Linear Algebra

Northern Michigan University
Winter 2021

Course Instructor

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Learning Outcomes

This is a course on the fundamentals of linear algebra. We will study matrices, matrix multiplication, and how to express linear systems via matrices. We consider the geometry of linear systems and then solve them via elementary matrices and echelon forms. Then we move on to vector spaces, subspaces, linear transformations, and the dimension formula. Finally we look at concepts related to a single linear operator: the determinant, conjugacy, eigenspaces, characteristic polynomials, and diagonalization. Throughout this course we will study various applications of linear algebra, for example, analyzing network flows, balancing chemical equations, calculating volumes, analyzing long term behaviour of markov processes, and solving recurrence relations. By the end of the class, students will be comfortable with, and able to apply the concepts of:

- matrices
- elementary matrices, echelon forms, solving linear systems
- vector spaces, subspaces, linear transformations, the dimension formula
- linear operators, determinants, conjugacy, eigenspaces, characteristic polynomials, diagonalization.

Course Meeting Times

ma211-01
MWF 11:00-11:50
WEST 2906
live-stream

Course Webpage

http://euclid.nmu.edu/~darowe/w21_ma211.html

Course Notes and Textbooks

My online notes will serve as your main reference. If you want to read another source, below are some good open linear algebra texts.

· Jim Hefferon, *Linear Algebra*, 3E
joshua.smcvt.edu/linearalgebra

· Gregory Hartman, *Fundamentals of Matrix Algebra*
https://open.umn.edu/opentextbooks/textbooks/fundamentals-of-matrix-algebra

· Cherney, Denton, Thomas, Waldron, *Linear Algebra*
https://www.math.ucdavis.edu/ linear/linear-guest.pdf

Grade Categories and Weights

Problem Sets	40%
Tests	30%
Final	30%

Calculating Your Grade

Each graded item may be out of different point totals, *i.e.* /70, /120, but they are converted to percentages /100, that are rounded up to the nearest percentage point in your favor.

For example, suppose it is sometime mid-semester, and you have the following raw scores: Problem Set 1 (35/50), Problem Set 2 (100/120), Problem Set 3 (73/90), Test 1 (36/50).

- Problem Set 1 $\rightsquigarrow$ 70/100
- Problem Set 2 $\rightsquigarrow$ 84/100
- Problem Set 3 $\rightsquigarrow$ 82/100
- Current *Problem Set* Grade: 236/300
- Test 1 $\rightsquigarrow$ 72/100
- Current *Test* Grade: 72/100
- Current *Course* Grade: $(236/300) \times 40 + (72/100) \times 30 \approx 53.1$ out of 70 total points thus far, so a current course grade of $\rightsquigarrow 75.9\%$ (C+).

Grade Scale

92-100%	A
90-91%	A-
86-89%	B+
82-85%	B
80-81%	B-
76-79%	C+
72-75%	C
70-71%	C-
66-69%	D+
62-65%	D
60-61%	D-
0-59%	F

Late Policy

All submissions of your work will be electronic, and they will have very clear due dates. My late policy will be exponential ($-5 \cdot 2^{n-1}$ %), capping out at -60%, i.e. -5% one day late, -10% two days late, -20% three days late, -40% four days late, and -60% five days late and thereafter.

Accessibility

If you have a need for disability-related accommodations or services, please inform the *Coordinator of Disability Services* in the Dean of Students Office at 2001 C. B. Hedgcock Building (906-227-1737 or disserv@nmu.edu). Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state, and University guidelines.