystyka matematyczna, PWN, Warszawa 1967.</p>   |
|  | eResources addresses   | <p>Adresy na platformie eNauczanie:</p> <p>Statystyka matematyczna - 2024 sem. 2, 1 stop. Transport - Moodle ID: 35267<br/> <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35267">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35267</a></p> |
| Example issues/<br>example questions/<br>tasks being completed | <ol style="list-style-type: none"> <li>1. Properties of the estimator;</li> <li>2. Central Limit Theorem;</li> <li>3. binomial distribution, Bernoulli scheme;</li> <li>4. 3 sigma rule;</li> <li>5. type I and II error;</li> <li>6. A necessary condition to verify the hypothesis about the equality of two general means is ...</li> <li>7. If we increase the sample size, how will the confidence interval for the mean change?</li> </ol> |   |
| Work placement   | Not applicable   |   |