

## Program Przygotowawczy Politechniki Warszawskiej

liczba godz. 60 semestr 1 oraz 60 semestr 2

Przedmiot: Mathematics

Zalecana literatura (dostępna online):

- 1) precalTB2019.pdf (washington.edu)
- 2) alg\_complete.pdf (lamar.edu)

oraz do ostatnich tematów z semestru 2:

- 3) Calculus I - Derivatives (lamar.edu)
- 4) Calculus I - Integrals (lamar.edu)

### **PROGRAM AUTORSKI – SEMESTR 1 (30 zajęć po 2h)**

Program:

**Zajęcia 1:** Introduction to mathematics – notation; basic types of numbers : Integers, Rational Numbers, Irrational Numbers. Basic rules of algebraic operations.

**Zajęcia 2:** Basic rules of algebraic operations and proper use of brackets, continuation.

**Zajęcia 3:** Basic algebraic operations on fractions.

**Zajęcia 4:** Basic algebraic operations on fractions, continuation.

**Zajęcia 5:** Algebraic identities such as square of a sum, cube of a sum, sum/difference of cubes, root of a square, Pascal pyramid.

**Zajęcia 6:** Algebraic identities such as square of a sum, cube of a sum, sum/difference of cubes, root of a square, Pascal pyramid, continuation.

**Zajęcia 7:** Factorial and its properties.

**Zajęcia 8:** Elementary set theory: intervals and logic operations on them.

**Zajęcia 9:** Elementary set theory: intervals and logic operations on them, continuation.

**Zajęcia 10:** Quantifiers and basics of mathematical logic.

**Zajęcia 11:** Quantifiers and basics of mathematical logic, continuation.

**Zajęcia 12:** Quantifiers and basics of mathematical logic, continuation.

**Zajęcia 13:** Test 1

**Zajęcia 14:** Planar sets and solids. Areas, volumes and other geometric properties, continuation.

**Zajęcia 15:** Cartesian coordinate system.

**Zajęcia 16:** Distance between two points on the plane. Distance in the space.

**Zajęcia 17:** Vectors and basics of vector algebra.

**Zajęcia 18:** Vectors and basics of vector algebra, continuation.

**Zajęcia 19:** The simplest figures on the plane (lines, curves on the plane (such as  $x=a$ ,  $y=a$ , circles, etc.).

**Zajęcia 20:** Skew lines in the plane.

**Zajęcia 21:** Parallel and perpendicular lines.

**Zajęcia 22:** Lines and curves intersection in connection with roots of a quadratic equation.

**Zajęcia 23:** Test 2. Distance from a point to a line - formula.

- Zajęcia 24:** Introduction to function theory : domain, counter-domain, range.
- Zajęcia 25:** Introduction to function theory: properties of functions like one-to-one or onto, inverse function, monotonicity and composition of functions.
- Zajęcia 26:** Operations on graph of a function: scaling, shifting.
- Zajęcia 27:** Functions given by a multipart formula ('cases').
- Zajęcia 28:** Absolute value function.
- Zajęcia 29:** Linear functions.
- Zajęcia 30:** Test 3. Basic properties of quadratic functions like : completing the square, roots, properties, graphs, extreme values.

## **PROGRAM AUTORSKI – SEMESTR 2 (30 zajęć po 2h)**

Program:

- Zajęcia 1:** Quadratic functions and modelling problems.
- Zajęcia 2:** Division of polynomials, roots of polynomials, factorization of polynomials, (generalized) Bezout theorem.
- Zajęcia 3:** Division of polynomials, roots of polynomials, factorization of polynomials, (generalized) Bezout theorem, continuation.
- Zajęcia 4:** Equations and inequalities involving polynomials.
- Zajęcia 5:** Equations and inequalities involving polynomials, continuation.
- Zajęcia 6:** Systems of equations.
- Zajęcia 7:** Absolute value in equations and inequalities.
- Zajęcia 8:** Absolute value in equations and inequalities, continuation.
- Zajęcia 9:** Short revision of the material and the Test 1.
- Zajęcia 10:** Basic operations on powers.
- Zajęcia 11:** Basic operations on powers, continuation.
- Zajęcia 12:** Logarithms.
- Zajęcia 13:** Logarithms, continuation.
- Zajęcia 14:** Exponential functions.
- Zajęcia 15:** Graphs of logarithms and exponential functions : scaling, shifting.
- Zajęcia 16:** Equations and inequalities involving logarithms and exponential functions.
- Zajęcia 17:** Equations and inequalities involving logarithms and exponential functions, continuation.
- Zajęcia 18:** Equations and inequalities involving logarithms and exponential functions, continuation.
- Zajęcia 19:** Short revision of the material and the Test 2.
- Zajęcia 20:** Radians and degrees.
- Zajęcia 21:** Trigonometric functions –  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $\cot x$ , basic properties (domain, range, period).
- Zajęcia 22:** Trigonometric functions – basic properties (domain, range, period), continuation.
- Zajęcia 23:** Equations and inequalities involving trigonometric functions.
- Zajęcia 24:** Equations and inequalities involving trigonometric functions, continuation.
- Zajęcia 25:** Equations and inequalities involving trigonometric functions, continuation.
- Zajęcia 26:** Inverse trigonometric functions.
- Zajęcia 27:** Introduction to differentiation.
- Zajęcia 28:** Introduction to differentiation, continuation.
- Zajęcia 29:** A very short introduction to integration.
- Zajęcia 30:** Test 3.