**Name: Mathematics for Engineers**
**Name in Polish: Matematyka dla inżynierów**
**Name in English: Mathematics for Engineers**

### Information on course:

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| **Course offered by department:** | Faculty of Organisation and Management |
| **Course for department:** | Silesian University of Technology |
| **Study level and form:** | Bachelor's degree, Full-time |
| **Term:** | winter semester 2022/2023 |
| **Coordinator of course edition:** | dr Daniel Ballesteros-Chavez |

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**Default type of course examination report:**

Zal.

**Language:**

English

**Course homepage:**

https://platforma.polsl.pl/rms/course/view.php?id=52

**ECTS**

7

**Short description:**

Introduction to mathematics for engineering. The aim of the course is to familiarize students with the basic issues of differential and integral calculus of a single-variable and double-variable function and its applications, ordinary differential equations, linear algebra, elements of combinatorics and probabilistic calculus.

**Description:**

Detailed programme's content:

Lecture:
Identification of true and false logic statements, quantifiers. Complex numbers – algebraic and trigonometric form, operations on complex numbers. Limit of a 1-variable function. Function continuity at the point. Types of function discontinuities. Derivative of a single-variable function and its geometric interpretation. Differential and its application in approximations and error calculations. Examination of the function variation (asymptotes, monotonicity, extremes, types of concavity of the graph, points of inflection). Matrix calculus and systems of linear equations (Cramér's system, Kronecker-Capelli's theorem, Gaussian elimination). Vector calculus in R3. Scalar, vector and mixed products. Plane and straight line in R3.

Exercises:
Practical realization of the issues, presented during the lectures, on the way of discussing and solving the tasks illustrating the undertaken problems.

Number of hours allocated for contact hours:
Lecture: 30h
Exercises: 60h

Student workload hours:
Preparation for classes (realization of homeworks): 60h
Preparation for tests (theoretical and practical): 60h

Total number of hours: 210

Number of ECTS credits: 7
including number of ECTS credits allocated for contact hours: 3

**Bibliography:**

(1) E. Łobos, B. Sikora, A first course in calculus. Wydawnictwo Politechniki Śląskiej, Gliwice, 2007.
(2) E. Łobos, B. Sikora, Advanced calculus. Selected topics, Wydawnictwo Pol. Śl. Gliwice 2006.
(3) E. Łobos, B. Sikora, Calculus and differential equations in exercises. Wydawnictwo Politechniki Śląskiej, Gliwice, 2012, wydanie III poprawione.
(4) H. Anton, C. Rorres, A.Kaul, Elementary linear algebra, Applications, Wiley, 2019.
(5) R. Grzymkowski, Matematyka dla studentów wyższych uczelni technicznych. Wydawnictwo Pracowni Komputerowej Jacka Skalmierskiego, Gliwice, 2000, wydanie II poprawione.
(6) R. Grzymkowski, Matematyka. Zadania i odpowiedzi. Wydawnictwo Pracowni Komputerowej Jacka Skalmierskiego, Gliwice, 2002.
(7) W. Krysicki, L.Włodarski: Analiza matematyczna w zadaniach, cz.1 i 2, PWN, Warszawa 2014.
(8) M. Biedrońska: Matematyka: zbiór zadań z rozwiązaniami i odpowiedziami, Wyd. Pol. Śl., Gliwice 2010,
(9) W. Żakowski, G. Decewicz: Matematyka: analiza matematyczna, cz. 1, PWN, Warszawa 2000.

**Learning outcomes:**

Knowledge: a student knows and understands
- basic issues in the field of mathematical logic
- basic issues in the field of complex numbers
- basic issues in the field of differential calculus of 1-variable functions
- basic issues in the field of linear algebra
- basic issues in the field of vector calculus and analytic geometry in R3

Skills: a student can
- identify true or false logic sentences and use the quantifiers
- perform calculations on complex numbers
- compute derivatives of 1-variable functions and use them in practice
- perform calculations on matrices and systems of linear equations
- perform calculations on vectors and solve basic exercises of analytic geometry in R3

**Assessment methods and assessment criteria:**

Student may get maximally 100p. in the following way:

Activity during the exercises: 10p.
Tests 1,2 and 3 (practical tasks): 25p. each
Theoretical test: 15p.
To pass each practical test (1,2 and 3) student must get 10p.
To pass the theoretical test student must get 7p.

To pass the course student must collect 41p.
The final grade in the course, based on the number of points scored, is calculated as follows:
0-40 insufficient (2.0);
41-55 sufficient (3.0);
56-70 above sufficient (3.5);
71-80 good (4.0);
81-90 above good (4.5);
91-100 very good (5.0).

**Practical placement:**

Not applicable