GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Mathematics I, PG_00055861 | | |
| Field of study | Power Engineering | | |
| Date of commencement of studies | October 2024 | Academic year of 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 | 1 | Language of instruction | Polish |
| Semester of study | 1 | ECTS credits | 10.0 |
| 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 Magdalena Musielak | |
| | Teachers | dr Magdalena Musielak<br>mgr Danuta Beger | |

| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|---|
| | Number of study hours | 45.0 | 60.0 | 0.0 | 0.0 | 0.0 | 105 |
| | 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 | 105 | 24.0 | 121.0 | 250 |

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| Subject objectives | Obtaining competences by a student in using the apparatus of mathematical analysis and equations and applying the acquired knowledge to solve simple problems occurring in engineering fields |

## Learning outcomes

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K6_W01] has basic knowledge of mathematics necessary to describe the phenomena related to the processes of energy conversion and transfer; uses information technology to solve mathematical problems | Student: Can name the basic properties of elementary functions. Solves the equations and inequalities containing elementary functions. Computes the limits of sequences and functions by definition. He knows the definition of a derivative and its applications, finds monotonicity intervals of functions and its extremes. Analyzes properties of a functions based on its first and second derivative. Applies the basic techniques of integration to calculate indefinite an definite integrals Examines the convergence of improper integrals. The student defines the basic the concepts of linear algebra. Defines the basic concepts of matrix calculus. Detetmines the position of the straight lines and planes in space. Uses packages mathematical to carry out calculations and visualization of mathematical concepts. | [SW1] Assessment of factual knowledge<br>[SW2] Assessment of knowledge contained in presentation |
| [K6_K01] is aware of the need for training and self-improvement in the profession of energy and the possibility of further education; can think and act in a creative and entrepreneurial manner; can define priorities for the implementation of an individual or group task | Student can use a computer program to calculate the needed values. He knows what mathematical methods are used in programs for technical calculations. | [SK2] Assessment of progress of work |
| [K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems | The student joins the knowledge in mathematics with knowledge from others fields. | [SU2] Assessment of ability to analyse information<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools |

## Subject contents

Elements of linear algebra. Matrices and determinants. Operations on matrices. Inverse of a matrix. System of linear equations.

Elementary functions and their properties: polynomial, rational, power, exponential, logarithmic, trigonometric, cyclometric.

Sequences. Definition. Monotonicity and boundedness. Limits.

Limits and continuity of functions.

Differential calculus and its applications.

Integral calculus and its applications.

Complex numbers.

## Prerequisites and co-requisites

## Assessment methods and criteria

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Tests during the semeter | 0.0% | 50.0% |
| Exam | 50.0% | 50.0% |

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| Recommended reading | Basic literature | 1. Jurkiewicz T., Skoczylas Z., Algebra liniowa 1, GiS, Wrocław 2006<br><br>2. Leja F., Rachunek różniczkowy i całkowy, PWN, Warszawa 1965<br><br>3. Mostowski A., Stark M., Elementy algebry wyższej, PWN,Warszawa 1968<br><br>4. Jankowska K., Jankowski T., Zbiór zadań z matematyki,Wydawnictwo PG, Gdańsk 1998<br><br>5. Wikieł B., Podstawy z elementami matematyki wyższej,Wydawnictwo PG, Gdańsk 2007 |
| | Supplementary literature | 1. Fichtencholtz G. M., Rachunek różniczkowy i całkowy, t. 1-2,PWN, Warszawa 1962<br><br>2. Jankowska K., Jankowski T., Zbiór zadań z matematyk wyższej,Wydawnictwo PG, Gdańsk 2004<br><br>3. Krysicki W., Włodarski W., Analiza matematyczna w zadaniach, cz.1, PWN, Warszawa 1994<br><br>4. Krysicki W., Włodarski W., Analiza matematyczna w zadaniach, cz.2, PWN, Warszawa 1994 |
| | eResources addresses | Adresy na platformie eNauczanie: |
| Example issues/ example questions/ tasks being completed | 1. Solve a system of equations. 2. Find the inverse matrix. 3. Solve the matrix equation eg. np. 3X-AX=B jeżeli A=[5 6; 7 8], B=[-1 -3; 2 -1]. 4 Compute limits of sequecncies. 5, Check by definition that a given sequence has limit.<br><br>6. Compute limits of functions, 7. Find asymptotes of a given function. 8. Calculate derivatives (using formulas). 9. Examine the intervals of monotonicity and extremes of a function. 10 Find tangent line to the graph, approximate value of eg. sqrt(14) 11. optimalizating exercise 12. Calculate antiderivative (eg of a rational function, trigonometric f-tion).13. Calculate the improper integral. 14. Calculate definiteve integral (find area or center of mass and such). | |
| Work placement | Not applicable | |