

SYLLABUS

Name: Mathematics (BudAB>SI1MATHEM19)

Name in Polish:

Name in English: Mathematics

Information on course:

Course offered by department: Faculty of Civil Engineering
Course for department: Silesian University of Technology

Default type of course examination report:

EGZ

Language:

English

Course homepage:

<https://platforma.polsl.pl/rms/course/view.php?id=1424>

Short description:

Course objectives: providing the skills of using the basic mathematical tools on the level sufficient for further studying, and the skill of formulation and description of problems using mathematical language, as well as interpreting the obtained results.

Description:

Lecture: 30 hours; Classes: 60 hours.

The detailed programme content:

Complex numbers: standard form, polar form, exponential form; operations; complex plane. Elementary functions and their properties. Sequences and their convergence in a metric space. Limit and continuity of a function. Asymptotes. One variable function differential calculus (derivative, derivative of the inverse and composite function, mean value theorems, the Taylor formula, extreme values, monotonicity, convexity). Indefinite integral (primitive function, properties of indefinite integral, integrating by parts and by substitution).

Methods of teaching, including methods and techniques of the distance learning education:

Lecture is led traditionally. During the lecture definitions and theorems are presented (some of them with proofs); all notions are illustrated by examples. During classes the students practice contents given during the lecture, they solve (on their own or with help of the teacher) tasks proposed by the teacher.

rules of the completion of the course, including forms of the correction, and the conditions that must be fulfilled for the accession of the examination:

In the file Rules of the Completion of the Course.

organization of academic classes, rules of attending them, and rules of the participation, with indication whether the presence is compulsory

presence in the class can be checked, presence on the lecture can also be checked; student should be prepared for classes – learn the content of the lecture referring to the particular classes, student who is unprepared for the classes can obtain negative points; students can obtain extra points for the activity in the class.

Bibliography:

- [1] R.A. Adams, C. Essex, Calculus. A Complete Course, 7th Edition, Pearson, 2010.
- [2] H. Anton, C. Rorres, Elementary Linear Algebra, 11th Edition, NJ: John Wiley & Sons, Hoboken, 2014.
- [3] J. Bird, Higher Engineering Mathematic, 6th Edition, Newnes, 2010.
- [4] J.M. Erdman, Exercises and Problems in Calculus, version of August 1, 2013, https://web.pdx.edu/~erdman/CALCULUS/CALCULUS_pdf.pdf
- [5] J.K. Hunter, An Introduction to Real Analysis, https://www.math.ucdavis.edu/~hunter/intro_analysis_pdf/intro_analysis.pdf
- [6] E.Łobos, B.Sikora, Calculus and Differential Equations in Exercises, Wydawnictwo Politechniki Śląskiej, Gliwice, 2006.
- [7] W. Rudin, Principles of Mathematical Analysis, 3rd Edition, International Series in Pure and Applied Mathematics, McGraw-Hill Book Company, Dusseldorf, 1976.
- [8] B.Sikora, E.Łobos, A First Course in Calculus, Wydawnictwo Politechniki Śląskiej, Gliwice, 2010.
- [9] W.F. Trench, Introduction to Real Analysis, http://ramanujan.math.trinity.edu/wtrench/texts/TRENCH_REAL_ANALYSIS.PDF

Learning outcomes:

Knowledge: student knows and understands definitions and basic theorems of the differential and integral calculus of one variable and basic properties of complex numbers (K1A_W01).

Skills: student can perform operations on complex numbers, interpret the complex numbers on the complex plane, evaluate limits and derivatives, apply appropriate theorems to selected elements of the function examination (K1A_U05).

Assessment methods and assessment criteria:

Preliminary requirements for this course is the knowledge of the high school mathematics at the advanced level.

To complete the course student has to pass five learning outcomes: E1-E4 and W.

Student can pass the outcomes E1-E4 on two tests that take place during classes, whereas the outcome W is checked on the examination. Each of the tests consists of four tasks; for each task one can obtain at most 5 points.

Each test takes 55 min. The tasks are divided into learning outcomes as follows.

Test I

E1 (0-10p)

one needs to obtain 4 points to pass T1 complex plane (0-5p)

T2 properties of complex numbers (0-5p)

E2 (0-10p)

one needs to obtain 4 points to pass T3 domain of a function (0-5p)

T4 function properties (0-5p)

Test II

E3 (0-10p)

one needs to obtain 4 points to pass T5 limit's evaluation (0-5p)

T6 evaluation of the derivative of

"complicated" function (0-5p)

E4 (0-10p)

one needs to obtain 4 points to pass T7 monotonicity and extreme values (0-5p)

T8 application of the derivative

different from T7(0-5p)

Corrections of the failed learning outcomes E1-E4 can be taken during the examinations.

Student is supposed to be prepared for classes, to know the formulas and definitions which were given on the lecture and/or to use materials prepared by him-/herself based on the lecture (handwritten lecture notes, printout of the lecture, the literature).

Students who are severely unprepared for the class and unwilling to take part in the class, result in obtaining -2 points in activity.

During the tests the student should solve the tasks using the formulas, theorems and methods given on the lecture. Any other formulas etc. used, should be proved by the student.

Student can obtain at most 5p. for his/her activity during classes.

Students who finish the semester with a nonnegative number of points in activity may

obtain at most 5p. for the short test in theory that takes place during the last lecture,

take the correction of one of the learning outcomes E1-E4 that takes place during the last class.

After passing all the outcomes E1-E4 student obtains the class grade according to the following table

S Class grade

0-26 satisfactory (3,0)

26,5-33 satisfactory+ (3,5)

33,5-39,5 good (4,0)

40-45,5 good+ (4,5)

46-50 very good (5,0)

where S denotes the sum of points obtained for the both tests, activity and short test in theory.

To pass the outcome W student must obtain at least 20 p. for a written exam (over 50).

The examination can be taken by students who passed the classes or did not pass at most one of the outcomes E1-E4. The examination grade follows from the below table

E Examination grade

20-26 satisfactory (3,0)

26,5-33 satisfactory+ (3,5)

33,5-39,5 good (4,0)

40-45,5 good+ (4,5)

46-50 very good (5,0)

where E denotes the number of points obtained for the exam.

After passing all the learning outcomes the final grade is given by the formula

$\max \{3, \frac{1}{2}(S+E-N) \}$

where S is the class grade, E is the examination grade, whereas N is the number of examinations that student could not take because of the failed outcomes E1-E4.

In order to transfer the grade obtained during the other mathematics course student has to contact the course coordinator with the syllabus of the latter course.

This syllabus is valid since the winter semester 2025/6 and cannot be changed during semester.

Practical placement:

Not applicable

Element of course groups in various terms:

Course group description	First term	Last term
missing group description in English (BudAB-S1-2019-sem1)	2020/2021-Z	

Course credits in various terms:

<without a specific program>			
Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	8	2020/2021-Z	