

SYLLABUS

LINEAR ALGEBRA WITH APPLICATIONS
SPRING 2020

BLAKE FARMAN
DEPARTMENT OF MATHEMATICS
LAFAYETTE COLLEGE

CONTACT INFORMATION

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Office Hours: Monday/Wednesday, 3:00 pm - 4:30 pm.

COURSE INFORMATION

Section: 01

Lectures: Monday/Wednesday/Friday, 1:10 pm - 2:00 am in Pardee Hall, room 321.

Co-Requisites: Math 263 or permission of instructor.

Course Objectives: An introductory course in linear algebra emphasizing applications to fields such as economics, natural sciences, computer science, statistics, and engineering. The course covers solutions of systems of equations, matrix algebra, vector spaces, linear transformations, determinants, eigenvalues and eigenvectors. Not open to students who have credit for MATH 300.

Text: The required text for this course is *Understanding Linear Algebra*, David Austin:

<http://merganser.math.gvsu.edu/david/linear.algebra/ula/ula/frontmatter.html>

It is **expected** that you will read the text outside of lecture. In particular, it is highly suggested that you take some time to read the section to be covered ahead of lecture.

Course Website: The URL for the course website is

<https://sites.lafayette.edu/farmanb/math-272-01/>

Here you can find a digital copy of the syllabus and other important information.

GRADING

This course will use **Standards-Based Grading**. This grading style emphasizes demonstration of subject mastery by students over accumulation of points. The course content is broken into 15 *standards* listed below.

STANDARDS

Systems of Equations

- Systems as Matrices:
Translate back and forth between systems of equations and augmented matrices.
- Gaussian Elimination
Use basic row operations to solve a system of linear equations.

Matrix Algebra

- Linear Combinations
Perform matrix/vector addition and scalar multiplication.
- Matrix Multiplication
Perform multiplication with matrices.
- Determinants
Compute the determinant of a given matrix.
- Invertibility
Determine whether a given matrix is invertible, and find its inverse.
- Matrices and Linear Maps
Translate between matrices and linear maps.

Vector Spaces

- Identification
Determine whether a given set satisfies the definition of a vector space.
- Span
Determine the span of a given set of vectors.
- Linear Independence
Determine whether a given set of vectors is linearly independent.
- Bases and Coordinate Systems
Find bases for a space and translate between the associated coordinate systems.
- Dimension
Compute the dimension of a given space.
- Null and Column Spaces
Find bases for the Null and Column spaces of a given matrix.

Eigentheory

- Eigenvalues
Find the eigenvalues of a given matrix.
- Eigenvectors
Find a basis for the eigenspace associated to an eigenvalue.

Problem Scoring: Each problem that you encounter during this semester will be scored on the following scale:

Mastery	The given solution is correct with no content related errors. Appropriate justification is provided in a clear, easy to follow manner.
Proficiency	The given solution is mostly correct, with only minor content errors. Appropriate justification is provided.
Improving	The given solution is only partially correct or lacks justification.
Rookie	The given solution is incorrect, but correct techniques were identified.
Not assessable	The given solution was blank, illegible, or used inappropriate techniques.

Mastery: You can achieve mastery of a standard by receiving a score of **M** on in-class assessments and the final exam. Once you have achieved mastery, problems explicitly from that standard will no longer appear on your assessments. However, calculus builds upon itself, so the concepts in any given standard will certainly reappear in later standards.

It is important to note that, unlike a traditional grading scheme, you will be afforded multiple opportunities to display mastery and your past performance does not affect mastery.

Scale: Letter grades will be assigned based on the following table.

		% Homework Mastered				
		< 60%	60% - 69%	70% - 79%	80% - 89%	90% - 100%
# Standards Mastered	14-15	A-	A-	A-	A-	A
	12-13	B-	B-	B-	B	B+
	10-11	C-	C-	C	C+	C+
	9-10	D-	D	D+	D+	D+
	< 9	F	F	F	F	F

ASSESSMENTS

Homework: Regular homework will be assigned, collected, and scored. The problems are chosen to highlight the core concepts from the standards. Mastery of these homework sets serves as a good indicator for quiz and exam performance. As such, you should ensure that you fully understand the material on these homework sets; that is, upon completion of the homework set, you should be capable of completing similar problems without the aid of the text, a computer, a calculator, or any other tools not available during an exam.

Late work. Late work will **not** be accepted, and you are solely responsible for ensuring that homework assignments are completed on time.

Quizzes: Quizzes will be given during class time, at least once per week. You should expect to see a quiz shortly after completion of a homework set. Each quiz will contain problems from only one standard, and will generally be your first opportunity to demonstrate mastery. If you receive a score of **M** on each problem on a quiz, then you will have mastered that standard.

Exams: There will be three in-class exams and a final exam. Each exam will be comprised of questions corresponding to the standards that you have not yet mastered and labeled accordingly. Mastery of a standard depends **only** on attaining a score of **M** on the questions corresponding to that standard.

The in-class exams are tentatively scheduled as follows:

- Exam 1: Friday, March 13, 2020,
- Exam 2: Friday, April 10, 2020, and
- Exam 3: Friday, May 1, 2020.

Re-Assessment: You will have the opportunity to re-assess **one homework set** that you have not mastered each day that office hours are held. Any homework you have not mastered must be re-assessed **before the next exam**.

I will provide you with at least one problem from the relevant standard which you will work out on the board. Your goal in this re-assessment is to demonstrate to me that you have mastered the homework set. If you are successful, then the score for that assignment will be changed to **M**.

Note: You may only re-assess homework assignments that were turned in on time.

Disability statement: In compliance with Lafayette College policy and equal access laws, I am available to discuss appropriate academic accommodations that you may require as a student with a disability. Requests for academic accommodations need to be made during the first two weeks of the semester, except for unusual circumstances, so arrangements can be made. Students must register with the Office of the Dean of Advising and Co-Curricular Programs for disability verification and for determination of reasonable academic accommodations.

EXPECTATIONS

Academic Integrity: To maintain the scholarly standards of the College and, equally important, the personal ethical standards of our students, it is essential that written assignments be a student's own work, just as is expected in examinations and class participation. A student who commits academic dishonesty is subject to a range of penalties, including suspension or expulsion. Finally, the underlying principle is one of intellectual honesty. If a person is to have self-respect and the respect of others, all work must be his/her own.

Any student found responsible of academic dishonesty **will receive a grade of F in the course** and disciplinary action according to the procedure outlined in Student Handbook.

Attendance: Lecture is the longest stretch of time each week in which you have access to an interactive learning resource (i.e. me). As such, lecture is arguably the most valuable aspect of the course and you are expected to not only attend class, but to also actively engage with the material (e.g. ask questions, contribute answers, etc.). Cell phones and other distractions should either be left at home or be silenced and remain stored your bag.

If you find yourself unable to attend class, please contact me in advance, if possible, to see what you will miss. In the event of an absence during a quiz or an exam, the assesment can be made up only with a Dean's excuse.

FEDERAL CREDIT HOUR REQUIREMENT

The student work in this course is in full compliance with the federal definition of a four credit hour course. Please see the Registrar's Office web site

<http://registrar.lafayette.edu/additional-resources/cep-course-proposal>
for the full policy and practice statement.