

MATH 3203, Fall 2023

Matrix Methods

Instructor Information

Professor:	Dr. Stephen Graves
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The preferred method of contact is via Canvas.
uttyler.instructure.com

Class Meeting Times

Section	Days	Times	Location
001	MoWeFr	08:00 — 08:55	RBN 4034

Office Hours

Mo	10:15 — 11:15	RBN 4011
TuTr	09:00 — 10:00	Zoom by Appt

1. COURSE INFORMATION

1.1. Official Course Description. Matrices and matrix algebra, determinants, systems of linear equations, Gaussian elimination, eigenvalues and eigenvectors, linear transformation, applications in science and engineering.

1.2. Course Prerequisites. A grade of C or better in Math 2413.

2. IMPORTANT DATES

21 Aug.	First day of classes
1 Sep.	Census date
4 Sep.	Labor Day (No classes)
30 Oct.	Withdrawal deadline
20 – 24 Nov.	Thanksgiving Break (No classes)
4 – 9 Dec.	Final exams
8 & 9 Dec.	Fall Commencement

3. COURSE CONTENT

3.1. Textbook. The primary textbook will be the source of lecture notes and homework problems; the others are provided so you can have an additional explanation of topics if you need them.

Primary: *Linear Algebra with Applications*¹
by W. Keith Nicholson²

Reference: *Fundamentals of Matrix Algebra*³
by Gregory Hartman⁴

Reference: *Linear Algebra*⁵
by Jim Hefferon⁶

Reference: *Introduction to Applied Linear Algebra - Vectors, Matrices, and Least Squares*⁷
by Stephen Boyd⁸ and Lieven Vandenberghé⁹

Reference: *Linear Algebra*¹⁰

by David Cherney, Tom Denton, Rohit Thomas¹¹, and Andrew Waldron¹².

Recommended: *The 5 Elements of Effective Thinking*
by Edward Burger and Michael Starbird

ISBN 978-0691156668

This inexpensive book can totally change how you view learning and I recommend it to anyone who

thinks they might struggle with course material, whether or not they're in my classes.

3.2. Student Learning Outcomes. Students should be able to successfully:

- Perform basic matrix operations including row reduction, transpose, finding the inverse and finding the determinant.
- Perform basic matrix operations including row reduction, transpose, finding the inverse and finding the determinant.
- Solve systems of linear equations using substitution, Gauss-Jordan elimination, Cramer's rule and inverse matrices.
- Find eigenvalues and eigenvectors as well as understanding their properties and importance to matrix theory and applications.
- Understand the basic properties of Euclidean space including linear independence, dimension, rank, orthogonality, norm and projection.

4. COURSE POLICIES

4.1. Academic Honesty. *All work submitted must be your own.* If this is determined not to be the case, you will be referred to the Director of Judicial Affairs, with a consequence appropriate to the level of the infraction. You will be reminded of the UT Tyler Honor Code on every exam.

Submitting the homework or lecture notes of another student is plagiarism and will result in an earned grade of 0 for the category, not just the assignment. Cheating on an exam will result in an F for the course. Posting copyrighted material to the internet without the prior written permission of the copyright holder is illegal.

4.2. Civil Environment. The free exchange of ideas is a central part of a university education. Class will be conducted in a polite and professional manner and I expect students to behave politely and professionally. *Disruptive behavior will not be allowed and is judged at my sole discretion.* Persistent incivility will result in your removal from the classroom.

4.3. **Canvas & Email.** You are expected to check Canvas at least daily, and also expected to check your university email. All at-home work will be submitted via Canvas.

4.4. **Personal Electronics.** Students are required to have access to a device capable of accessing Canvas and a device capable of scanning hand-written work for upload to Canvas. **Graphing calculators are not permitted in this class.** You are expected to keep all personal electronics (phones, laptops, tablets, headsets, earpods, etc.) stowed in your bag during class *unless actively being used for class purposes.*

4.5. **Late & Missed Work.** Late work will not be accepted. Missed lecture notes and homework will count as 0s. In the event that a student misses a single in-class exam, the final exam grade will increase to cover the missing points. Students missing more than one in-class exam fail the course. Students missing the final exam fail the course.

5. UNIVERSITY POLICIES

The University has many policies required to be included on syllabi. As these policies can change, please find the most recent version online.¹³

6. COURSE STRUCTURE

The course content will be tentatively organized by week in Canvas modules; this is subject to change as our use of class time necessitates. Your grade will be calculated in **percentage points (PP)**: lecture notes (5 PP), homework (5 PP), and exams (90 PP).

6.1. **Grade Scale.** Student letter grades will be recorded based upon their earned percentage points (PP). The grade scale will be no stricter than the standard:

PP Range	[0, 60]	(60, 70)	[70, 80)	[80, 90)	[90, ∞)
Letter	F	D	C	B	A

6.2. **Lecture Notes, 5 PP.** Students who consistently attend class and participate by writing notes and asking questions outperform students who do not. In order to encourage attendance, you will be required to scan and upload your hand-written course notes before 23:59 on the same day as class. *When that you miss class, make sure to obtain lecture notes from a classmate and submit*

them before the deadline. Notes will not be provided by the instructor. Each day's notes will be graded as a 0 (no meaningful notes), 1 (halfway complete and meaningful notes), or 2 (complete and meaningful notes). The notes *do not need to be an exact transcript of class to be complete*, but must contain all meaningful ideas from class.

There are 24 days for which notes can be submitted; at 2 points each that totals 48 points. Your grade x will be taken out of 40 points, and you will earn $5x/40$ PP for lecture notes.

Extra Credit. If you receive $x > 40$ points from lecture notes, you will receive an additional $1/8$ PP per point above 40, for a maximum of 6 PP.

This makes the formula $5 + (x - 40)/8$.

6.3. **Homework, 5 PP.** There is no practice as reliable as working homework to help you learn mathematics, so I will assign homework regularly. You are encouraged to work together and even more strongly encouraged to contact me when you struggle. Homework must be written by hand, scanned, and uploaded to Canvas before 23:59 on the due date. Homework will be graded for *completeness only*, on a similar scale as lecture notes: 0 for minimal completion, 1 for at least half completion, and 2 for full completion.

There are 24 homework assignments. Your grade x will be taken out of 48 points, and you will earn $5x/48$ PP for homework.

6.4. **Exams, 90 PP.** There will be 3 in-class exams as well as a final exam. In-class exams dates are listed on Canvas. The Final Exam is scheduled by the University administration and is Wednesday, 6 December, from 08:00 — 10:00. In-class exams each contribute 20 PP towards your final grade, while the final contributes 30 PP. All exams will be comprehensive, but will be skewed toward the newer material covered since the last exam.

Extra Credit. A student who takes all exams and earns all nonzero scores will receive an additional 1 PP towards their grade.

6.5. **Tentative Schedule of Topics.** The schedule for the semester can be found on the main Syllabus page of Canvas, including all assigned due dates.

NOTES

- <https://lyryx.com/linear-algebra-applications/>
- <https://contacts.ucalgary.ca/info/math/profiles/101-152962>
- <https://open.umn.edu/opentextbooks/textbooks/fundamentals-of-matrix-algebra>
- <https://www.vmi.edu/academics/departments/applied-mathematics/faculty-and-staff/>
- <https://joshua.smcvt.edu/linearalgebra/>

6. <https://joshua.smcvt.edu/math/hefferon.html>
7. <https://web.stanford.edu/~boyd/vmls/>
8. <https://web.stanford.edu/~boyd/>
9. <http://www.seas.ucla.edu/~vandenbe/>
10. <https://www.math.ucdavis.edu/~linear/>
11. https://www.math.ucdavis.edu/people/general-profile?fac_id=rthomas
12. https://www.math.ucdavis.edu/people/general-profile?fac_id=wally
13. Usually at <https://www.uttyler.edu/academic-affairs/files/syllabuspolicy.pdf>