VIRGINIA COMMONWEALTH UNIVERSITY
Department of Mathematics & Applied Mathematics
Math 610 – Advanced Linear Algebra
Spring 2026

Instructor: Dr Larson
Office: 4106 Harris Hall
Email Address: clarson@vcu.edu
Web page: math1um.github.io/Teaching and Canvas for grades.
Classroom and Meeting: 2123 Harris Hall, 12:00-12:50 MWF
Office Hours: 12:30-2:00 TTh

Prerequisite: Graduate standing, or approval by instructor.

Text: *Matrix Mathematics: A Second Course in Linear Algebra*, by R. Horn and S. Garcia, *Cambridge University Press*, 2023 (ISBN #1108837107).

Bulletin Description: Vector spaces, bases and dimension, change of basis. Linear transformations, linear functionals. Simultaneous triangularization and diagonalization. Rational and Jordan canonical forms.

Learning Goals: Review of complex and real vector spaces, including linear independence, bases, dimension, rank, and matrix representations of linear transformations; the block-matrix paradigm; inner product and normed linear spaces, includig orthogonal vectors, orthogonal projections, orthonormal bases, orthogonalization, the Riesz representation theorem; unitary matrices; eigenvalues, eigenvectors, and Gershgorin's Theorem; normal matrices; eigenvalue interlacing and Sylvester's Inertia Theorem.

Course Schedule: This course is based on a set of daily instructor-produced worksheets. We will do one of these in class every class day. It is generally impossible to finish these completely without in-class help and discussion. Tests are based these daily classroom worksheets and assigned homework. The pace will not be predetermined (but will depend on how things go in class from day to day).

Expectations:

- You are expected to attend class, complete homework, and ask questions during class or office hours.
- Communicating mathematics is integral to the creation and transmission of mathematics. You should give significant thought as to how to explain your homework solutions to the class.
- I encourage you to work with others on homework problems, however, any assignments to be turned in must be written up on your own. If you work with others, you must write who you worked with on your assignment.
- Please write neatly on all assignments to be graded; exceptionally messy work may not be graded.
- Only selected homework problems will be graded; other problems will be graded for completion.
- **There are no make-ups on in-class assignments.** I will drop your three lowest in-class assignments, assuming that you couldn't come to class for excusable reasons.
- Make up tests will be considered under exceptional circumstances: if you miss a test and want to be considered for a make-up, you *must* contact me immediately.

Tests and Determination of Grades:

There will be 2 equally weighted tests. Here is the *tentative* schedule:

Test #1, Fri., Mar. 6
Test #2, Mon., Apr. 27.

• The tests are closed-book and closed-notes.
• The tests will be based *on* the in-class assignments and assigned homework.
• Use of calculators or other computing technology is not allowed on the tests.
• Tests are written under the assumption that you are studying the material at least 6 hours per week outside of class.

Your final average will be computed as follows:

Test 1, 2:   20% each
Homework: 25%
In-class assignments: 35%

Grade Scale: The 10-point scale: 90-100 A, 80-89 B, etc.

Important Dates to Know:

- Spring Break, Mar. 8-15
- Last day to withdraw, Fri., April 3
- Classes end, Tues., April 28

More VCU Policies, Honor System and Syllabus Information:

Students should visit http://go.vcu.edu/syllabus and review all syllabus statement information. The full university syllabus statement includes information on safety, registration, the VCU Honor Code, student conduct, withdrawal and more.