Syllabus
Course Program

Higher mathematics

Specialty
073 – Management

Institute
Educational and Scientific Institute of Computer Sciences and Information Technologies

Educational program
Business-administration

Department
Computer mathematics and data analysis (324)

Level of education
Bachelor's level

Course type
General. Mandatory

Semester
1

Language of instruction
English

Lecturers and course developers

Kornil Tatyana Leonivna

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Candidate of technical sciences, associate professor, associate professor of Computer mathematics and data analysis Department (NTU “KhPI”). 30 years of work experience. Author and co-author of more than 50 scientific and educational publications. Leading lecturer of the courses: "Higher Mathematics", "Probability Theory and Mathematical Statistics".
More about the lecturer on the department's website
http://web.kpi.kharkov.ua/kmmm/uk/o_kafedre_ua/profesorsko-vikladatskij-sklad/kornil-tetyana-leonivna/

Tonitsa Oleh Volodymyrovych

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Candidate of physical-mathematical sciences, associate professor, associate professor of Computer mathematics and data analysis Department (NTU “KhPI”). 23 years of work experience.
Authored and co-authored over 60 scientific publications.
Leading lecturer of the courses: "Higher Mathematics", "Computer's discrete mathematics".
More about the lecturer on the department's website
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General information

Summary

The course covers all aspects of students' formation of a system of basic theoretical and practical mathematical knowledge and competences necessary for solving complex specialized tasks and problems in the spheres of business, trade and stock exchange activities, development of skills in mathematical research of applied problems, formation of logical thinking.

Course objectives and goals

The course covers all aspects of students' formation of a system of basic theoretical and practical mathematical knowledge and competences necessary for solving complex specialized tasks and problems in the spheres of business, trade and stock exchange activities, development of skills in mathematical research of applied problems, formation of logical thinking.

Format of classes

The course covers all aspects of students' formation of a system of basic theoretical and practical mathematical knowledge and competences necessary for solving complex specialized tasks and problems in the spheres of business, trade and stock exchange activities, development of skills in mathematical research of applied problems, formation of logical thinking.

Competencies

GC03 - Ability to abstract thinking, analysis, synthesis.
GC09 - Ability to learn and master modern knowledge.

Learning outcomes

LO16. Demonstrate the skills of independent work, flexible thinking, openness to new knowledge, be critical and self-critical.

Student workload

The total scope of the discipline is 180 hours. (6 ECTS credits): lectures – 32 hours, practical classes 48 hours, independent work – 100 hours. The final assessment is exam

Course prerequisites

Algebra in the school curriculum. Geometry in the scope of the school curriculum.

Features of the course, teaching and learning methods, and technologies

Interactive lectures with presentations, discussions

Program of the course

Topics of the lectures

Topic 1. Elements of linear algebra and analytic geometry
Topic 2. Elements of analytic geometry in the plane.
Topic 3. Limit and continuity of a function.
Topic 4. Differential calculus of functions of one and many variables.
Topic 5. Integral calculus.

Topics of the workshops

Topic 1. Elements of linear algebra and analytic geometry.
Matrices and determinants. Inverse matrix. Systems of linear algebraic equations (LAL) and their solution by the method of complete exclusion. SLAR as a mathematical model of economic problems. Solving economic problems and their interpretation.
Topic 2. Elements of analytic geometry in the plane.
Straight in the plane. Curves of the second order. The application of equations of a straight line and curves of the second order in problems with an economic content.
Topic 3. Limit and continuity of a function.
The limit of a function. Infinitely small and large. Equivalent infinitesimals. Interest calculation problem. (Elements of finance mathematics).
Topic 4. Differential calculus of functions of one and many variables.
The derivative and its economic meaning. Marginal values of production functions. A function of many variables (FBZ). Extremes of FBZ. Application of FBZ in economic theory.
Topic 5. Integral calculus.
Indefinite, definite, improper integrals. Economic problems: average value of functions, discounted sum.

Topics of the laboratory classes

Laboratory work within the discipline is not provided.

Self-study

Independent work: study of lecture material, preparation for practical classes, independent study of topics and issues that are not taught in lecture classes, performance of individual tasks. Individual tasks contain tasks from all studied topics.

Course materials and recommended reading

1. Kurpa L. V. Higher mathematics: Problems solving and variants of typical calculation. Volume 1.Kharkiv: NTU KhPI - 316 p.;
2. Kurpa L.V., Shmatko T.V. Differential and Integral Calculus for One Variable Functions – Kharkiv: NTU KhPI: 2017. – 324 p.;
3. Mulyk O. Calculus: part I. Differential calculus of function of one variable - Kyiv : Igor Sikorsky Kyiv Polytechnic Institute, 2022. – 117 p. ;
4. Zhuravska G.V. Higher Mathematics. Differential Calculus of a Function of One Variable. Elements of Theory – Kyiv : Igor Sikorsky Kyiv Polytechnic Institute, 2019. – 81 p.

Assessment and grading

Criteria for assessment of student performance, and the final score structure

100% of the final grade consists of the results of the current assessment (60%) and exam (40%). The current assessment consists of IDZ assessment (40%), work in classes and tests (20%).

Grading scale

Total points	National	ECTS
90–100	Excellent	A
82–89	Good	B
75–81	Good	C
64–74	Satisfactory	D
60–63	Satisfactory	E
35–59	Unsatisfactory (requires additional learning)	FX
1–34	Unsatisfactory (requires repetition of the course)	F

Norms of academic integrity and course policy

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": to demonstrate discipline, good manners, kindness, honesty, and responsibility. Conflict situations should be openly discussed in academic groups with a lecturer, and if it is impossible to resolve the conflict, they should be brought to the attention of the Institute's management.
Regulatory and legal documents related to the implementation of the principles of academic integrity at NTU "KhPI" are available on the website: http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/

Approval

Approved by	Date, signature	Head of the department Olena AKHIEZER
	Date, signature	Guarantor of the educational program Olena PROKHORENKO