GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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| Subject name and code | Mathematics, PG_00064167 | | |
| Field of study | Transport | | |
| Date of commencement of studies | October 2026 | Academic year of realisation of subject | 2026/2027 |
| 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 | 1 | ECTS credits | 7.0 |
| Learning profile | general academic profile | Assessment form | exam |
| Conducting unit | Mathematics Center -> Vice-Rector For Education | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr Krzysztof Radziszewski | |
| | Teachers | | |

**Lesson types**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 30.0 | 30.0 | 0.0 | 0.0 | 0.0 | 60 |

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 | 60 | 10.0 | 105.0 | 175 |

**Subject objectives**

Students obtain competence in the range of using methods of mathematical analysis and linear algebra and knowledge how to solve simple problems that can be found in the field of engineering.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K6_U08] able to carry out simple engineering tasks related to the construction and operation of a selected element of the transport system, select the right methods and tools | Student: defines the basic concepts of linear algebra, solves equations and inequalities, containing elementary functions, geometrically interprets the results of an examination of a graph of a function using the concept of limit, continuity and derivatives of functions, recognizes the importance of selfexpanding knowledge and take the challenge of working with a group to solve a problem. | [SU1] Assessment of task fulfilment |
| [K6_W01] has knowledge of mathematical analysis, algebra, calculus of probability and operational research required for describing and solving transport problems | Student: defines the basic concepts of linear algebra, solves equations and inequalities, containing elementary functions geometrically interprets the results of an examination of a graph of a function using the concept of limit, continuity and derivatives of functions, recognizes the importance of selfexpanding knowledge and take the challenge of working with a group to solve a problem. | [SW1] Assessment of factual knowledge |

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| Subject contents | Course content – lecture<br>Matrices. Determinants. Inverse matrix. Rank of the matrix. Systems of linear equations: Cramers theorem, Kronecker-Capelly theorem, Gauss-Jordan elimination. Absolute value of a real number. Functions and their properties. Elementary functions: polynomials, rational functions, exponential functions, logarithmic functions, trigonometric and inverse trigonometric functions. Sequences of numbers. Limit of a sequence. Limit and continuity of a function. Differential calculus: derivative and differential of a function, Taylors formula, asymptotes of functions, maxima and minima, concavity and points of inflection. Antiderivative and the indefinite integral. |
| Prerequisites and co-requisites | |

**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Midterm colloquium | 50.0% | 40.0% |
| Written exam | 50.0% | 60.0% |

**Recommended reading**

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| Basic literature | 1. Praca zbiorowa pod redakcją B. Wikieł, Matematyka - Podstawy z elementami matematyki wyższej, PG, Gdańsk 2007. 2. K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, PG, Gdańsk 1997. 3. Praca zbiorowa pod red. E. Mieloszyka, Matematyka Materiały pomocnicze do ćwiczeń, PG, Gdańsk 2004. 4. R. Leitner, Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 2001. 5. R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 1999. 6. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2001. |
| Supplementary literature | 7. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2001. 8. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach I i II, Wydawnictwo Naukowe PWN, Warszawa 1998. 9. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2002. 10. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2002. 11. E. Mieloszyk, Macierze, wyznaczniki i układy równań, PG, Gdańsk 2003. |
| eResources addresses | |

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| Example issues/ example questions/ tasks being completed | 1. Find the domain and the set of values of the function f(x)=arcsin(3x-2)+. Determine the inverse function of f.<br>2. Find the derivative of $y=4x(3x^2+5)^5$.<br>3. Sketch the graph of the function f(x)=x-lnx. Identify any local extrema and points of inflection.<br>4. Find the absolute extrema of $f(x)=4x-36x^{-1}$ on the interval [1,6].<br>5. Calculate $4x^2 \ln x \, dx$.<br>6. Find $A^{-1}$ if the matrix $A$ is a 2x2 matrix of the elements $a_{ij} = 3i - j$. |
| Practical activites within the subject | Not applicable |

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