



Україна, 01601, м. Київ, вул. Пирогова, 9

ConcordiaUA

9, Pyrohova street, Kyiv, 01601, Ukraine

Тел./tel.: +38(044)236-90-85; моб./cell: +38(050)331-42-95

info@uacu.edu.ua • www.concordia.edu.ua

Mathematics for Economics

Syllabus

3П 1.5

MATH-111

Specialty: C1 Economics and International Economic Relations
Educational program C1.02 International Economic Relations

Quarter/Year: Spring / 2026

ECTS Credits: 6

Instructor: Dr. Yuliya Gladka, Ph.D.

US Credits: 3

Contact information: : yuliya.gladka@uacu.edu.ua

Prerequisites: -

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Course Description

The course presents topics in algebra, including the number system, percentages, polynomials, algebraic functions, exponents, radicals, linear and quadratic equations, inequalities, lines in the plane, linear modeling, algebra of functions, exponential functions and systems of equations and inequalities. The course develops the topic of graphing in the coordinate plane with analysis of equations and graphs with applications.

Topics covered include functions and using functions to create simple models of real world problems. The main focus is made on practicing the skills necessary to properly manipulate algebraic expressions and equations. Development and solutions of mathematical models include economic and other applications.

This course will fulfill a prerequisite for future math and economic disciplines.

Course Outcomes

PH3. Use modern information and communication technologies, software packages for general and special purposes.

PH4. Systematize and streamline the information received on the processes and phenomena in the world economy; evaluate and explain the influence of endogenous and exogenous factors on them; formulate conclusions and develop recommendations, considering the peculiarities of the national and international environment.

PH6. Plan, organize, motivate, evaluate and increase the effectiveness of teamwork, conduct research in a group under the leadership of a leader, taking into account today's requirements and features in a limited time.

PH7. Apply the acquired theoretical knowledge to solve practical problems and meaningfully interpret the results.

PH8. Understand, highlight and describe new phenomena, processes and trends of global development, mechanisms and tools for the implementation of economic policy and world integration / disintegration processes, including Euro-Atlantic integration.

PH9. Understand and be able to apply, in accordance with other requirements of the educational program, modern theories and methods of solving specialized complex problems and practical problems in the field of international trade in goods and services, international capital flow, international monetary and financial relations, mobility of human resources, international technology transfer.

PH10. Identify and highlight the features of the functioning of the subjects of international relations and models of their economic development.

PH11. Substantiate own opinion regarding the specific conditions for the implementation of forms of international economic relations at the mega-, macro-, meso- and micro-levels.

PH12. Carry out a comprehensive analysis of complex economic systems, compare and contrast their components, evaluate and justify evaluations of the effectiveness of their functioning.

PH13. Select and skillfully apply analytical tools for studying the state and development prospects of individual segments of the international markets for goods and services using modern knowledge about the methods, forms and tools for regulating international trade.

PH14. Understand and apply theories, principles, means and tools for the implementation of international monetary and financial and credit relations.

PH15. Determine the functional features, nature, level and degree of interconnections between subjects of international economic relations of different levels and establish communications between them.

PH18. Investigate economic phenomena and processes in the international sphere based on an understanding of categories, laws; highlighting and summarizing trends, patterns of functioning and development of the world economy, taking into account the cause-effect and space-time relationships.

PH19. Understand and apply current legislation, international regulations and agreements, reference materials, current standards and specifications, etc. in the field of international economic relations.

PH22. Apply appropriate methods, rules and principles of functioning of international economic relations for the development of foreign economic activity of Ukraine.

PH24. Substantiate the choice and apply information and analytical tools, economic and statistical calculation methods, complex analysis techniques and methods of monitoring world markets.

PH25. Present the results of the research on the basis of which recommendations and measures for adaptation to changes in the international environment are developed.

Competencies

IK. The ability to solve complex specialized tasks and practical problems in the field of international relations in general and international economic, in particular, as well as in the learning process, which involves the use of new theories and methods in conducting comprehensive research of world economic relations, is characterized by complexity and uncertainty.

3K4. Ability to plan and manage time.

3K8. Ability to abstract thinking, analysis and synthesis.

CK3. Ability to identify features of the functioning of the environment of international economic relations and models of economic development.

CK5. Ability to carry out a comprehensive analysis and monitoring of world markets, assess changes in the international environment and be able to adapt to them.

Internationality: Adherence to the international standards in educational process, considering different examples of simple mathematical models' application in solving economic problems.

Communications

For individual issues, students should contact the professor **ONLY** by given e-mail or by Moodle. In the Subject line they should put: UACUFirstNameLastName. E-mail messages will normally be answered within 24 hours.

Note! Only emails sent from the student's corporate email address will be answered.

Attention! Official and only language used for assessment activities is English. Official and only languages used for communication within the University are Ukrainian and English.

Student Responsibilities

Time Commitment

The study of technical courses is cumulative (i.e., an understanding of earlier material is necessary to grasp concepts covered later). Past experience has shown a high correlation between procrastination and low grades. Students must be committed to completing tasks on time.

Students are responsible for following the schedule, attending classes, completing assignments on time and to the required standards, and maintaining academic integrity. These responsibilities are not open for discussion with instructors or the dean's office.

Technical Aspects

The student is obliged to provide himself/herself with all the necessary technical equipment for the educational process (laptop or computer, webcam, headsets or headphones and microphone), as well as access to the Internet.

Only students signed-in with their own first and last name are allowed into video consultations in Zoom.

Grading Policy

The course is based on mastery of course outcomes. Student grades for this course will be calculated based on performance.

Note: the minimal grade to pass a subject is 60% (70% for Master's courses).

Graduate Grading Guidelines

The assignment of a letter grade for a course is an indication of the student's overall success in achieving the learning outcomes for the course. The course letter grade may be viewed as a summary statement of the student's achievement in individual assessments (assignments & activities). These assessments are intended to identify for students their strengths as well as those areas in need of improvement. Student work is assessed according to the guidelines below.

Course-level Grading guidelines:

Grade	ECTS Grade	International Grade
90% - 100%	A	5 (Excellent)
83% - 89%	B	4 (Very Good)
75% - 82%	C	4 (Good)
70% - 74%	D	3 (Good)
60% - 69%	E	3 (Acceptable)
35% - 59%	FX	Not acceptable, possible repetition of course

Criteria for grading:

ECTS grade	Requirements for the student
A	The student demonstrated a comprehensive systemic and in-depth knowledge of program material; processed basic and additional literature; obtained a solid grasp of the conceptual apparatus, methods, techniques and tools provided by the program; found creative abilities in the presentation of the educational program material both on this issue and on related modules of the course and related courses, or the student had a current control of 90-100 points
B	The student demonstrated good knowledge of program material; processed the basic literature, mastered the conceptual apparatus, methods, techniques and tools provided by the program, but with some inaccuracies
C	
D	The student showed mediocre knowledge of the core program material; learned information mainly from a lecture course or just one textbook; mastered only certain methods, techniques and tools provided by the program
E	
FX	The student has significant gaps in knowledge of the main program material; fragmentary mastered the basic concepts, techniques and tools; significant mistakes are made when using them

Maximum total possible points – 500 points incl. (midterm and final exam are 70% of overall evaluation, where Midterm – 30% and Final – 40%)

Test / Class Assignment – 15 points (2 times during the course)

Homework Assignment – 12 points (2 times during the course)

Quiz – (6 times during the course, 72 points total)

Problem Solving Activity in Class (24 points total)

Midterm exam – 150 points

Final exam – 200 points

Student Workload

It is assumed that for each out of 17 class sessions a student spends about 10.5 academic hours of work. This includes 3.5 academic hours of working on lecture materials (including

consultations) and 7 academic hours of personal work. Personal work includes: reviewing lectures, practice in solving tasks and problems, preparing for assessments. Please pay attention that 1 academic hour equals to 40 minutes.

Assignment Format

- All work should be shown in time. If the student misses the deadline – the task is failed.
- **Midterm** covered topics from previous lectures (weeks 1-7). It included multiple choice questions and cases (problems) and took about 1 hours.
- The Final exam covered all course material and included multiple choice questions and cases (problems). It lasts for 1.5 hours. Admission to the Final exam is possible only if all the tasks of the curriculum are covered.
- After the **Midterm** and Final is graded a student has access to the grade only. Access to the attempt, corrects answers and information whether the answer is correct cannot be granted.

Academic dishonesty

Academic integrity is submitting one's own work and properly acknowledging the contributions of others. Forms of academic dishonesty include:

1. Plagiarism – submitting all or part of another's work as one's own in an academic exercise such as an examination, a computer program, or written assignment.
2. Cheating – using or attempting to use unauthorized materials on an examination or assignment, such as using unauthorized texts or notes or improperly obtaining (or attempting to obtain) copies of an examination or answers to an examination. Including the use of artificial intelligence and pre-prepared answers to the questions of tasks is prohibited (unless otherwise specified in the task itself or allowed by the instructor).
3. Facilitating Academic Dishonesty – helping another commit an act of dishonesty, such as substituting for an examination or completing an assignment for someone else.
4. Fabrication – altering or transmitting, without authorization, academic information or records.

Any violation of these rules constitutes academic dishonesty and is liable to result in a failing grade and disciplinary action. In case of any academic dishonesty a student is not allowed to continue or retake the assessment activity and for the Final the unsatisfactory grade (“0”) is assigned for the course total. Cases of the academic dishonesty are not considered by the Academic Council.

Midterm and **Final** are valid only if they are taken on-campus (room defined by the dean's office) and on UACU's computer/laptop or online on the student's computer/laptop using Zoom and other conditions defined by the dean's office to avoid the cases of academic dishonesty. Students who will not meet this requirement will be expelled from the course with grade “0”.

In case of missed **Midterm** or **Final** exam (for a valid reason like sickness or an emergency) a request to repeat the exam is possible. Permit to repeat a **midterm** or final exam is done through a letter to the dean's office with request and approval of subject lecturer.

Submission or retaking of any assessment activities after deadlines are forbidden.

Submission & Return Policy

Assignments must be submitted to the professor on or before the due date indicated in the Course Schedule. The assignments submitted after the due dates receive zero points.

**** NO MAKE –UP QUIZZES AND EXAMS ****

Schedule

Lecture	Research Projects	Assignments Due	Points (for each assessment activity)
1	Topic 1. Sets and Real Numbers Set notation, Union of Sets, Intersection of Sets. The Rational numbers, the Irrational numbers, Intervals of Real numbers. Operations on a Set of Real numbers.	Review Lecture Class Problem Solving Activity	 _3_
2	Topic 2. Evaluating Arithmetic and Algebraic Expressions Arithmetic Expressions, Exponential Expressions. Square Roots. Order of Operations. Algebraic Expressions. Reading a Graph.	Review Lecture Quiz	 _15_
3	Topic 3. Decimals, Fractions and Percentages Perform Addition, Subtraction, Multiplication and Division on Decimals and Fractions. Converting Decimals to a Fraction. Percentages, Simple and Compound interest.	Review Lecture Class Problem Solving Activity	 _3_
4	Topic 4. Linear Equations What is an Equation? Solving Equations. Types of Equations. Strategy for solving Linear Equations. Investment Problems. Mixture Problems. Commission Problems.	Review Lecture Test / Class Assignment	 _15_
5	Topic 5. Linear Inequalities Inequality symbols. Interval notations and Graphs. Solving Linear Inequalities. Absolute Value Equations and Inequalities.	Review Lecture Quiz Homework Assignment	 _10_ _12_
6	Topic 6. Systems of Linear Equations Graphing Lines in the Coordinate Plane. Graphing a Linear Equation in two variables. Using Intercepts for Graphing. Slope of a Line. Parallel and Perpendicular Lines. Three forms for the Equation of a Line.	Review Lecture Class Problem Solving Activity	 _3_
7	Topic 7. Systems of Linear Inequalities Graphing Linear Inequalities. The Test Point Method. Graphing Compound Inequalities. Absolute Values Inequalities. Inequalities with No Solutions.	Review Lecture Quiz	 _15_
	Midterm Exam (30%)		_150_
8	Topic 8. Functions and Relations The Concept of a Function. Function Notation. Domain and Range of a Function. Applications.	Review Lecture Quiz Class Problem Solving Activity	 _7_ _3_

9	Topic 9. Systems of Linear Equations Solving a System by Graphing. Types of Systems. Solving by Substitution. Applications. The Addition Method. Applications.	Review Lecture Class Problem Solving Activity	_3_
10	Topic Topic 10. Exponents and Polynomials Positive and Negative Exponents. Raising a Product to a Power. Polynomials. Multiplying Binomials. Factoring Polynomials. Factoring Trinomials. Solving Equations by Factoring.	Review Lecture Quiz	_12_
11	Topic Topic 11. Rational Expressions Properties of Rational Expressions and Functions. Multiplication and Division of Rational Expressions. Applications.	Review Lecture Class Problem Solving Activity	_3_
12	Topic Topic 12. Polynomial Functions Addition and Subtraction of Polynomial Functions. The Remainder Theorem. Fractions and Proportions. Solving Equations Involving Rational Expressions.	Review Lecture Test / Class Assignment	_15_
13	Topic 13. Radicals and Rational Exponents Roots and Variables. Product Rule and Quotient Rule for Radicals. Rational Exponents. Solving Equations with Radicals and Exponents.	Review Lecture Class Problem Solving Activity Homework Assignment	_3_ _12_
14	Topic 14. Quadratic Equations Solving Quadratic Equations by Completing the Square. The Quadratic Formula. Number of Solutions.	Review Lecture Quiz	_13_
15	Topic 15. Quadratic Functions and Their Graphs Quadratic Functions, Graphing Quadratic Functions. The Vertex and Intercepts. Applications.	Review Lecture Class Problem Solving Activity	_3_
	Final Exam (40%)		_200_

Recommended Materials

- 1) Mark Dugopolski “Algebra for College Students”, Sixth Edition, 2015.
- 2) Raymond A. Barnett, Michael R. Riegler, Karl E. Byleen, Christopher J. Stocker “Mathematics for Business, Economics, Life Sciences, and Social Sciences”, 14th Edition, Pearson, 2021.
- 3) Jay Abramson, “College Algebra”, Second Edition, OpenStax, 2021.
- 4) Ian Jacques “Mathematics for economics and business”, Ninth Edition, Pearson, 2018.
- 5) Michael Sullivan “College Algebra”, Tenth Edition, 2016.
- 6) Gary Clendenen, Stanley A. Salzman, “Business Mathematics”, 15th Edition, 2015.
- 7) Marvin L. Bittinger “College Algebra: Graphs and Models”, 6th Edition.
- 8) Richard W. Fisher “No-nonsense Algebra“, Second Edition, 2018.

Internet links

1) <http://www.mathhelp.com> (for straightforward explanations of mathematical terms and concepts)

2) <http://www.study.com> (a lot of examples and practical tasks with solutions)

* *The above schedule and procedures are subject to change in the event of extenuating circumstances.*

Протокол засідання кафедр № 1 від 27.01.2026 року

Проректор з навчально-методичної роботи



Л.І.Кондратенко

Завідувач кафедри



А.В.Кінаш

Викладач



Ю.А.Гладка

