1. Course number and name

RB-S1-19-I08-B; **Mathematics**

2. Credits and contact hours*

5 ECTS, lectures: 45 hours**, classes: 60 hours**

3. Instructor's or course coordinator's name

Wojciech Kempa PhD, DSc/University Professor

4. Text book, title, author, and year

- B. Sikora, E. Łobos, A first course in calculus. Silesian University of Technology Press, Gliwice, 2007
- E. Łobos, B. Sikora, Calculus and differential equations in exercises. Silesian University of Technology Press, Gliwice, 2004
- E. Łobos, J, Macura, B. Sikora, Calculus and linear algebra in exercises, Part 1 and 2, Silesian University of Technology Press, Gliwice, 2020

a. other supplemental materials

- free textbooks in Mathematics available on https://openstax.org/subjects/math

5. Specific course information

a. brief description of the content of the course (catalog description)

Lectures:

(1) Fundamentals of mathematical logic. (2) Basics of algebra of complex numbers. (3) Matrix calculus. (4) Systems of linear equations. (5) Vector calculus in R^3. Scalar, vector and mixed products. (6) Plane and straight line in R^3. (7) Elementary functions. (8) Number sequence and its limit. (9) Limit of a single-variable function. (10) Function continuity at the point. Types of function discontinuities. (11) Derivative of a single-variable function and its geometric interpretation. (12) Differential and its application in approximations and error calculations. (13) Examination of the function variation

Classes:

Classes illustrate the issues presented during lectures.

b. prerequisites or co-requisites

No prerequisites and additional requirements

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

Required.

6. Specific goals for the course

a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic

The student can:

- perform calculations on complex numbers and matrices
- perform calculations on vectors and solve basic exercises of analytic geometry in R^3
- compute limits and derivatives of a single-variable function

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

K1A_W01, K1A_U05

7. Brief list of topics to be covered

1. Fundamentals of mathematical logic.
2. Basics of algebra of complex numbers.
3. Matrix calculus (operations on matrices, matrix determinant, matrix rank, inverse matrix).
4. Systems of linear equations (Cramér's system, Kronecker-Capelli's theorem, Gaussian elimination).
5. Vector calculus in R^3. Scalar, vector and mixed products.
6. Plane and straight line in R^3.
7. Elementary functions (polynomial, rational, exponential, logarithmic, trigonometric and cyclometric).
8. Number sequence and its limit.
9. Limit of a single-variable function. F
10. unction continuity at the point. Types of function discontinuities.
11. Derivative of a single-variable function and its geometric interpretation.
12. Differential and its application in approximations and error calculations.
13. Examination of the function variation (asymptotes, monotonicity, extremes, types of concavity of the graph, points of inflection).

*- Consultations were not included in the contact hours

**-per semester