

**Linear Algebra (Math 201)**  
**Sabancı University, Fall 2023-2024**

*This syllabus may be subject to update and change.*

**Lecturer:** Canan Kaşıkçı

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**Office:** FENS L017

**Office Hour:** Wednesdays 13:40 - 14:30 or by appointment..

**Lecture Hours:**

**Section A:** Tuesdays 15:40 - 16:30 (FMAN 1099),  
Thursdays 08:40 - 10:30 (FMAN 1099).

**Section B:** Tuesdays 16:40 - 17:30 (FMAN 1099),  
Thursdays 14:40 - 16:30 (FENS G077).

**You are responsible for every announcement made in the lecture or in SUCourse+. Not attending the lecture or not following SUCourse+ regularly is not an excuse, in case you miss something.**

**Recitation Hours:** Fri 10:40 - 11:30 (A1 - A4), Fri 11:40 - 12:30 (B1 - B4),  
Fri 14:40 - 15:30 (C1 - C4), Fri 15:40 - 16:30 (D1 - D4),  
Fri 16:40 - 17:30 (E1 - E4).

**Course Content:** Systems of linear equations, Gaussian elimination, matrices and matrix operations, vector spaces, subspaces, linear independence, dimension, change of bases, linear transformations, orthogonality, eigenvalues, eigenspaces and diagonalization.

**Objectives:** This course aims to introduce basic concepts of linear algebra such as vector spaces, bases, linear transformations, eigenvalues and eigenspaces. The course gives students training to develop their mathematical skills, analytical and critical thinking abilities, their ability to apply these capabilities to practical problems, and to communicate their knowledge of these areas.

**Course Support Materials:**

- Strang, G., Introduction to Linear Algebra, 5th edition, Wellesley-Cambridge Press and SIAM, 2016.
- Axler, A., Linear Algebra Done Right, Springer.
- Anton H., Rorres C., Elementary Linear Algebra with supplemental applications, Wiley International Student Version, 11th edition, 2015.
- Leon, S. J., Linear Algebra with Applications, Prentice Hall.
- Bretscher O., Linear Algebra with Applications, 2nd Edition, Prentice-Hall, 2001.
- Poole, D., Linear Algebra: A Modern Introduction, 3rd Edition, Brooks Cole, 2011.
- Kolman B., Hill D., Elementary Linear Algebra with Applications, 9th edition, Prentice-Hall, 2008.
- Friedberg, S., Insel, A., Spence, L., Linear Algebra, 4th edition, Pearson, 2013.

**Tentative Course Outline:**

- Week 1 - 4: Introduction to vectors, linear combinations, systems of linear equations, solving linear equations, matrices,
- Week 5 - 7: Vector spaces and subspaces, subspace criteria, linear independence, basis, dimension,

- Week 8 - 10: Linear transformations, matrix representation, change of bases,
- Week 11: Determinants,
- Week 12 - 13: Eigenvalues, eigenvectors, diagonalization,
- Week 14: Orthogonality (if time allows).

## Learning Outcomes:

On completion of this course the student should be able to:

- Understand the notion of mathematical thinking, mathematical proofs, and able to apply them in problem solving.
- Present simple proofs in a precise and formally correct way.
- Solve a system of linear equations using matrix reduction.
- Do basic arithmetical operations with matrices.
- Understand the notions of linear independence, basis and dimension of a vector space.
- Find a basis and dimension of Euclidean or abstract vector spaces.
- Geometrically interpret the above concepts.
- Represent linear transformations as matrices and, conversely, interpret matrices as linear maps.
- Compute eigenvalues and eigenspaces of matrices.
- Identify whether a matrix is diagonalizable or not.

## Grading:

Your grade exclusively depends on the below listed items. **There will be no other extra-credit opportunities.**

Midterm I	30%
Midterm II	30%
Final (06.01.2024 (09:00-12:00))	35%
Lecture Attendance	5%
Recitation Grade	5%

The passing grade will be determined after the last exam. Be aware that this passing grade may not match the overall average of the students.

## Exam Dates:

The midterms will be on the below listed dates and times. More detailed information will be available in due time.

Midterm I	20.11.2023 at 19:40
Midterm II	18.12.2023 at 19:40

The university will later announce the final exam date. The final may be given on any day between January 6th - January 19th. Student resources will determine the dates and times for all final exams, and instructors cannot change it. The last day for grade submissions is January 25, so do not plan to leave İstanbul before January 25, 2024.

## Participation and NA Policy:

Following the lectures and recitation hours is a prerequisite for the course. Attendance in recitations will be regularly checked. Students missing 7 recitations or two out of the three exams (two midterms and one final) will automatically get an NA grade. The students who earned the NA grade will not be allowed in the subsequent exams. No excuses will be accepted to miss that much in the course. Health reports, official permission notices are *already* included in this number, meaning that if you have a health report or an official permission notice, if you are not in the recitation, you will be anyway considered absent. If you miss 6 recitations for whatever reason, then get sick and have to miss the 7th one, you will still get NA, so do not use up all of your allowed absences. You are required to attend your registered recitation section; otherwise your attendance grade will be 0. You are responsible for keeping track of your attendance grades on SUCourse+. If it is entered incorrectly, you must notify me within 1 week to change it. There will be no personal reminders or warnings sent throughout the semester. If you have a medical report for an extended period of time (about a month or so), you are required to contact me.

## Lecture Attendance:

There will be attendance checks in the form of pop-up quizzes during lecture times. There will be no make up for any of these quizzes. In order to be valid, each quiz must bear name, surname, ID, signature of the students, and some effort to solve the given quiz. You are required to attend your registered lecture section. Students found having a behavior in contrast with Academic Integrity multiple times, will receive 0 from Lecture Attendance.

## Recitation Grade:

You are expected to study the lecture notes before you enter the recitation so that you can actively participate in the discussion. The attendance/participation grade is based on active participation as well as civil behavior in the recitation class. **Disturbing fellow students, being late, leaving early during classes will not be tolerated and will affect your recitation grade.**

## Supplementary Exercises:

There will be supplementary exercises assigned each week via SuCourse+. You are not expected to return the solutions but you are strongly advised to solve them (even if not in full detail) before the recitation.

## Make Up Policy:

Make-ups are only allowed for the midterm exams and the final exam to those with an official report and to those with an official permission notice from the university on the date of the exam in question. Students must submit their reports/notices to the instructor before the exam in question. The ones having other excuses should contact the instructor within the day of the exam to be missed and then it will be decided whether these students are allowed to take the make-up exam. Any excuses to be brought to the attention of the instructor after the exam will not be considered. No exceptions to these rules. Makeup for the midterms and the final exam will be held towards the end semester and will cover all the topics. Only students who got permission for the makeup will be able to take it.

## Academic Honesty:

All university policies on academic integrity apply to our course, and they will be enforced. (more information on <http://www.sabanciuniv.edu/en/academic-integrity-statement>).

Any form of academic dishonesty (plagiarism, copying/using other people's work, attending classes/exams on behalf of other people, etc.) will be penalized with 0 points for the related exam/attendance and disciplinary actions will be taken.

In particular, exams are closed book. This means that during the exams, the use of books, notes, cheatsheets, electronic devices (including cell phones, smart watches, calculators, computers etc.), or any other kind of supporting learning material is NOT allowed. A student violating this rule will receive 0

points for that exam and disciplinary actions will be taken.

### **Class Discipline:**

It is our responsibility to provide students with excellent teaching and learning environments. We are therefore asking you to respect both our responsibility to teach and the right of other students to learn. Any action that disturbs your classmates or interrupts the lecture/recitation is unacceptable and may cause a student to be counted as absent for a lecture or a recitation.

### **Suggestions:**

- Always come to lectures and recitations with a notebook and a pen.
- Feel free to ask me and your TA questions in and out of class, especially during office hours.
- Math 201 is a combination of computational mathematics and theoretical mathematics (that is abstract definitions and Theorems). The computational aspects of the course will feel more familiar and easier to grasp, but we will also focus on the theoretical aspects of the subject. Whenever you encounter an abstract concept in the lecture, take a pause and give yourself some time to think about it.
- In linear algebra, definitions and Theorems build on each other quickly. If you fall behind, it will be difficult to catch up. Work hard from the beginning, and come to office hours immediately if you do not understand something.
- Studying out of class for this course should become a routine. Key to success in mathematics is practice.
- Students are expected to follow the announcements made during the lectures or in SUCourse. Not attending the class or not following SUCourse+ regularly is not an excuse, in case you miss something.

### **Registration Overrides:**

Time conflict requests for lecture hours will be accepted. However, any and all negative outcomes that may result are solely the student's responsibility.