MA260 – Linear Algebra I **Fall 2017**
TTh 2:00 p.m.–3:15 p.m. (M-1-417)

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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 schedule of topics 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,_Fall_2017`

Schedule of topics

Week 1: Introduction. Systems of linear equations. (Textbook section 1.1.)

Week 2: Gauss-Jordan elimination. Solutions of linear systems. (Sections 1.2 and 1.3.)

Week 3: Linear transformations and their inverses. Linear transformations in geometry. (Sections 2.1 and 2.2.)

Week 4: Matrix products and inverses. (Textbook sections 2.3 and 2.4.)

Week 5: Images and kernels. Subspaces, bases, and linear independence. (Sections 3.1 and 3.2)

Week 6: First midterm (Tuesday, October 10; covers assignments 1–4). Dimension. (Section 3.3.)

Week 7: Coordinates. Abstract linear spaces. (Sections 3.4 and 4.1.)

Week 8: Linear transformations and isomorphisms. The matrix of a linear transformation. (Sections 4.2 and 4.3.)

Week 9: Orthogonal projections and orthonormal bases. Gram-Schmidt orthonormalization. (Sections 5.1 and 5.2.)

Week 10: Orthogonal transformations. Introduction to determinants. (Sections 5.3 and 6.1.)

Week 11: Second midterm (Tuesday, November 14; covers assignments 5–9). Properties of the determinant. (Section 6.2.)

Week 12: Cramer's rule. (Section 6.3.)

Week 13: Dynamical systems and eigenvectors. Finding eigenvalues. (Sections 7.1 and 7.2.)

Week 14: Finding eigenvectors. Diagonalization. (Sections 7.3 and 7.4.)

Week 15: Complex eigenvalues. (Section 7.5.)