# Spring 2020        MATE 204 Linear Algebra II

| | |
|---|---|
| **Instructor:** Dr. Elçin Emre-Akdoğan | **Place:** A116 / Online (Zoom) |
| **Office Hours:** by appointment | **Textbook:** Kolman, B. & Hill, D. R., Elementary Linear Algebra with Applications (9th Edition), 2007 |
| **Office:** GB24 | |
| **Email:** elcin.akdogan@tedu.edu.tr | **Time:** Tuesday 13:00-15:00 |

**Course Description:** This linear algebra course covers basic concepts of linear algebra, vector spaces, linear transformations, inner product spaces. Topics include:

- Vector spaces, subspaces, linear independence, linear combinations
- Span, basis and dimensions.
- Linear transformations, kernel and range of a transformation
- Isomorphism
- Eigenvalues and eigenvectors
- Diagonalization, Characteristic polynomial
- Inner product spaces, orthogonality of vectors, orthonormal vector sets

**Course objectives:**
The aim of this course is to provide students fundamental understanding of vector spaces and linear transformations. In addition to this, several concepts and procedures including diagonalization, polynomials and inner product spaces will be handled.

**Learning Outcomes:**
- Identify the concepts of vector spaces, subspaces, linear independence, linear combinations, span, basis and dimensions.
- Comprehend the basics of linear transformations.
- Relate eigenvalue and eigenvector
- Apply diagonalization process for determined matrix.
- Define orthogonality of vectors.
- Identify orthonormal vector sets.

**Methods for Assessment of Learning Outcomes:** The expected learning outcomes for the course will be assessed through graded activities and ungraded activities. The graded activities include take-home midterm, take-home final and homework. The ungraded activities will be used to monitor your progress. A variety of these ungraded assessment techniques may be employed, including problems to be completed during class, direct questioning of students, answering students questions in class, and discussions during office hours.

**Take-Home Midterm:** You need to upload your take-home to moodle, your document's title should be NAME_SURNAME_Take-homemidterm (Due Date:04/05/2020)

**Content for Take-Home Midterm:** 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7

**Take-Home Final:** You need to upload your take-home to moodle, your document's title should be NAME_SURNAME_Take-homehomefinal (Due Date: 29/05/2020)
**Content for Take-Home Final:** 4.8, 5.1, 5.3, 6.1, 6.2, 7.1, 7.2

**Attendance:** This course requires strong involvement and attendance. You are responsible for all information given out during the courses. Exceeding 20% of attendance with unexcused absences will result a half letter grade reduction. You are expected to arrive on time for the lectures.

**Communication:** All announcements will be sent to your e-mail address through Moodle. Check your e-mails regularly in order to be informed.

**Grades:** Your final grade will be weighted as follows:

| | | |
|---|---|---|
| **40%** | Homework | |
| **30%** | Take-home midterm | Details will be given during the course |
| **30%** | Take-home final | Details will be given during the course |

**Homework:** As in all mathematics courses, working on problems is the key to success. It is also vital to work on problems on a regular basis. Each assignment will be due at the **beginning** of the following class.

Homework Exercises will be from the textbook. One exercise will be chosen at random from each assignment and graded on a scale of 0-10.

Solutions to homework exercises will be posted after the class during which they have been collected.

<u>Late Homework Policy:</u>

Homework is due at the **beginning** of class.
Examples:

- If you are not in class when homework is collected, your homework will be considered late.
  This includes lateness due to oversleeping, traffic, and parking availability.
- If you pass homework in at the end of class on the day it is due, it will be considered late.
- If you can not make it to class, **you are responsible** for turning in the assignment early or finding someone to drop it off in class for you.
- Only under severe circumstances will late homework be accepted for full credit, for example, involvement in a traffic accident, or illness requiring medical attention.

Late homework **will** be accepted at any time, subject to the following conditions:

- The word "LATE" must be written at the top of the assignment.
- Only half credit will be awarded, solely based on effort.

**Academic Honesty:** It hardly needs to be said that such things as plagiarism or stealing another student's work are unacceptable. However, in this class, it is entirely proper to work in teams to do discussion on the problems or the problem solving, as long as you yourself have mastery of those answers and are prepared on your own to present them in class. Plagiarism is a serious breach of academic trust. In academic work, our words and ideas are the value of our work, so turning in someone else's work as if it were your own is a form of theft. When you use someone else's words and ideas--whether it's the work of a famous writer or a fellow student--without crediting the source or authorship of those words and ideas, you are plagiarizing. So here's the bottom line: original work only, credit to ideas, writing, or words from someone other than you.

**SCHEDULE**

| Date | Topic | Content | Next lesson |
|---|---|---|---|
| Week 1 Session 1 (18/02/2020) | Chapter 4. Real Vector Spaces | 4.1. Vectors in the Plane and in 3-Space | *Homework assignment from textbook |
| Week 2 Session 1 (25/02/2020) | Chapter 4. Real Vector Spaces | 4.2. Vector Spaces | No assignment |
| Week 3 Session 3 (03/03/2020) | Chapter 4. Real Vector Spaces | 4.3. Subspaces | *Homework assignment from textbook |
| Week 4 Session 1 (10/03/2020) | Chapter 4. Real Vector Spaces | 4.4. Span | *Homework assignment from textbook |
| Week 5 Session 1 (17/03/2020) | COVID 19 BREAK! | | |
| Week 6 Session 1 (24/03/2020) | Chapter 4. Real Vector Spaces | 4.5. Linear Independence | *Homework assignment from textbook |
| Week 7 Session 1 (31/03/2020) | Chapter 4. Real Vector Spaces | 4.6. Basis and Dimension<br><br>4.7. Homogenous System | *Homework assignment from textbook |
| Week 8 Session 1 07/04/2020 | Chapter 4. Real Vector Spaces | 4.8. Coordinates and Isomorphism | *Homework assignment from textbook |
| Week 9 Session 1 (14/04/2020) | Chapter 5. Inner Product Spaces | 5.1. Length and Direction in $R^2$ and $R^3$ | **Take-home Midterm (Due Date: 04/05/2020)** |
| Week 10 Session 1 (21/04/2020) | Chapter 5. Inner Product Spaces | 5.3. Inner Product Spaces | *Homework assignment from textbook |
| Week 11 Session 1 (28/04/2020) | Chapter 6. Linear Transformations and Matrices | 6.1. Linear Transformations | *Homework assignment from textbook |

| Week 12 Session 1 (05/05/2020) | Chapter 6. Linear Transformations and Matrices | 6.2. Kernel and Range of Transformations | *Homework assignment from textbook |
|---|---|---|---|
| Week 13 Session 1 (12/05/2020) | Chapter 7. Eigenvalues and Eigenvectors | 7.1. Eigenvalues and Eigenvectors | *Homework assignment from textbook |
| Week 13 Session 2 (14/05/2020) (MAKE-UP) | Chapter 7. Eigenvalues and Eigenvectors | 7.2. Diagonalization | *Homework assignment from textbook |
| Week 14 Session 1 (19/05/2020) | HOLIDAY! | | **Take-home Final (Due date: 29/05/2020)** |