



Czech Technical University in Prague

Faculty of Mechanical Engineering

Department of Technical Mathematics, Karlovo nám. 13, 121 35 Prague 2

Mathematics I – Exercise Class Schedule for Full-Time Study Academic Year 2026/2027

Compared with previous years, the test at the end of the semester will contain more subproblems aimed at demonstrating knowledge of theory. Please take this into account in exercise classes as well and include theoretically oriented problems requiring independent reasoning, formulation of definitions and theorems, verification of assumptions, and similar tasks.

1. week (21. 9. – 25. 9.)

Basic information about the course, requirements for obtaining the course credit. Entrance test. Practice of important topics from secondary-school mathematics (in response to the results of the entrance test): Powers, manipulation of expressions. Solution of simple equations and inequalities. Domains of functions. Elementary functions: power, linear, quadratic, n th root, logarithmic, exponential, and trigonometric functions (domains, graphs), shifted graphs of elementary functions.

2. week (28. 9. – 2. 10.) (*Monday September 28 is cancelled, it will be replaced on January 4.*)

Secondary-school mathematics problems focused on linear algebra: relative positions of lines (and their relationship to direction vectors), solution of systems of linear algebraic equations (by “adding” and “subtracting” equations, elimination, relationship between solutions and equation coefficients). Vectors in $\mathbb{E}_2$ and $\mathbb{E}_3$, geometric interpretation. Calculations with vectors. Linear dependence and independence of a set of vectors. Dimension and basis of a vector space.

3. week (5. 10. – 9. 10.)

Operations with matrices. Rank of a matrix. Determinants. Inverse matrix. Linear dependence and independence of vectors, basis (solved using matrices or determinants). Problems with parameters.

4. week (12. 10. – 16. 10.)

Systems of linear algebraic equations (homogeneous, nonhomogeneous). Frobenius theorem. Cramer’s rule. Geometric interpretation (relative positions of planes and lines).

5. week (19. 10. – 23. 10.)

Systems of linear equations with parameters.
Eigenvalues and eigenvectors of square matrices.

6. week (26. 10. – 30. 10.) (*Wednesday 28 October is cancelled, it will be replaced on January 6.*)

Sequences of real numbers and their limits. Squeeze theorem for sequences, subsequences. Problems with factorials. Inverse trigonometric functions. Limit of a function. Limit of a composite function. Continuity of a function.

7. week (2. 11. – 6. 11.)

Derivative of a function. Derivative of a composite function. Equations of the tangent and normal to the graph of a function. Differential. Approximate calculation of a function value.
L’Hospital’s rule.
Intervals of monotonicity and local extrema of a function.

8. **week (9. 11. – 13. 11.)**
Global extrema. Second derivative.
Intervals of convexity and concavity of a function. Inflection points.
9. **week (16. 11. – 20. 11.)**
Asymptotes. Analysis of the behaviour of a function.
Approximation of functions by Taylor polynomials.
10. **week (23. 11. – 27. 11.)**
Indefinite integrals – use of tabulated integrals.
Integration by parts.
Substitution method.
11. **week (30. 11. – 4. 12.)**
Integration of rational functions.
Integration of functions of the type $\sin^m x \cdot \cos^n x$.
Integration of irrational functions of the type $R\left(x, \sqrt[n]{\frac{ax+b}{cx+d}}\right)$.
12. **week (7. 12. – 11. 12.)**
Riemann integral and its calculation. Newton–Leibniz formula. Mean value of a function on an interval. Integration by parts for the Riemann integral. Substitution method for the Riemann integral. Applications of the Riemann integral: area, volume of a solid of revolution, length of a curve.
13. **week (14. 12. – 18. 12.) (Monday 16 December is a replacement for 28 October.)**
Improper Riemann integral.
14. **week (4. 1. – 6. 1.)**
Replacement week: 4 January 2027 follows the even-week Monday schedule (replacement for 28 September 2026), 5 January 2027 follows the odd-week Tuesday schedule (replacement for 17 November 2026), and 6 January 2027 follows the even-week Wednesday schedule (replacement for 28 October 2026).