

MA260 – Linear Algebra I
TTh 2:00 p.m.–3:15 p.m. (S-2-63)

Fall 2015

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Course Description

This course is an introduction to the objects and techniques of linear algebra. Topics include systems of linear equations and their solution by Gauss-Jordan elimination, matrices, linear transformations, image and kernel of a linear transformation, linear spaces, bases and linear independence, invariance of dimension, change of coordinates, orthonormal sets, the Gram-Schmidt Process and QR factorization, determinants, eigenvalues, and eigenvectors. See the course calendar for more detailed information.

Prerequisites

Admission to the course is contingent upon successful completion of MA140 or an equivalent college level calculus course.

Text

There is one required text for the course: *Linear Algebra with Applications*, Third Edition, by Otto Bretscher.

Grading

Course grades are based on weekly quizzes (20%), two in-class tests (20% each), and a cumulative final exam (40%).

Reading and class preparation

There is a reading assignment associated with each class period. Although it is not generally possible to discuss every topic in class, students are responsible for the entire content of the reading assignment. *Test and exam questions may cover reading material not discussed explicitly in class.* Consequently it is very important to complete the reading assignments on time and to come to class prepared with questions.

Make-up tests

Tests may be rescheduled only in cases of serious illness, bereavement, or other circumstances of similar gravity. Whenever possible, arrangements for make-up tests must be made *in advance* of the regularly scheduled testing time.

Student conduct

Students are required to adhere to the University Policy on Academic Standards and Cheating, to the University Statement on Plagiarism and the Documentation of Written Work, and to the Code of Student Conduct as delineated in the catalog of Undergraduate Programs, pp. 44–45 and 48–52. The Code is available online at the following web site:

http://cdn.umb.edu/images/life_on_campus/Code_of_Conduct.5-14-14.pdf

Web page

This syllabus and other course materials are available on-line at

http://cartan.math.umb.edu/wiki/index.php/Math_260,_Fall_2015

Course Calendar

*Homework problems should be done prior to the due date but **are not to be handed in**. One problem from each assignment will appear on the weekly quiz.*

Tuesday, September 8: Introduction.

Thursday, September 10: Systems of linear equations.

Read before class: Section 1.1.

Tuesday, September 15: Gauss-Jordan elimination.

Read before class: Section 1.2.

Do before class: Assignment 1.

Thursday, September 17: Solutions of linear systems.

Read before class: Section 1.3.

Tuesday, September 22: Linear transformations and their inverses.

Read before class: Section 2.1.

Do before class: Assignment 2.

Thursday, September 24: Linear transformations in geometry.

Read before class: Section 2.2.

Tuesday, September 29: Matrix products.

Read before class: Section 2.3.

Do before class: Assignment 3.

Thursday, October 1: Inverses.

Read before class: Section 2.4.

Tuesday, October 6: Images and kernels.

Read before class: Section 3.1.

Do before class: Assignment 4.

Thursday, October 8: Subspaces. Bases and linear independence.

Read before class: Section 3.2.

Tuesday, October 13: Exam 1 (sections 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, and 2.4;
assignments 1–4)

Do before class: Assignment 5.

Thursday, October 15: Dimension.

Read before class: Section 3.3.

Tuesday, October 20: Coordinates.

Read before class: Section 3.4.

Do before class: Assignment 6.

Thursday, October 22: Abstract linear spaces.

Read before class: Section 4.1.

Tuesday, October 27: Linear transformations and isomorphisms.

Read before class: Section 4.2.

Do before class: Assignment 7.

Thursday, October 29: The matrix of a linear transformation.

Read before class: Section 4.3.

Tuesday, November 3: Orthogonal projections and orthonormal bases.

Read before class: Section 5.1.

Do before class: Assignment 8.

Thursday, November 5: Gram-Schmidt orthonormalization and QR-factorization.

Read before class: Section 5.2.

Tuesday, November 10: Orthogonal transformations and orthogonal matrices.

Read before class: Section 5.3.

Do before class: Assignment 9.

Thursday, November 12: Least squares and data fitting.

Read before class: Section 5.4.

Tuesday, November 17: Exam 2 (sections 3.1, 3.2, 3.3, 3.4, 4.1, 4.2, 4.3, 5.1, and 5.2; assignments 5–9).

Do before class: Assignment 10.

Thursday, November 19: Introduction to determinants.

Read before class: Section 6.1.

Tuesday, November 24: Properties of the determinant.

Read before class: Section 6.2.

Do before class: Assignment 11.

Tuesday, December 1: Geometric interpretations. Cramer's rule.

Read before class: Section 6.3.

Do before class: Assignment 12.

Thursday, December 3: Dynamical systems and eigenvectors.

Read before class: Section 7.1.

Tuesday, December 8: Finding eigenvalues.

Read before class: Section 7.2.

Do before class: Assignment 13.

Thursday, December 10: Finding eigenvectors.

Read before class: Section 7.3.

Do before class: Assignment 14.