GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Mathematics, PG_00069037 | | |
| Field of study | Chemical Technology | | |
| Date of commencement of studies | October 2025 | Academic year of realisation of subject | 2025/2026 |
| 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 | 9.0 |
| 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 Hanna Guze | |
| | Teachers | mgr Katarzyna Kujawska<br>dr Hanna Guze<br>dr Leszek Ziemczonek | |

**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

eNauczanie source addresses:
Moodle ID: 996 WCh - TCh, Ch, ZT, sem.1 Matematyka 2025/26 (H.Guze)
https://enauczanie.pg.edu.pl/2025/course/view.php?id=996

**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 | 15.0 | 105.0 | 225 |

**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_W01] Possesses knowledge of mathematics and physics necessary to analyze and describe technological processes, including differential and integral calculus, numerical methods, statistics and elements of vector analysis. | Student mentions basic properties of elementary functions. Student solves equations and inequalities with elementary functions. Student gives the definition of basic notions of differential calculus. Student uses basic notions and formulas of differential calculus. Student determines intervals of monotonicity of a given functions and its extrema. Students calculates antiderivatives using the substitution method of integration and integration by parts. Student applies definite integrals to solving geometrical problems. Student uses the basic operations on complex numbers. | [SW1] Assessment of factual knowledge |
| [K6_U01] Is able to independently plan the learning process and acquire, analyse and interpret information from various sources, also in English. | Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future. Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions. | [SU2] Assessment of ability to analyse information<br>[SU1] Assessment of task fulfilment<br>[SU5] Assessment of ability to present the results of task |

**Subject contents**

The sets of numbers and set notation. Basic mathematics symbols.

Functions of one variable:

- definitions, graphs, properties, continuity, limits
- absolute value, equations and inequalities
- polynomials, rational functions, power functions, trigonometric and inverse trigonomertic functions, exponential and logarithmic functions
- equations and inequalities involving these functions
- applications to mathematical modeling

Infinite number sequences, limits and continuity of functions

- boundedness and monotonicity
- imits
- continuity of functions, types of discontinuities and their interpretation

Single variable calculus:

- definition of the derivative
- Rolle's and Lagrange's theorems and their applications
- L'Hospital's Rule
- monotonicity and local/global extrema (optimization problems)
- higher order derivatives
- concavity, inflection points
- applications of single variable differential calculus to curve sketching,
- applications of differential calculus to other fields (e.g. chemistry, physics, biology)

Definite and indefinite integral, Fundamental Theorem of Calculus

- basic integration formulas
- integration by substitution, by parts, by partial fractions
- applications of integral calculus to other fields

Complex numbers.

**Prerequisites and co-requisites**

**Assessment methods and criteria**

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Written and/or oral exam | 50.0% | 50.0% |
| Tests and activity during the classes | 0.0% | 50.0% |

**Recommended reading**

Basic literature

- Praca zbiorowa pod redakcją Wikieł B.: Matematyka - Podstawy z elementami matematyki wyższej. PG, Gdańsk 2007;

- M. Gewert, Z. Skoczylas : Analiza matematyczna 1, Oficyna Wydawnicza GiS 2008;

- K. Jankowska, T. Jankowski : Zbiór zadań z matematyki, Wydawnictwo PG, 2010.

- J.Topp : Matematyka. Funkcje jednej zmiennej, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2016.

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|---|---|---|
| | Supplementary literature | - G.M. Fichtenholz : Rachunek różniczkowy i całkowy I, PWN 1985;<br><br>- R. Leitner : Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne Warszawa 1999;<br><br>- L. Maurin, M. Maczyński, T. Traczyk : Matematyka - podręcznik dla studentów wydziałów chemicznych, PWN 1975.<br><br>- W. Żakowski, G. Decewicz : Matematyka I I II, Wydawnictwo Naukowo-Techniczne, Warszawa 1991.<br><br>- W.Krysicki, L.Włodarski : Analiza matematyczna w zadaniach. cz1, Wydawnictwo Naukowe PWN. |
| | eResources addresses | |
| Example issues/ example questions/ tasks being completed | 1. Find the domian and the set of values of the function f(x) =....<br><br>2. Find the derivative of f(x)=<br><br>3. Sketch the graph of the function f(x)= . Identify any local extrema and points of inflection.<br><br>4. Use the definite integral to find the area of the region bounded by.... .<br><br>5. Use the definite integral to determine the volume of the solid formed by the rotation of the curve ... around the axis oX. | |
| Work placement | Not applicable | |

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