



## Subject card

|   |  |  |          |                                     |  |            |     |
|---|--|--|----------|-------------------------------------|--|------------|-----|
| Subject name and code                       | Mathematics, PG_00044536   |  |          |                                     |  |            |     |
| Field of study                              | Transport  |  |          |                                     |  |            |     |
| Date of commencement of studies             | October 2020   | Academic year of realisation of subject                  |          |                                     | 2020/2021                                      |            |     |
| 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                               | 1  | Language of instruction                                  |          |                                     | Polish   |            |     |
| Semester of study                           | 2  | ECTS credits   |          |                                     | 3.0  |            |     |
| Learning profile                            | general academic profile   | Assessment form  |          |                                     | assessment                                     |            |     |
| Conducting unit                             | Mathematics Center -> Vice-Rector for Education  |  |          |                                     |  |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   | dr Krzysztof Radziszewski                                |          |                                     |  |            |     |
|   | Teachers   | mgr inż. Krystyna Dąbrowska<br>dr Krzysztof Radziszewski |          |                                     |  |            |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture  | Tutorial | Laboratory                          | Project  | Seminar    | SUM |
|   | Number of study hours  | 15.0   | 15.0     | 0.0                                 | 0.0  | 0.0        | 30  |
|   | E-learning hours included: 0.0   |  |          |                                     |  |            |     |
|   | Adresy na platformie eNauczanie:<br>WLiŚ - Transport sem.2 - Matematyka 2020/2021 (K.Radziszewski) - Moodle ID: 13610<br><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13610">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13610</a><br>WLiŚ - Transport sem.2 - Matematyka 2020/2021 (K.Radziszewski) - Moodle ID: 13610<br><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13610">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13610</a> |  |          |                                     |  |            |     |
| 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                          | Students obtain competence in the range of using methods of mathematical analysis and knowledge how to solve simple problems that can be found in the field of engineering.  |  |          |                                     |  |            |     |

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|--|--|--|--|
| Learning outcomes  | Course outcome   | Subject outcome  | Method of verification                             |
|  | [K6_W01] has basic knowledge of mathematical analysis, algebra, calculus of probability and operational research required for describing and solving transport problems  | Student: examines functions of several variables, using the concept of limit, continuity and derivatives, calculates double integrals, and explains the substitution method, applies double integrals to solve geometrical problems, demonstrates some techniques for solving ordinary differential equations. Student recognizes the importance of self-expanding knowledge and take the challenge of working with a group to solve a problem.  | [SW1] Assessment of factual knowledge              |
|  | [K6_U71] is able to apply knowledge from humanistic, social, economic or legal sciences in order to solve problems in a social environment   | Student: examines functions of several variables, using the concept of limit, continuity and derivatives, calculates double integrals, and explains the substitution method, applies double integrals to solve geometrical problems, demonstrates some techniques for solving ordinary differential equations. Student recognizes the importance of self-expanding knowledge and take the challenge of working with a group to solve a problem.  | [SU2] Assessment of ability to analyse information |
| Subject contents   | Functions of several variables. Partial derivatives. Total differential. Maxima and minima of a function of several variables. Ordinary differential equations: separable diff. eq., linear first-order diff. eq., Bernoulli's eq., linear diff. eq. with constant coefficients of higher order. Double integrals. Applications of double integrals.   |  |  |
| Prerequisites and co-requisites                                | There is no requirement.   |  |  |
| Assessment methods and criteria                                | Subject passing criteria   | Passing threshold  | Percentage of the final grade                      |
|  | Midterm colloquium   | 50.0%  | 100.0%   |
| Recommended reading  | Basic literature   | 1. K. Jankowska, T. Jankowski, Funkcje wielu zmiennych. Całki wielokrotne. Geometria analityczna, PG, Gdańsk 2005. 2. K. Jankowska, T. Jankowski, Zadania z matematyki wyższej, PG, Gdańsk 1999. 3. M. Gewert, Z. Skoczylas, Analiza matematyczna 2 – Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2003. 4. M. Gewert, Z. Skoczylas, Analiza matematyczna 2 – Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2003. 5. M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne, Oficyna Wydawnicza GiS, Wrocław 2001. |  |
|  | Supplementary literature   | 6. R. Leitner, Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 2001. 7. R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 1999. 8. W. Kryszwicki, L. Włodarski, Analiza matematyczna w zadaniach I i II, Wydawnictwo Naukowe PWN, Warszawa 1998.   |  |
|  | eResources addresses   | WILiŚ - Transport sem.2 - Matematyka 2020/2021 (K.Radziszewski) - Moodle ID: 13610<br><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13610">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13610</a><br>WILiŚ - Transport sem.2 - Matematyka 2020/2021 (K.Radziszewski) - Moodle ID: 13610<br><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13610">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13610</a>   |  |
| Example issues/<br>example questions/<br>tasks being completed | <ol style="list-style-type: none"> <li>Sketch the graph of the function <math>f(x,y)=(9-x^2-y^2)^{1/2}</math>.</li> <li>Identify any local extrema of the function <math>f(x,y)=e^{x-y}(x^2-2y^2)</math>.</li> <li>Find the absolute extrema of the function <math>f(x,y)=xy-x(x+1)-y(y+1)</math> on the set <math>D=\{(x,y): x^2+y^2\leq 25, y\geq 3\}</math>.</li> <li>Solve the equation <math>y''+6y'+9y=10\sin x</math>.</li> <li>Find the area between the two curves <math>y^2=4+x</math> and <math>x+3y=0</math>.</li> </ol> |  |  |
| Work placement   | Not applicable   |  |  |