MATH340, Elementary Matrix and Linear Algebra
Credits: 3
Canvas Course URL: https://canvas.wisc.edu/courses/183750

Meeting Time and Location
Monday, Wednesday and Friday, 7:45-8:35AM, B130 Van Vleck Hall

Instructional Mode
Face-to-face
This class meets for three 50-minute class period each week over the fall/spring semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 2 hours out of classroom for every class period. The syllabus includes additional information about meeting times and expectations for student work.

INSTRUCTORS AND TEACHING ASSISTANTS
Instructor Title and Name
Shaosai Huang, Van Vleck Visiting Assistant Professor
Instructor Availability
Office Hours: Monday 2-4PM, 803 Van Vleck Hall
Instructor Email/Preferred Contact
Email: sshuang@math.wisc.edu

OFFICIAL COURSE DESCRIPTION
Official Course Description
Math 340 is our standard Linear algebra course for non-math majors. Math majors are also allowed to take Math 340 for their requirements, although the more theoretical, proof-based Math 341 is recommended in their case. Math 340 covers the principles of linear algebra and the theory of matrices with an emphasis on understanding the concepts and being able to perform calculations. Some proofs are also introduced in Math 340.

Requisites
Math 234 or Math 222 & 240.

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

- **Matrix Algebra**: Perform matrix addition, subtraction and multiplication and elementary row operations; solve linear systems of equations using row reduced echelon form of a matrix and invertible matrices; find the inverse of a matrix using row operations and understand properties of invertible matrices.
- **Determinants**: Find the determinant of a matrix using the definition, the properties of determinants and cofactor expansion; understand the relationship between the determinant and the invertibility of a matrix; and solve a system of linear equations using determinants.
- **Real Vector Spaces**: Understand the algebraic structure of a vector space over the real numbers and its subspaces and the span of a set of vectors; linear independence and linear dependence of vectors; find the basis and dimension of a finite dimensional vector space; find the null space, the nullity, the column space and the rank of a matrix; understand coordinates, isomorphisms and change of bases and compute transition matrices.
- **Linear Transformations**: Understand the definition and the properties of a linear transformation between two vector spaces; find the kernel and the range of a linear transformation and the relation between their dimensions; find the matrix of a linear transformation.
- **Eigenvalues and Eigenvectors**: Find eigenvalues and eigenvectors of a linear operator and of a square matrix; diagonalize a linear operator and a square matrix.
- **Inner Product Spaces**: Find the inner product of vectors and the angle between two vectors in an inner product space; and find an orthonormal basis for a finite dimensional inner product space using Gram-Schmidt process.

**GRADING**

- Quiz 30%
- Midterm 1: 20%
- Midterm 2: 20%
- Final Exam: 30%

**DISCUSSION SESSIONS**

- DIS321, T 7:45-8:35AM, B215 Van Vleck Hall, TA: Yining Li
- DIS322, T 7:45-8:35AM, B223 Van Vleck Hall, TA: Peter Wei
- DIS323, R 7:45-8:35AM, B215 Van Vleck Hall, TA: Yining Li
- DIS324, R 7:45-8:35AM, B223 Van Vleck Hall, TA: Peter Wei
- DIS325, T 8:50-9:40AM, B323 Van Vleck Hall, TA: Yining Li
- DIS326, R 8:50-9:40AM, B159 Van Vleck Hall, TA: Peter Wei

**REQUIRED TEXTBOOK, SOFTWARE & OTHER COURSE MATERIALS**

EXAMS, QUIZZES, PAPERS & OTHER MAJOR GRADED WORK

- Quizzes are given weekly in discussion sessions, starting in the second week and no quiz during the midterm weeks. 11 quizzes in total, and lowest score will be dropped.
- Midterm 1 will be in class on February 17, 2020.
- Midterm 2 will be in class on March 23, 2020.
- Final exam will be accumulative, given on May 5, 2020.

HOMEWORK & OTHER ASSIGNMENTS

- Homework will be assigned weekly, and it will be posted on Canvas. Homework will not be collected or graded.
- The quizzes in discussion will be based on the homework assignments, so completing the assignments is essential for learning the class material.

RULES, RIGHTS & RESPONSIBILITIES

- To see the Guide’s Rules, Rights and Responsibilities information, refer to http://guide.wisc.edu/undergraduate/#rulesrightsandresponsibilitiestext.

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 studentconduct.wiscweb.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/](https://diversity.wisc.edu/)