Linear Algebra (Math 201)
Sabancı University, Fall 2020-2021

This syllabus may be subject to update and change.

Lecturer: Canan Kaşıkcı
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Office Hour: Mondays 17:40 - 18:30 and Wednesdays 13:40 - 14:30 or by appointment, online via Zoom in both cases.

Lecture Hours: Section A: Tuesdays 08:40 - 09:30 and Thursdays 08:40 - 10:30.
Section B: Tuesdays 09:40 - 10:30 and Thursdays 14:40 - 16:30.

Lecture Format: Lectures will be live-streamed (Tuesday and Thursday) unless a technical difficulty occurs. You can find the Zoom links for the lecture on SUcourse+. In order to have access to them, you must be logged in with your Sabancı account. The online lectures will be made available afterwards, so that you can also watch them at a later time. They are going to be published on SUCourse+ via Google Drive. I will also share some material for you on SUCourse+ to read or watch before/after the lectures. You will find a tentative breakdown of course material in the syllabus.

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

Recitation Hours: Fridays 13:40 - 14:30 (A1, A2, A3, A4),
Fridays 14:40 - 15:30 (A7, A8, A9, A10),
Fridays 15:40 - 16:30 (B1, B2, B3, B4),
Fridays 16:40 - 17:30 (B5, B6, B7, B8),
Fridays 17:40 - 18:30 (A5, A6, B9, B10).

Recitation Format: Recitations will be live-streamed and held as Tophat and Zoom polls integrated discussions with the TAs via Zoom. You can find the Zoom links for recitations on SUcourse+. In order to have access to them, you must be logged in with your Sabancı account. Students must attend the online recitation classes to which they are registered.

Course Content: Systems of linear equations, Gaussian elimination, vector spaces, subspaces, linear independence, dimension, change of bases, linear transformations, inner product, 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. (Majority of homework problems will be assigned from this book.)

- Axler, A., Linear Algebra Done Right, Springer.

- 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.

- Friedberg, S., Insel, A., Spence, L., Linear Algebra, 4th edition, Pearson, 2013.

Tentative Course Outline:

- Week 1-4: Introduction to vectors, matrices, solving linear equations
- Week 5-6: Vector spaces and subspaces
- Week 7-9: Linear transformations
- Week 10: Determinants
- Week 11-12: Eigenvalues, Eigenvectors, Diagonalization
- Week 13: Orthogonality
- Week 14: Applications (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 (28.11.2020 at 09:00)	35%
Final (27.01.2021 at 09:00)	35%
Self Study (Online Assignments)	20%
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.

Important Warning:

Every document that requires a student submission,

- must be in **pdf** format, and **hand-written**,
- must have **name, surname, student ID, and signature** on the top left corner of the document **on each page** submitted,
- **Sabancı Student ID card** must be placed on the top right corner of the **first page**.

Submissions must be uploaded as a **single pdf file**. Any submission that is not in the described format will **NOT** be taken into account. Moreover, any solution that contains notations that are not used in the lectures/recitations will be completely ignored.

Midterm:

The midterm exam will be given online. The date will be announced later. More details will be announced on SUCourse+ in due time.

Final Exam:

The final exam will be given online, at the end of the semester. More details will be announced on SUCourse+ in due time.
Both exams will be online proctored and recorded.

Self Study (Online Assignments):

This consists of online assignment which will be given via SuCourse+, consisting of up to 3 problems. You will be asked to solve the questions on A4 size papers to be submitted as in the format prescribed above. There will be 6 such online assignments. The best 4 of your online assignment scores will determine the self study grade. **There will be no make up for any of these assignments for any reason**. Students found having a behaviour in contrast with Academic Integrity multiple times, will receive 0 from the Self Study Grade.

Lecture Attendance:

There will be attendance checks during online lectures. There may be up to 17 lecture attendance checks, and only the best 10 will be counted. Attendance during the lectures will be taken via Zoom registration with SU email. **In order to be counted as present during the lecture, you must be logged in with your Sabancı account, otherwise, your attendance will not be recorded.** Students with time conflicts, please see the **Registration Overrides** section of the syllabus.

Recitation Grade:

You are expected to study the lecture notes before you enter the recitation so that you can actively participate in the discussion. In each recitation, a certain number of pop-up questions will be presented to the students, via TopHat and Zoom polls. Students attending their correct Zoom sessions will get participation point if they also answer all of the questions. Disturbing your classmates, being late, leaving early during online classes will not be tolerated and will affect your recitation grade. At the end of the semester, the best 8 scores will be counted for the final 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. It will be given in two parts, the ones that will be solved in the recitation and the ones whose recorded solutions will be shared via SuCourse+ later on.

Make Up Policy

Make-ups are only allowed for the midterm and the final examinations. Since there is limited access to health services during this period, any verbal (and legitimate) excuse can be accepted, provided that you contact the instructor **beforehand**. Any excuses that will be taken into the instructor's account after the exam will not be considered. **No exceptions to these rules**. Makeup for the midterm or the final exam will be held at the end of the semester (after the finals period ends). The make-up exam will contain all topics covered throughout the semester. The make-up examination will be done as a face-to-face online verbal exam.
One can have a make-up exam for **ONLY** one of the exams. If a student miss both (Final and Midterm) exams even with a valid excuse , then he/she will be allowed to take make-up for Final exam only, and receive 0 points for Midterm exam.

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).

In particular, no form of cheating is welcome in the exams or quizzes, such as copying whole or part of each other's answers, using cheat-sheets etc. The action against such violations could range from getting a zero on the particular exam to explaining the case in front of the Disciplinary Committee.

After any submission (i.e. online assignments, midterm exam, final exam), some of the students may be called for an oral examination. In this case, some students will be selected randomly and some will be selected based on any irregularities in their performance and/or level of work they submit. Oral examinations will be done over Zoom and each oral examination will be recorded. During an oral examination, students must (i) keep their camera on at all times, (ii) share their entire screens (not specific tabs or windows). Performance of the student in an oral examination will affect their grades of the grading item they have been called upon. If a student fails to show up at an oral exam, or does not obey the aforementioned rules, (s)he will automatically get 0 (zero) points from that grading item.

Suggestions:

- 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.