Math 340, Linear Algebra

Number of Credits: 3 credits

Canvas Course URL: **Section 1:** https://canvas.wisc.edu/courses/111713

Section 2: https://canvas.wisc.edu/courses/111714

Course Designation or Attributes:

Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S

Meeting Time and Location: Section 1: TR 9:30-10:45 in VAN VLECK B130
Section 2: TR 1-2:15 in VAN VLECK B130

Instructional Mode: Face to face

Credit hours: Each week students attend 3 hours of lecture (and 1 hours of discussion). They are expected to work about 10 hours of week outside of class meeting time on homework and other assignments.

INSTRUCTOR:

Dr. Autumn Kent
Office hours and location: Tuesday 11-12 by appointment, Van Vleck Hall 615

Email: kent@math.wisc.edu

OFFICIAL COURSE DESCRIPTION

Matrix algebra, linear systems of equations, vector spaces, sub-spaces, linear dependence, rank of matrices, determinants, linear transformations, eigenvalues and eigenvectors, diagonalization, inner products and orthogonal vectors, symmetric matrices. Prospective math majors should instead consider Math 341 for a proof based introductory linear algebra course.

Requisites

Math 222. Not open to students with credit for either Math 341 or Math 375.

LEARNING OUTCOMES

At the end of this course students should be able to:

- Solve systems of linear equations.

- Work with matrices.
- Encode a system of linear equations in a matrix.
- Perform row and column operations.
- Put a matrix in echelon and reduced echelon form.
- Perform Gauss-Jordan elimination.
- Compute the determinant of a matrix.
- Computate the determinant via row and column operations.
- Understand the geometric interpretation of the determinant.
- Understand the cofactor expansion and Cramer's rule.
- Determine if a matrix is singular.
- Compute the inverse of a matrix.
- Work with abstract vector spaces.
- Work with linear transformations, coordinate vectors, and associated matrices.
- Recognize and work with subspaces of a vector space.
- Understand spanning sets and linear independence/dependence.
- Work with bases and understand dimension.
- Understand the rank of a matrix.
- Work with and compute the kernel and image of a linear transformation.
- Work with similarities and changes of basis.
- Compute and work with eigenvalues and eigenvectors.
- Determine when matrices are diagonalizable.
- Recognize symmetric matrices and their properties.
- Work with inner product spaces.
- Be able to encode an inner product using a matrix, and be able to recognize when a matrix is associated to an inner product.
- Be able to carry out the Gram-Schmidt process.
- Understand and apply the Cauchy-Schwarz inequality.

Textbook

- Kolman & Hill, Elementary Linear Algebra with Applications, Ninth Edition.

GRADING

• Quizzes	25%
• Midterm I	25%
• Midterm II	25%
• Final Exam	25%

EXAMS

The two midterm exams will be in class on **TUESDAY, OCTOBER 16** and **THURSDAY, NOVEMBER 15**. The final exam will be held **FRIDAY, DECEMBER 14, 5:05-7:05 PM** in a location to be determined.

HOMEWORK & OTHER ASSIGNMENTS

- Homework will be assigned but not graded.
- TAs will admister quizzes roughly every other week

RULES, RIGHTS & RESPONSIBILITIES

- See the Guide's to Rules, Rights and Responsibilities.

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to https://conduct.students.wisc.edu/academic-integrity/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA." http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

DIVERSITY & INCLUSION

Institutional statement on diversity: "Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion

enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." https://diversity.wisc.edu/