

# MATH 255, Introductory Linear Algebra

## Syllabus, Fall 2023

### Course Information.

- 4 semester hours
- Professor: Thomas Scofield
- Text: *A First Course in Linear Algebra, an Open Text*, Version 2017–Revision A (or later), by K. Kuttler
- Class meetings: MWF, 8:00–9:05 am, NH 259

### Catalog Description.

An introduction to linear algebra, including applications.

**Student Learning Outcomes.** Upon completion of this course, students will be able to

- Use reduced matrices to solve systems of equations.
- Find the matrix representation of a linear operator in a given basis.
- Calculate eigenvalues and eigenvectors of a linear transformation.
- Describe subspaces geometrically and specify them using equations or bases.
- State and apply the Spectral Theorem for symmetric linear operators on finite-dimensional vector spaces.

### Topics include

1. Scalars, vectors, and matrices
2. Dot products and projection
3. Hyperplanes
4. Systems of linear equations and Gaussian elimination
5. The theory of linear systems
6. Matrix operations
7. Linear transformations
8. Subspaces
9. Linear independence
10. Spanning sets and bases
11. Orthogonal bases
12. The matrix of a linear operator with respect to a given basis
13. The change-of-basis formula
14. Properties of determinants
15. The characteristic polynomial
16. Diagonalization of a linear operator

17. The Spectral Theorem
18. Abstract vector spaces (as time permits)
19. Homogeneous coordinates and affine transformations for computer graphics (as time permits)
20. Least squares methods (as time permits)

Methods of Evaluation.	<u>Assessment</u>	<u>Pct</u>
	Homework assignments	24%
	Midterm tests (Sept. 20, Oct. 25, and Nov. 29)	51%
	Final (Dec. 9, at 1:30 pm)	25%

### Policies.

- You are expected to attend class faithfully, in person, ready to go as class begins. When you cannot, regardless of reason, you are responsible for catching yourself up.
- Written work should be neat and well-organized, legibly written in complete sentences, and providing justification in the form of reasoning and mathematical or computational work/plots with shared code. You are expected to be aware of assignments and their due dates. If you are unable to submit work by the due date, you may use one of your allotted late passes in MyOpenMath, adhering to the extra time it provides, until such time that you have used up your passes.
- Unless directed otherwise on specific assignments, you may freely collaborate with classmates as you explore problems. Your write-ups are to be your own, however. Sections grafted from another student's work shall be considered *cheating*, and shall result in a score of zero. Repeated instances shall result in a course grade of "F".
- You are expected to take exams on the dates specified, or provide sufficient cause why you cannot. Family trips, pre-arranged flights, etc. are *not* sufficient.

**Accommodations.** Calvin University is committed to providing reasonable accommodations for students with documented disabilities. Students with disabilities requiring special assistance to facilitate participation in this class are urged to contact Disability Services in the Center for Student Success ([disabilityservices@calvin.edu](mailto:disabilityservices@calvin.edu)) as soon as possible to explore arrangements.

**Exceptions.** I reserve the right to make changes or exceptions to course policies, including those described in this document, either for the entire class or for individuals. The ultimate goal in this course is **learning**, and formal requirements should not unnecessarily stand in the way of that. Thus, if you think that any of the conditions of the course are interfering with learning, please speak with me about this, and we will consider what can be done.