New Uzbekistan University

School of Humanities, Natural & Social Sciences
Department of Mathematics

Course Syllabus

Linear algebra
MATH201

Spring Semester
2026

Course Syllabus

Course Title	Linear algebra		
Course Code	MATH201		
Credits / ECTS	3 Credits / 6 ECTS	**Total Hours**	180
Contact hours per week	Lectures / Tutorials	2 hours / 2 hours	
Prerequisite(s)	Precalculus		
Semester	Spring	**Academic Year**	2025-2026
Course leader	Emily Autumn Windes		
Email	e.windes@newuu.uz		
Office Number	Ulugbek Central Auditorium, 208		
Office Hours	Tuesday: 15:00-16:00, Wednesday: 9:00-11:00, or by appointment		
Textbook	Otto Bretscher, Linear Algebra with Applications, Fourth Edition, Pearson, 2014		
Reference Book	Gilbert Strang, Introduction to Linear Algebra, Sixth Edition, Wellesley-Cambridge Press, 2023		

Course Description (as in the catalog):

This course provides an introduction to fundamental concepts in linear algebra, including solving linear systems using Gauss-Jordan elimination and other methods, matrix operations, and linear transformations. Students will explore inverse matrices, image and kernel, basis and dimension, and coordinate representations in vector spaces. The course covers orthonormal bases, the Gram-Schmidt process, QR factorization, determinants, eigenvalues, eigenvectors, and matrix diagonalization. Applications to dynamical systems, including complex eigenvalues, will also be discussed. Through theoretical study and practical exercises, students will develop problem-solving skills essential for various fields.

Course Instructors:

Position	Name	Email	Office
Lecturer and Tutorial Leader	Dr. Emily Windes	e.windes@newuu.uz	U.C.A. 208

Attendance policy:

Attendance is compulsory. We emphasize the importance of discussions during instructed hours. A student missing 25% (16 hours or more) of all instructed hours will fail the course (in accordance with the University Academic Regulations).

Participation policy:

Active participation in lectures and tutorials is mandatory. Students are expected to:

- Refrain from using phones during class
- Take notes during lectures
- Answer questions when called on by instructors
- Actively participate in group work.

Failure to follow these guidelines may result in lower attendance grades. Note-taking may be monitored for a grade.

Course Learning Outcomes (CLOs): Upon successful completion of this course, the student will be able to:

No.	Course Learning Outcome
CLO1	Solve systems of linear equations using Gaussian elimination;
CLO2	Express systems in matrix form and determine their consistency;
CLO3	Perform matrix operations and compute matrix inverses;
CLO4	Understand key properties of matrices;
CL05	Develop a strong grasp of vector spaces, linear independence, basis, and dimension;

No.	Course Learning Outcome
CLO6	Analyze subspaces, including kernel and image;
CLO7	Compute and interpret determinants;
CLO8	Find eigenvalues, eigenvectors, and solve eigenvalue problems;
CLO9	Apply linear algebra concepts to real-world problems in engineering, physics, computer science, and economics.

Contribution level of Course Learning Outcomes (CLOs) to Student/Program Outcomes: Chemical Engineering, Mechanical Engineering, Industrial Management, Cyber Security, Artificial Intelligence, Software Engineering

	SO1	SO2	SO3	SO4	SO5	SO6	SO7
CLO1	high	high	--	low	--	high	medium
CLO2	high	high	low	low	--	high	medium
CLO3	high	high	--	low	--	high	low
CLO4	high	high	--	low	--	high	medium
CLO5	high	high	--	low	--	high	medium
CLO6	high	high	--	low	--	high	medium
CLO7	high	high	--	low	--	high	low
CLO8	high	high	--	low	--	high	medium
CLO9	high	high	low	medium	--	high	medium

Applied math

	SO1	SO2	SO3	SO4	SO5
CLO1	high	high	--	low	--
CLO2	high	high	low	low	--
CLO3	high	high	--	low	--
CLO4	high	high	--	low	--
CLO5	high	high	--	low	--
CLO6	high	high	--	low	--
CLO7	high	high	--	low	--
CLO8	high	high	--	low	--
CLO9	high	high	low	medium	--

Pedagogy

	SO1	SO2	SO3	SO4	SO5	SO6	SO7	SO8
CLO1	medium	--	--	medium	high	high	--	--
CLO2	medium	--	--	medium	high	high	--	--
CLO3	medium	--	--	medium	high	high	--	--
CLO4	medium	--	--	medium	high	high	--	--
CLO5	medium	--	--	medium	high	high	--	--
CLO6	medium	--	--	medium	high	high	--	--
CLO7	medium	--	--	medium	high	high	--	--
CLO8	medium	--	--	medium	high	high	--	--
CLO9	medium	--	low	medium	high	high	--	--

Economics and Data Science

	SO1	SO2	SO3	SO4	SO5	SO6	SO7	SO8
CLO1	high	high	high	low	low	--	medium	low
CLO2	high	high	high	low	low	--	medium	low
CLO3	high	high	high	low	low	--	medium	low
CLO4	high	high	high	low	low	--	medium	low
CLO5	high	high	high	low	low	--	medium	low
CLO6	high	high	high	low	low	--	medium	low
CLO7	high	high	high	low	low	--	medium	low
CLO8	high	high	high	low	low	--	medium	low
CLO9	high	high	high	low	low	low	medium	low

New Uzbekistan University

Weekly Distribution of Course Topics/Contents (subject to change)

Week	Class Type	Topic	Required Reading	CLOs
1	Lecture	Linear systems and Gauss-Jordan elimination	Chapters 1.1, 1.2	1,2,9
	Tutorial	Solving linear systems using Gauss-Jordan elimination		
2	Lecture	On the solutions of linear systems	Chapter 1.3	1,2,9
	Tutorial	Solving linear systems using different approaches		
3	Lecture	Linear transformations. Matrix products	Chapters 2.1, 2.3	3,4,9
	Tutorial	Construction and analysis of linear transformations. Practice on matrix products.		
4	Lecture	Inverse Matrices. Image and Kernel	Chapters 2.4, 3.1	3,4,9
	Tutorial	Practice on finding inverse matrices. Determining kernels and images of linear transformations		
5	Lecture	Basis, linear dependence, dimensions.	Chapters 3.2, 3.3	5,6,9
	Tutorial	Finding basis of linear transformation. Determining linear dependence and dimensions of a subspace		
6	Lecture	Coordinates.	Chapter 3.4	5,9
	Tutorial	Operating in coordinates		
7	Lecture	Review	Review	
	Tutorial			
8		**Midterm Exam**		
9	Lecture	Linear spaces, the matrix of a linear transformation.	Chapters 4.1, 4.2, 4.3	5,9
	Tutorial	Finding basis of linear space, identifying isomorphisms, and finding matrices of linear transformations.		
10	Lecture	Gram-Schmidt process, orthogonal matrices	Chapters 5.2, 5.3	5,9
	Tutorial	QR factorization of the matrix		
	Lecture	Review		

Week	Class Type	Topic	Required Reading	CLOs
11	Tutorial	Review	Review/Catch-up	
12	Lecture	Determinants	Chapters 6.1, 6.2	7,9
	Tutorial	Finding determinants of matrices		
13	Lecture	Eigenvalues and eigenvectors	Chapters 7.1, 7.2	8,9
	Tutorial	Finding eigenvalues and eigenvectors		
14	Lecture	Matrix diagonalization, dynamical systems, complex eigenvalues	Chapters 7.3, 7.4	6,8,9
	Tutorial	Matrix diagonalization, solving dynamical systems, finding eigenvectors for complex eigenvalues		
15	Lecture	Review		
	Tutorial			
16		**Final Exam**		

Assessment of Course Learning Outcomes

CLO	Meaning	Evaluation Tool(s) & Weights (tentative)
CLO1	Solve systems of linear equations using Gaussian elimination;	- Midterm Exam (80%) - Quiz (20%)
CLO2	Express systems in matrix form and determine their consistency;	- Midterm Exam (80%) - Quiz (20%)
CLO3	Perform matrix operations and compute matrix inverses;	- Midterm Exam (80%) - Quiz (20%)
CLO4	Understand key properties of matrices;	- Midterm Exam (40%) - Final Exam (40%) - Quizzes (20%)
CLO5	Develop a strong grasp of vector spaces, linear independence, basis, and dimension;	- Midterm Exam (80%) - Quiz (20%)
CLO6	Analyze subspaces, including kernel and image;	- Final Exam (80%) - Quiz (20%)

CLO7	Compute and interpret determinants;	- Final Exam (80%) - Quiz (20%)
CLO8	Find eigenvalues, eigenvectors, and solve eigenvalue problems;	- Final Exam (80%) - Quiz (20%)
CLO9	Apply linear algebra concepts to real-world problems in engineering, physics, computer science, and economics.	- Midterm Exam (40%) - Final Exam (40%) - Quiz (20%)

Students' Assessment: Students are assessed as follows:

Assessment Tool(s)**	Date	Weight (%)
Quizzes	Weekly	10
Participation	Each week except weeks 7, 8, 15, and 16	10
Midterm exam	Week 8	40
Final exam	Week 16	40
Total		**100**

Students' Workload: Students' workload is distributed as follows:

	Activity	Hrs.	%
Assessment methods and criteria	In-Class Time	56	31%
	Independent Study	50	28%
	Assignments	50	28%
	Examinations	24	13%
	Group Discussions	0	0%
	Fieldwork and Practicum	0	0%
	Workshops and Seminars	0	0%
	Individual Development	0	0%
Total		**180**	**100%**

Scope and Nature of Assessment Tools

Exams will be closed book/closed notes. Make-up exams are not given except under very special circumstances as stated in New Uzbekistan University bylaws.

Mid-term exam

The Midterm exam is designed to cover all relevant materials covered up to specific time in the semester. The exams might include multiple-choice questions which examine the understanding of different concepts covered in class and simple analytical and problem solving skills. Essay questions may be included to give the opportunity to elaborate different topics. Students are required to reflect on the questions from their understanding. Memorization is to be totally discouraged as it is a futile method in developing critical thinking. Instead, problem solving and critical thinking skills will be emphasized in all *assessment instruments*.

Final exam

The Final exam will be _comprehensive._ It is similar to the mid-term exam in structure; however, it will cover more topics and include more questions. The idea of the final exam is to examine the overall understanding relevant to the Course Learning Outcomes.

Quizzes

- There will be a quiz at the beginning of each lecture.

- There will be a designated box for completed quizzes. If a student's quiz paper (with their name written on it) is not in this box fifteen minutes after the start of class, they will be marked absent for the first half of the lecture.

- The lowest *two* quiz grades will be dropped at the end of the semester.

- Each student has one "makeup pass". This means that for one missed quiz, you may take it during office hours.

- A study guide for each quiz will be provided by Friday morning the week before.

- The content of the quiz will be on vocabulary, required reading, basic computational skills, and basic facts pertaining to the topics covered the week before.

Notebooks

- Each student is *required* to have a single, dedicated notebook for this class. Optionally, the student can have two notebooks. One for lecture, and one for tutorials. The notebook should have "Linear Algebra" and the student's name written on the front.
- This notebook and a writing utensil *must* be brought to each lecture and each tutorial. The first time a student forgets their notebook, they will be issued a warning. The second time a student forgets their notebook, they will be docked half their attendance for the class.
- If a student loses their notebook, they must obtain an appropriately labeled replacement.

Tutorials

- Each week, a problem set will be prepared for tutorials. This problem set will contain problems of varying difficulties.
- You will receive a participation grade based on the completion of a portion of this problem set.
- There will be *no graded homework* throughout the semester. Instead, students are expected to practice solving problems on their own using tutorial problem sets, problems from the textbook, or any of the other resources provided on the class website.

University LMS

Students enrolled in this course will be given access to a variety of internet resources, including course material that will be posted on LMS. Students are strongly advised to access course material posted on LMS for their learning. The course outline, lecture notes, assignments, marks, and other materials will be made available through LMS.

Plagiarism/Cheating:

Students are expected to do their own work. You are allowed to work on assignments in teams only if specified by the instructor. In other words, students are encouraged to communicate about general principles of the course, but all graded work must be done on an individual basis. The instructors are available to provide any assistance that you might need. Cheating is considered a serious offense by the university. You should be

aware of the severe penalty for cheating (refer to the student code of conduct published in the university catalog).

Make-up exams/quizzes:
- Outside of the single allowed makeup quiz mentioned above, no make-ups will be allowed without a medical certificate (or equivalent) accompanying it.
- Make-up exams and quizzes will be considered only in extreme circumstances. Any student, who for reasons of serious illness cannot take an exam or quiz during the scheduled time, will need full and convincing documentation of that illness, specifically a valid medical certificate. In cases where students have applied for special consideration, assignments must still be completed within five days of the submission date or they will not be marked.
- Performance in the course to that time will be taken into account by the instructor in deciding whether to approve an application for consideration.
- Employment obligations or holiday plans of any kind are not acceptable reasons for absence from any test/examination. The criterion for assessment of the assignment as per grading rubric in the appendix.

In-class etiquette
- The following will absolutely not be tolerated:
  - Sleeping during class
  - Talking while I am speaking (unless explicitly allowed).
  - Using your phone during class
  - Wearing headphones
- The first time a student engages in any of the above disruptive behaviors, you will be issued a warning. Upon the second offense, you will be asked to leave the classroom.
- In the case of cellphone use: if a student is fount to be using their cell phone after the first warning, the student will be offered a choice: they may either leave their cell phone at the front of the classroom until the end of lecture, or leave the classroom.
- A significant portion of class time will be used for group work. Students are expected to engage actively solving the assigned exercises during class.

- Students are welcome to leave and re-enter the classroom without permission as long as it is not so frequent as to be disruptive. Reasons for temporarily leaving include
  - finding it difficult to stay awake
  - headaches or minor medical problems
  - bathroom breaks
  - important phone calls or text messages.
- If a student is late to lecture, they do *not* have to knock or ask permission to enter the classroom. Instead, they should enter quietly.

Additional rules

- Students should take responsibility for their own learning.
- Attendance is vitally important to student success. The university policy on class attendance will be strictly implemented.
- Students are expected to do the required readings prior to coming to class.
- Students are expected to use a variety of references in their assignments (e.g., books, on-line sources, journal articles).
- Students are expected to keep copies of their assignments for their own record and later references.
- **Proper Referencing and Plagiarism:** All submitted assignments are expected to be properly referenced. Plagiarized assignments will be penalized. Plagiarism is the copying of another person's ideas or expressions without appropriate acknowledgment and presenting these ideas or forms of expression as your own. Plagiarism includes copying any material from books, journals, study notes or recording, the web, the work of other students, or any other source without indicating this by quotation marks or by indentation, italics or spacing and without acknowledging that source by footnote or citation. Plagiarism also includes the use of the work of other students as your own without acknowledgment. The University regards plagiarism as an extremely serious academic offense and will impose penalties. Assignments, reports, and any other material used for assessment purposes should be submitted through the University LMS.
- Attendance will be taken twice during class. Once at the beginning, and once after

the ten minute break approximately half way through class time.

- ○ For the first half of the class, students who are late for more than 15 minutes will be allowed to sit for the class but will be marked as absent in the attendance record.
- ○ For the second half of the class, students more than 5 minutes late returning from a break will be allowed to sit for the class but will be marked as absent.
- In case of absence, students are responsible for the material covered in the missed class.
- No phones will be allowed during the exams.
- Communicating with other students during exams will be treated as a case of cheating, and will result in an "F" grade. Other measures may also be taken according to University rules.

Approval			
Course instructor / leader			
Name	Dr. Emily Autumn Windes		
Signature		**Date:**	
Department Head			
Name	Dr. Rustam Turdibaev		
Signature		**Date**	
Head of Quality Assurance & Accreditation Department			
Name	Rebecca Carter		
Signature		**Date**	