

Course description, Requirements

Óbuda University Bánki Donát Faculty of Mechanical and Safety Engineering		Institute of Natural Sciences and Basic Subjects (TAI)			
Course title and code: Mathematics I, BTXMME1BNF				Credits: 5	
Full-time, semester 1. 2026/27 fall semester					
Faculties in which the subject is taught: Mechatronics engineer, BSc					
Supervised by:	Dr. Hanka László		Instructors:	Dr. Hanka László	
Prerequisites conditions:		-			
Lessons per week:	Theory: 2	Practice (in Auditorium): 2	Laboratory: 0	Consultation:	
Exam type (s,v,f):	exam				
Syllabus					
Aim: The purpose of the lecture is to present efficient mathematical tools that can be successfully applied in engineering sciences. In the framework of the practice lessons, the students deepen their knowledge through practical tasks, thereby becoming able to solve complex engineering problems at the end of the semester.					
Curriculum: Elementary algebra, Polynomials, Trigonometry, vector geometry, Complex algebra, Functions, Sequences, Limit, Differentiation and its applications.					
Topics:				Lec.	Lab.
1. Elementary algebra, exponentiation, root extraction, application of identities. Solving equations. Logarithms and their identities. Calculations with logarithms, solving equations. The logarithmic function.				2	2
2. Polynomials, long division of polynomials, polynomial factorization. Solving higher-degree equations. The binomial theorem and its applications. Binomial coefficients and their properties, Pascal's triangle.				2	2
3. Trigonometric functions of acute and general angles, trigonometry. Trigonometric identities, addition formulas, trigonometric equations. Trigonometric functions.				2	2
4. Vector geometry in 3D, basic vector operations. Scalar/dot/inner product, vector/cross product, mixed/scalar-triple product. Calculations using coordinates. Geometric applications.				2	2
5. Analytic geometry. Equations of geometric figures. Equation of a plane, system of equations of a line.				2	2
6. Complex algebra. Operations with complex numbers in algebraic, trigonometric, and exponential form. Solving equations.				2	2
7. Midterm 1. Covers topics up to this week.				2	2
8. Functions, basic concepts. Domain, range, monotonicity, boundedness, parity. Operations with functions. Inverse function, composition of functions. Sequences, monotonicity, boundedness, limit. Convergent and divergent sequences. The concept of infinity. Euler's sequence, interpretation of Euler's number.				2	2
9. Limits of functions. Finite and infinite limits at finite and infinite points, one-sided limits. Continuity of functions.				2	2
10. Definition of the derivative, equation of the tangent line, linear approximation.				2	2
11. Differentiation rules. Rules for scalar multiples, sums/differences, products, quotients, composite functions, and inverse functions.				2	2
12. Applications of the derivative, L'Hospital's rule.				2	2
13. Applications of the derivative, finding extrema, complete function analysis.				2	2
14. Midterm 2.				2	2

Semester requirements

blitz quizzes, midterm test, exam.

Requirements:**Two midterm tests:**

test 1.: On the 9th or 10th week. Its subjects are the topics covered up to the 7th week, only computational problems. On the test you can get 50 points.

test 2.: On the 14th week. Its subjects are the topics covered from 8th up to the 13th week, only computational problems. On the test you can get 50 points.

The **prerequisite for the signature** is taking the midterms. In case you missed or failed one of the midterm tests you have to retake in the exam period. If you want to improve one of the midterms, you can retake it in the exam period. But the last result will be taken into consideration.

Altogether you can get 100 points during the semester.

If you miss both of the midterms, or one of the midterms and its retake, the course is not allowed to be completed, in this case you have to register for the course again in the following year!

If you have a signature, an exam grade will be offered. The **grade** is determined by the sum of the points you achieved on the midterm tests. The intervals are as follows:

0-49%: fail (1)
50-62%: pass (2)
63-74%: satisfactory (3)
75-87%: good(4)
88-100%: excellent (5)

If you have a signature and you don't accept the offered grade, you are free to take the **exam** in the exam period. In that case you lose your scores. The exam covers the whole semester. On the exam you can get 100 points. The exam is written, only computational problems.

Exam method: written

Literature:**Mandatory:**

Thomas Calculus I-III.; Pearson Addison- Wesley, 2005
Stewart Calculus; Brooks, 2008

Offered: