MA260 – Linear Algebra I **Spring 2017**
TTh 2:00 p.m.–3:15 p.m. (W-1-58)

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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*, Fifth 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.

Accomodations for students with disabilities

Section 504 of the Americans with Disabilities Act of 1990 offers guidelines for curriculum modifications and adaptations for students with documented disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services, CC-UL-211, (617-287-7430). The student must present these recommendations and discuss them with each professor within a reasonable period, preferably by the end of the Drop/Add period.

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. The Code is available online at the following web site:

`https://www.umb.edu/editor_uploads/images/life_on_campus/Code_of_Conduct_5-14-14.pdf`

Please pay particular attention to Section XII, paragraphs 1 and 5. In this course, you will be permitted to use a short note sheet during exams, provided that you have prepared the sheet yourself. Your exam responses may quote your lecture notes or the course textbook without attribution, but material taken from any other source must be properly attributed to its author. In addition, the use of electronic devices during exams is *expressly prohibited*. Violation of these policies will result in disciplinary action.

Web page

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

`http://cartan.math.umb.edu/wiki/index.php/Math_260,_Spring_2017`

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, January 24: Introduction.

Thursday, January 26: Systems of linear equations.

Read before class: Section 1.1.

Tuesday, January 31: Gauss-Jordan elimination.

Read before class: Section 1.2.

Do before class: Assignment 1.

Thursday, February 2: Solutions of linear systems.

Read before class: Section 1.3.

Tuesday, February 7: Linear transformations and their inverses.

Read before class: Section 2.1.

Do before class: Assignment 2.

Thursday, February 9: Linear transformations in geometry.

Read before class: Section 2.2.

Tuesday, February 14: Matrix products.

Read before class: Section 2.3.

Do before class: Assignment 3.

Thursday, February 16: Inverses.

Read before class: Section 2.4.

Tuesday, February 21: Images and kernels.

Read before class: Section 3.1.

Do before class: Assignment 4.

Thursday, February 23: Subspaces. Bases and linear independence.

Read before class: Section 3.2.

Tuesday, February 28: 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, March 2: Dimension.

Read before class: Section 3.3.

Tuesday, March 7: Coordinates.

Read before class: Section 3.4.

Do before class: Assignment 6.

Thursday, March 9: Abstract linear spaces.

Read before class: Section 4.1.

Tuesday, March 21: Linear transformations and isomorphisms.

Read before class: Section 4.2.

Do before class: Assignment 7.

Thursday, March 23: The matrix of a linear transformation.

Read before class: Section 4.3.

Tuesday, March 28: Orthogonal projections and orthonormal bases.

Read before class: Section 5.1.

Do before class: Assignment 8.

Thursday, March 30: Gram-Schmidt orthonormalization and QR-factorization.

Read before class: Section 5.2.

Tuesday, April 4: Orthogonal transformations and orthogonal matrices.

Read before class: Section 5.3.

Do before class: Assignment 9.

Thursday, April 6: Least squares and data fitting.

Read before class: Section 5.4.

Tuesday, April 11: 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, April 13: Introduction to determinants.

Read before class: Section 6.1.

Tuesday, April 18: Properties of the determinant.

Read before class: Section 6.2.

Do before class: Assignment 11.

Thursday, April 20: Geometric interpretations. Cramer's rule.

Read before class: Section 6.3.

Tuesday, April 25: Dynamical systems and eigenvectors.

Read before class: Section 7.1.

Do before class: Assignment 12.

Thursday, April 27: Finding eigenvalues.

Read before class: Section 7.2.

Tuesday, May 2: Finding eigenvectors.

Read before class: Section 7.3.

Do before class: Assignment 13.

Thursday, May 4: Diagonalization.

Read before class: Section 7.4.

Tuesday, May 9: Complex eigenvalues.

Read before class: Section 7.5.

Do before class: Assignment 14.