

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ДВНЗ «Ужгородський національний університет»
Приймальна комісія

ЗАТВЕРДЖУЮ

Голова приймальної комісії
ДВНЗ «УжНУ», ректор

_____ проф. Володимир СМОЛАНКА

_____ 2025 р.

ПРОГРАМА
вступного іспиту для іноземців
з математики
для вступників на навчання
для здобуття освітнього ступеня “бакалавр” (“магістр”)
(на основі повної загальної середньої освіти/ НРК5)

РОЗРОБЛЕНО
Предметною екзаменаційною комісією
з математики

Голова комісії Маріанна ШАРКАДІ

Ужгород – 2025

Explanatory note

Assessment of the readiness of applicants in mathematics for competitive selection for higher education.

The entrance exam in mathematics aims to assess the knowledge and skills of participants:

- to carry out mathematical calculations (operations on numbers given in different forms, operations with percentages, forming and solving proportions, approximate calculations, etc.);
- to carry out the transformation of expressions (understanding the value of each element of the expression, finding admissible values of variables, finding the numerical values of expressions for given values of variables, expressing one variable of the equality of two expressions through the other, etc.);
- to plot and analyze graphs of functional dependencies, investigate their properties;
- to solve equations, inequalities and their systems, text problems with the help of equations, inequalities and their systems;
- to plot and define geometric shapes in drawings, define their properties and perform geometric constructions;
- to find the quantitative characteristics of geometric shapes (lengths, angles, areas);
- to analyze information presented in various forms (graphic, tabular, text, etc.).

Topics of the training material and list of questions:

Algebra:

1. Comparison of real numbers.
2. Signs of the division of integers.
3. Finding the largest common divisor and the smallest common multiple for two integers.
4. Finding the ratio of numbers as a percentage, percentage of the number, finding the number by the value of its percentage.
5. Tasks for interest calculations and proportions.

6. Identical transformations of rational, irrational, power, exponential, logarithmic, trigonometric expressions and find their numerical value at given values of variables
7. Solving linear equations and inequalities, and equations and inequalities that reduce to them.
8. Solve the square equations and inequalities, and equations and the inequalities that reduce to them.
9. Solving the system of linear equations and inequalities, and those that reduce to them.
10. Solving equations and inequalities using module definitions and properties.
11. Solving equations and inequalities containing indicator and logarithmic expressions.
12. Problem solving for arithmetic and geometric progression.
13. Find the area of definition, and area of values of the function.
14. Construction of graphs of linear, quadratic, power, exponential, logarithmic and trigonometric functions.
15. Finding a derivative function.
16. Finding the angular coefficient and slope tangent to the graph of the function at this point.
17. Finding intervals of monotonicity of function.
18. Finding the extremes of a function by the derivative, the largest and the smallest value of the function.
19. Exploring a function using a derivative and plotting it.
20. Calculation of probability of accidental events, using its definition and combinatorial schemes.

Geometry:

21. Application of definitions, features and properties of elementary geometric figures to solving planimetric and practical problems.
22. Finding unknown quantities of triangles by given quantities.
23. Find the radii and centers of the circles described around the triangle and inscribed in the triangle.

24. Application of the definition and properties of polygons to the solution of planimetric and practical problems.
25. Finding the length of segments, degrees and radians, angles, areas of geometric shapes.
26. Calculation of the length of a circle and its arcs, the area of a circle and a sector.
27. Application of formulas for geometric shapes to solve planimetric and practical problems.
28. Find the coordinates of the midpoint of the segment, the distance between two points.
29. Drawing up a straight line equation and a circle equation.
30. Performing actions with vectors, finding the scalar product of vectors.
31. Solving problems, in particular, practical content for calculating the volumes and areas of surfaces of geometric bodies.

Evaluation criteria, evaluation structure, procedure for assessing the readiness of entrants.

The entrance test in mathematics is a written control of the entrant's knowledge. Written entry work is rated from 100 to 200 points. The total number of written assignments is 25. All tasks are short-answer. Each of them involves solving the problem. If done correctly, the entrant receives 4,8 points for it, otherwise - 0 points. It takes 60 minutes to complete the work.

Assessment of works on the entrance exam is carried out according to the following formula: $80 + k \cdot 4,8$, where k - the number of correct answers.

An applicant, who scores less than 100 points on the entrance exam, receives a "failed" grade.

Критерії оцінювання, структура оцінювання, процедура оцінювання підготовленості абитурієнтів.

Вступне випробування з математики - це письмовий контроль знань вступника. Письмова вступна робота оцінюється від 100 до 200 балів. Загальна

кількість письмових завдань - 25. Усі завдання є завданнями з короткою відповіддю. Кожне з них передбачає розв'язання задачі. Якщо воно виконане правильно, абітурієнт отримує за нього 4,8 бали, в іншому випадку - 0 балів. На виконання роботи відводиться 60 хвилин.

Оцінювання робіт на вступному іспиті здійснюється за наступною формулою: $80 + k \cdot 4,8$, де k - кількість правильних відповідей.

Вступник, який набрав менше 100 балів із вступного випробування, отримує оцінку «не склав».

Literature:

1. Математика для студентів-іноземців підготовчих факультетів : навчальний посібник. Частина 1 / О. І. Удодова, О. В. Рибачук, О. П. Мосьпан та ін. – Харків : УкрДУЗТ, 2019. – 282 с.
2. Lang, S. (2005). Basic Mathematics. Springer.
3. Rusczyk, R. (2007). Prealgebra. AoPS Incorporated.
4. Artin, M. (2011). Algebra. Pearson.
5. Gelfand, I. M. (2007). Algebra. Springer.
6. Jacobs, H. R. (2003). Geometry: Seeing, Doing, Understanding. W. H. Freeman.
7. Greenberg, M. J. (1993). Euclidean and Non-Euclidean Geometries: Development and History. W. H. Freeman.
8. Gelfand, I. M., & Saul, M. (2001). Trigonometry. Birkhäuser.
9. Young, C. (2017). Trigonometry. Wiley.
10. Spivak, M. (2008). Calculus. Publish or Perish.
11. Stewart, J. (2015). Calculus: Early Transcendentals. Cengage Learning.
12. Axler, S. (2015). Linear Algebra Done Right. Springer.
13. Lang, S. (2004). Linear Algebra. Springer.