

Linear Algebra I (CRN: 9317/10286)
Spring 2021
MATH 322.50/502.50 (4 credits), MTu_ThF, 10:00A-10:50A, Online

Prerequisite: A grade of C- or better in MATH 311 (*Calculus III*) is the prerequisite for this course. This course may also be taken concurrently with MATH 311. MATH 310 (*Introduction to Proofs*) is recommended as well.

Instructor: Dr. Buchanan

Office: Wickersham 203-1, Phone: 871-7305, FAX: 871-7948

Office Hours: 12:30P-1:30P (MTuWThF), or by appointment

Email: Robert.Buchanan@millersville.edu (**preferred**)

Office hours will be held through Zoom videoconferencing. Students needing to connect with me during office hours should use the link:

<https://millersville.zoom.us/j/95440809855> Meeting ID: 954 4080 9855 Passcode: 453790

Textbook: I will assign readings and some homework exercises from either of the following free textbooks on linear algebra. Since the titles are the same, I will refer to them by the authors' last names (Beezer or Kuttler).

Beezer: *A First Course in Linear Algebra*, Robert A. Beezer, (Version 3.50), Congruent Press, Gig Harbor, Washington (2015), ISBN: 978-0-9844175-5-1

Kuttler: *A First Course in Linear Algebra*, Ken Kuttler, (Version 2017 – Revision A) Lyryx Learning (2017)

PDF copies of these textbooks are available online and within our D2L course shell.

Description: An introduction to linear algebra: matrices, row reduction, inverses of matrices, determinants, solution theory for systems of equations, Euclidean vector spaces, Gram-Schmidt orthogonalization, inner product spaces, eigenvalues, eigenvectors, and diagonalization, abstract vector spaces and linear transformations.

Objectives:

- Learn the basic algorithms for matrix computation.
- Understand the solution theory for systems of linear equations, and its connection with matrix algebra.
- Learn about the major structures and techniques of linear algebra, such as determinants, inner products, and eigenvectors.
- Learn about abstract vector spaces and linear transformations.
- Improve ability to read and compose proofs in abstract mathematical symbolism in the context of a specific area of mathematics.

Topic Coverage:

- Systems of Linear Equations and Matrices
- Determinants
- Euclidean Vector Spaces
- General Vector Spaces

- Inner Product Spaces
- Eigenvalues, Eigenvectors
- Linear Transformations

Other topics may be covered as time or interest permit.

The topic of “Vectors in 2-space and 3-space,” will not be covered since that material is part of MATH 311 (*Calculus III*). Students should review this material on their own as necessary.

Attendance: This course will be conducted entirely online due to the COVID-19 pandemic. Class meetings (at the scheduled time of 10:00A–10:50A) will be conducted synchronously on Tuesdays and Thursdays through Zoom videoconferencing and asynchronously on Mondays and Fridays. During the synchronous class meetings I will present course content and conduct other class business requiring synchronous two-way communication with students. During the asynchronous days of the class, students will find recorded lectures and handouts to read under D2L. The zoom meeting link can be used during the asynchronous days for asking questions of me, getting help with understanding the course material, and additional office hours. There will be no live lecture conducted on the asynchronous class days. In order to effectively participate in class, students should have a computer with broadband internet access, a microphone, and preferably a webcam. Please use the recurring invitation:

<https://millersville.zoom.us/j/95776916121> Meeting ID: 957 7691 6121 Passcode: 995874

to join the videoconference. Zoom logs the participants who join the class meeting and the amount of time they were in the meeting. The class meetings will be recorded and the recordings posted to D2L in case students miss all or a portion of a synchronous class meeting. D2L also logs the content that students view and the length of time spent viewing each posted resource, therefore I will have a record of class attendance.

Students are expected to attend all synchronous class meetings. There is an inverse correlation between a student’s number of absences and final grade. This is due to the fact that daily contact with the material is essential to understanding the course contents. Getting the material second hand from someone else’s notes is simply not the same as hearing it for yourself. If you must be absent from class you are expected to complete class requirements (tests and/or homework assignments) prior to the absence. Students who miss a test should provide a valid excuse, otherwise you will not be allowed to make up the test. Tests should be made up within one week of their scheduled date. No final exam exemptions. Further information and details about this attendance policy can be found in the [University Approved Guidelines](#).

Homework: Students are expected to do their homework and participate in class by, among other things, asking questions of the instructor about linear algebra concepts and processes and answering questions posed by student peers during class and in online discussions. Some homework exercises will be assigned from the textbooks while others will be composed by the instructor and distributed electronically to the students. Students will submit their assignments by scanning their work and uploading it as a single PDF file to a dropbox created for each assignment under D2L. **Late homework will not be accepted.**

Students should expect to spend a *minimum* of twelve hours per week reviewing notes taken during class and working assigned homework exercises. Preparation for the tests and final exam will require additional hours of study. Students will find it beneficial to review all lecture notes and other relevant material collected from the beginning of the semester until the present time at least once per week.

Tests: There will be three in-class tests and a comprehensive final examination. The tests and the final exam will also be distributed electronically to the students and collected by scanning and uploading to a dropbox under D2L. The tests are tentatively scheduled for

1. Thursday, February 18, 2021

2. Tuesday, March 16, 2021
3. Tuesday, April 13, 2021

The final exam is scheduled for Thursday, May 6, 2021, 8:00A–10:00A. I will not “curve” test or exam grades.

Tests and the final examination will be proctored by the instructor through Zoom. Students will be asked to take the tests in a distraction-free environment with their webcams open and the student visible, so that the instructor make sure the students are not using inappropriate resources or aids to gain an unfair advantage on the tests. Students who engage in academically dishonest behavior on a test or final examination will receive a grade of 0 for the assessment activity.

Grades: Course grade will be calculated as follows.

Tests	50%
Exam	25%
Homework	25%

Tests and the final examination will be graded individually on a 100-point scale. If a student believes that an error was made in the grading of an assignment or test, the student should explain *in writing* why they believe an error exists and submit the graded material and the explanation of the possible error to me within 3 class periods of the graded test or homework being returned to the student. In no cases will adjustments to grades of less than 3 points be made. I keep a record of students’ test and exam scores. Students should also keep a record of graded assignments, tests, and other materials. As an example of the calculation of the numerical course grade, suppose a student’s three test grades were 87, 78, and 60 (out of a maximum of 100 points on each test), the student’s final examination grade was 71 (again, out of a maximum of 100). Suppose seven homework assignment were collected and the student’s grades were 32/40, 38/50, 50/60, 20/40, 27/50, 40/40, and 23/40. This hypothetical student’s numerical course grade would be calculated according to the formula

$$\begin{aligned}
 & \frac{87 + 78 + 60}{3} \cdot 0.50 + 71 \cdot 0.25 + \\
 & \quad \frac{32/40 + 38/50 + 50/60 + 20/40 + 27/50 + 40/40 + 23/40}{7} \cdot 25 \\
 & = 37.5 + 17.75 + 17.89 \\
 & = 73.14
 \end{aligned}$$

The course letter grades will be calculated as follows. I will not “curve” course grades.

90-92	A–	93-100	A		
80-82	B–	83-86	B	87-89	B+
70-72	C–	73-76	C	77-79	C+
60-62	D–	63-66	D	67-69	D+
			0-59		F

Course Repeat Policy: An undergraduate student may not take an undergraduate course of record more than [three times](#). A course of record is defined as a course in which a student receives a grade of A, B, C, D, (including + and –) F, U, Z or W. The academic department offering a course may drop a student from a course if the student attempts to take a course more than three times.

The last day to withdraw from a course (and receive the W grade) is April 5, 2021 at 11:59P.

Inclement Weather Policy: If we should miss a class day due to a school closing because of [weather](#), any activities planned for that missed day will take place the next time the class meets. For example, if a test is scheduled for a day that class is canceled on account of snow, the test will be given the next time the class meets.

Cell Phones: Silence (or better yet, turn off) all cellular telephones upon entering the classroom. Leaving class to initiate or receive a telephone call will not be tolerated and students doing so will not be re-admitted to the classroom until the following class meeting. Texting or tweeting during class interferes with the learning process. Students distracted by their cell phones are not engaged in class and will find, over the course of the semester, that learning and course grade will suffer.

Title IX Reporting Responsibilities: Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972, 20 U.S.C. §1681, *et seq.*, and act in accordance with guidance from the Office for Civil Rights, the University requires faculty members to report to the University's Title IX Coordinator incidents of sexual violence shared by students. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report to the person designated in the University Protection of Minors policy incidents of sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred. Information regarding the reporting of sexual violence, and the resources that are available to victims of sexual violence, is available at <https://www.millersville.edu/titleix/index.php>.

Academic Honesty: Using a remote mode of instruction presents challenges in maintaining a rigorous level of academic integrity. Just as during a traditional face-to-face course, students are required to avoid plagiarism, falsification of their work, cheating (including assisting others in cheating), and other forms of academic misconduct. For more information including definitions and examples of academic dishonesty, please see the [Academic Honesty Policy](#).

Final Word: Math is not a spectator sport. What you learn from this course and your final grade depend mainly on the amount of work you put forth. Daily contact with the material through homework assignments and review of notes taken during lectures is extremely important.

No one can guarantee you success in this course. Your responsibilities and the instructor's expectations are outlined above. There will be no second chances or "do-overs".