Math 2450 - Elementary Linear Algebra Fall 2024

Instructor**:** Dr. David Covert
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Office: Express Scripts Hall (ESH) #349
Phone number: (314) 516-6627 (**email is the most reliable way to get ahold of me)
Class Meetings Times: Tuesday/Thursday 11:00 - 12:15 (SSB #342)

- Class Zoom Link: **https://umsystem.zoom.us/j/91848877542**

Office hours:

- MW 1:30 - 2:00 pm (SSB 342 - in person only)
- Tues/Thurs 9:30 - 10:20 am (Virtual and in-person - ESH 349)
    - Link for Tu/Th office hours: **https://umsystem.zoom.us/j/93104265529**

Office hours are times that I will be around for you to ask me questions, and you do not need an appointment to attend. If you cannot attend office hours due to work or other scheduling conflicts, email me and we will try to find a suitable time to meet.

I will have regular face-to-face lectures as scheduled, but I will also **do my best** to broadcast the lecture via Zoom so that you can participate from home if you prefer. I strongly encourage everyone to attend in-person, but I want you to have the flexibility to participate from home on occasion. Our class lecture videos will be recorded and put on Canvas/Panopto for 45 days after they are recorded. After 45 days, the videos are automatically deleted from Canvas/Panopto. The videos are intended only for the students in this class, and they will not be made public. If a technological problem arises which prohibits me from broadcasting our class on Zoom, you will still be responsible for learning that material. In my experience, students do **much** better in the course by attending lectures in-person rather than watching online (either at the time of recording or later). However, you are free to choose the learning style that works best for you that day.

Please be aware that I have small kids, so I generally do not answer emails between 3pm - 9pm. I may answer emails after 9pm, but in general I will communicate with you from 8am to 3pm each day. Email me at any time, and I will respond as soon as I can.

Prerequisites: A grade of C- or better in either Math 1100 or Math 1900.

Topics Include: Complex numbers, geometric vectors in two and three dimensions and their linear transformations, the algebra of matrices, determinants, solutions of systems of equations, eigenvalues and eigenvectors. If time allows, we may explore singular value decomposition or other topics.

Course Materials:

- Cengage Unlimited: The course materials will all be available to you via Cengage Unlimited, and you have been auto enrolled in Auto Access for Cengage Unlimited through the bookstore. Do not purchase an additional subscription to Cengage Unlimited. Access to Cengage Unlimited is discounted through the university, and this includes use of the homework software WebAssign and access to the eBook, among other features.
- The 12-character Class Key to enroll in WebAssign is **umsl 5691 2514**. You can enter the class key at webassign.net or getenrolled.com.
- Textbook: The book we are using is "Elementary Linear Algebra," 8th edition, by Ron Larson (ISBN-13: 9781337249928). You do not need to purchase a paper copy of this book, as the eBook is digitally available to you using Cengage/WebAssign as explained above. You may request a (three hole punch) rental copy of the textbook to be mailed to you for $7.99 (including shipping and returns). Instructions for renting a textbook have been posted to Canvas.

Supplemental Instruction:
This course offers Supplemental Instruction (SI), a free service available to all students in the course. Supplemental Instruction is an academic support program that uses study sessions to promote student success. The SI Leader is a student who has taken this course before and done well. Throughout the semester, the SI Leader will hold regular study sessions to help students with developing study skills and mastering the course content. Participation in SI is voluntary, but highly encouraged. The SI Leader this semester is Colton Fitzjarrald (cwfdfd@umsl.edu).

Assistance:

1. Talk to each other! I would encourage you to introduce yourselves to each other and share contact information. You should be each other's best resource.
2. Contact your SI Leader or attend one of their SI sessions.
3. Talk to me in office hours, or send me questions via email. I'm happy to help!
4. The website http://LarsonLinearAlgebra.com is built around our textbook. There are some resources available here. WebAssign also has built-in resources.

5. DO NOT go to the Math Academic Center for assistance. The purpose of the Math Academic Center is to help those students in low level classes (up to and including Calculus). You are now past the help that they should give you.

Tests: There will be three mid-semester exams, each worth 100 points. A cumulative final exam will be taken during finals week. Your exams will be conducted in-person and on paper. Exams will be closed book, and calculator use is not allowed.

Quizzes: There will be regular online quizzes (using Canvas and/or WebAssign) to accompany each set of homework. These quizzes will be timed, and they can only be attempted twice. Your final quiz score will be taken out of 100 points.

Homework: Working *many* problems on a regular basis and "getting your hands dirty" is the only way to learn mathematics. Working in groups is acceptable as long as you try each exercise individually at first, and as long as you turn in your own work for each assignment. In other words you can and should work together to solve problems, but you must be able to explain all your own work in detail. At the end of the semester, your homework grade will be taken out of 75 points.

Important Dates: See https://www.umsl.edu/registration/students/semester-calendars-important-dates.html for a current academic calendar.

Grade Calculation: Your course grade will be calculated as follows:

3 Tests @ 100 points each	300 points
Homework (WebAssign)	75 points
Quizzes (WebAssign)	100 points
Final Exam	125 points
Total	600 Points

There will be only one opportunity for extra credit: If at least 80% of the class completes a course evaluation then I will add 5 points to everyone's final class score. This extra credit cannot be awarded on an individual basis. We will use the following approximate scale: A=100-90%, B = 89-80%, C = 79-70%, D = 69-60%, F < 60%.
Note that plus and minus grades will not be used!

Classroom Conduct and Expectations: Cellphones and other electronic devices, including laptops and tablets, iPods, electronic watches, etc, must be turned off and put away during class. Recording of lectures, either audio or video, is not allowed. Furthermore, it is of utmost importance that everyone is respectful in my classroom and during office hours. Incidents of profanity, harassment, bullying, and discrimination are in violation of the University's Standard of Conduct and will be reported to the department chair as appropriate. Furthermore, class disruptions (including the use of a phone or laptop during class, coming to class late, leaving class early) are to be avoided, and excessive disruptions may be reported. You may review the University's Standard of Student Conduct here.

Academic Dishonesty Policy: Academic dishonesty is a serious offense that may lead to probation, suspension, or expulsion. Students are expected to be honest in all academic work. A student's name on any academic exercise (theme, report, notebook, paper, examination) shall be regarded as assurance that the work is the result of the student's own thought and study. Cheating includes but is not limited to: receiving any unauthorized assistance on homework assignments, the term paper, or examinations; using unauthorized tools (such as calculators, phones, ipods, etc.) on assignments or examinations, acquisition or possession of other academic material belonging to a member of the University faculty or staff without my permission; use of unauthorized sources in homework assignments, writing papers, and taking exams beyond those authorized by the instructor; knowingly asking for or providing any unauthorized assistance to other students on assignments or examinations. In all cases of academic dishonesty, you will receive a grade of zero for the entire assignment, and the case will be forwarded to the chair of the mathematics department. If deemed necessary, a case may be brought to the attention of the Dean of Students upon which time a student may receive supplemental discipline. If at any point you are unsure if a certain activity is considered cheating, ask the instructor's permission. To view the campus policy on academic dishonesty, see http://www.umsl.edu/services/academic/policy/academic-dishonesty.html.

Academic Disabilities Policy: If you need accommodations because of a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please inform me privately after class, or in my office. To request academic accommodations (for example, a note taker or extended time on exams), students must register with the Office of Disability Access Services. Theirs is the campus office responsible for reviewing documentation provided by students requesting academic accommo- dations, and for accommodations planning in cooperation with students and instructors, as needed and consistent with course requirements. Please see me right away if you are registered with DAS or if you plan to

register with the Office of Disability Access Services.

AI Policy: Use of an AI Generator such as ChatGPT, iA Writer, MidJourney, DALL-E, etc. is explicitly prohibited unless otherwise noted by the instructor. The information derived from these tools is based on previously published materials. Therefore, using these tools without proper citation constitutes plagiarism. Additionally, the information derived from these tools is often inaccurate or incomplete. It's imperative that all work submitted should be your own. Any assignment that is found to have been plagiarized or to have used unauthorized AI tools may receive a zero or be reported for academic misconduct or both.

Tentative Course Schedule (May change week-to-week)

Week	Date	Objective	
1	Aug 20, 22	Intro to Course, Chapter 1	Chapter 1, 2
2	Aug 27, 29	Chapter 2	Chapter 2
3	Sept 3, 5	Chapter 2	Chapter 3
4	Sept 10, 12	Chapter 3	Chapter 3
5	Sept 17, 19	Chapter 4	Exam 1
6	Sept 24, 26	Chapter 4	Chapter 4
7	Oct 1, 3	Chapter 4	Chapter 4
8	Oct 8, 10	Chapter 4	Chapter 4
9	Oct 15, 17	Exam 2	(Fall Break)
10	Oct 22, 24	Chapter 5	Chapter 5
11	Oct 29, 31	Chapter 6	Chapter 6
12	Nov 5, 7	Chapter 6	Chapter 6, Section 4.7
13	Nov 12, 14	Chapter 7	Chapter 7
14	Nov 19, 21	Chapter 7	Exam 3
15	Nov 26, 28	Thanksgiving Break	
16	Dec 3, 5	Various Topics	Various Topics

Final exam is Tuesday, December 10th from 10:00 am - 12:00 noon

List of Topics Covered:

Linear Equations in Multiple Variables
Solving Systems of Linear Equations
Gaussian Elimination and Gauss-Jordan Elimination
Matrices
Elementary Row Operations
Homogeneous Systems of Linear Equations
Applications of Systems of Linear Equations
Operations with Matrices
Properties of Matrix Operations and Matrix Algebra
The Inverse of a Matrix
Elementary Matrices
Applications of Matrices
The Determinant of a Matrix
Minors and cofactors
Determinants and Elementary Operations
Properties of Determinants
Applications of Determinants
Vectors in Rn
Vector Spaces
Subspaces
Spanning Sets and Linear Independence
Basis and Dimension
Rank of a Matrix
Dot Products in Rn
Inner Product Spaces
Orthonormal Bases
Gram-Schmidt Process
Least Squares Analysis
Linear Transformations
The Kernel and Range of a Linear Transformation
Isomorphisms of Linear Transformations
Matrices of Linear Transformations
Transition Matrices
Coordinates and Change of Basis
Eigenvalues and Eigenvectors
Diagonalization
Symmetric Matrices and Orthogonal Diagonalization