

Math 3203.001 - Matrix Methods in Science and Engineering

Fall 2024

MW 9:05 - 10:00 am in RBN 4034

Instructor: Dr. Maddie Dawsey
Office: RBN 4048
Office Hours: TuTh 8-9 am and We 1:30-3 pm, or by appointment
Email: mdawsey@uttyler.edu
Website: All course materials will be posted on Canvas

Required Textbook

Linear Algebra and Its Applications, 5th edition, by Lay, Lay, and McDonald, ISBN #9780321982384.

Course Description

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

The prerequisite for the course is Math 2413 Calculus I.

Student Learning Outcomes

Upon completion of this course, students should be able to do the following:

- Perform basic computations with matrices, including Gaussian elimination, matrix multiplication, and computing transposes, inverses, and determinants
- Solve systems of linear equations using Gaussian elimination and inverse matrices
- Compute eigenvalues and eigenvectors of matrices and understand their importance to matrix theory and its applications
- Apply matrix techniques to real world applications from science and engineering

Important Dates

September 2	Labor Day Holiday
September 9	Census Date
November 4	Withdrawal Deadline
November 25-29	Thanksgiving Break
December 9-13	Final Exams

Grading Scheme

Your final letter grade will be determined by the following grading scheme, subject to the rules below:

Homework	5%	definitely an A	90 - 100
Activities	25%	at least a B	80 - 89.99
Midterm Exams	40% (20% each)	at least a C	70 - 79.99
Final Exam	30%	at least a D	60 - 69.99
		definitely an F	0 - 59.99

To pass the course with a C or higher:

- you **MUST** earn a grade of 50 or higher on the final exam **AND**
- the average of your two midterm exam grades **MUST** be 50 or higher.

Attendance

Students are expected to attend every lecture in person and are responsible for any announcements made.

Homework (5%)

Homework from the textbook will be posted on Canvas after each class. The homework problems for each week will be due by the beginning of class the following Monday, unless otherwise specified by the professor. Homework will be graded for completion, but keep in mind that taking homework assignments seriously will help prepare you for activities and exams. Late homework will not be graded and will receive a grade of zero. Your lowest homework grade will be dropped at the end of the semester.

Activities (25%)

Activities will be posted on Canvas for each section. Activities will be worksheets containing real-life applications, hands-on practice, or in-depth examples to supplement your understanding. Late activities will not be graded and will receive a grade of zero. Your lowest activity grade will be dropped at the end of the semester.

Exams (20% each)

There will be two midterm exams, each worth 20% of the final course grade. The tentative schedule is:

Exam 1	Wednesday, October 9
Exam 2	Wednesday, November 13

Make-up exams for documented absences that are required as part of a UT Tyler obligation or for religious observation will be granted. For all make-ups of this type, prior notification and documentation are required. Other make-ups will be granted only in extreme cases and at the sole discretion of the professor. Missed exams that are not made up within one week will earn a grade of zero.

Final Exam (30%)

The final exam is cumulative and will be Monday, December 9 at 8:00 - 10:00 am in our usual classroom.

Technology

Students will be required to have a device capable of internet access and access to Canvas, as well as either a PDF scanning app (iPhone Notes, Microsoft OneDrive, CamScanner, etc.) or access to a physical scanner. No laptops, cell phones, calculators, or other devices will be permitted on exams.

Student Resources

The Mathematics Learning Center (MLC), RBN 4021, is an open access computer lab for math students. There are tutors on duty for several hours each day to assist students who are enrolled in early-career courses. While there are no tutors specifically for MATH 3203, the tutors on duty may be able to help you. See <https://www.uttyler.edu/math/mlc.php> and click the link to the MLC's Canvas page to see the online tutoring schedule.

Students are encouraged to set up study groups to study and work on homework and activities together, but each student must submit their own individual assignments.

Other resources available to you include your textbook and your professor (in office hours or via email), and online tutorials (online textbooks or YouTube videos, for example) may be used as well.

The use of artificial intelligence (AI), online Q&A blogs like Math Stack Exchange, and online solution manuals like Chegg is not permitted in this course. Please refrain from using AI tools and online solutions.

University Policies

For university policies concerning Students' Rights and Responsibilities, Grade Replacement/Forgiveness, State-Mandated Drop Policy, Disability Services, Student Absence due to Religious Observance, Student Absence for University-Sponsored Events and Activities, Campus Carry, Social Security and FERPA Statement, please see the University Information module on the course Canvas page.

Tentative Schedule

WEEK	DAY	PLANNED MATERIAL	ACTIVITY
Week 1 8/26–8/30	M W	Section 1.1 Section 1.2	Heat Transfer
Week 2 9/2–9/6	M W	<i>Labor Day Holiday – no class</i> Continue Section 1.2	Finishing Heat Transfer
Week 3 9/9–9/13	M W	Finish Section 1.2 Section 1.3	Linear Combinations and Span
Week 4 9/16–9/20	M W	Section 1.4 Section 1.5	Interpretations of Consistent Systems Dimensional Analysis
Week 5 9/23–9/27	M W	Section 1.7 Section 1.8	Linear Independence Comparing Costs
Week 6 9/30–10/4	M W	Sections 1.6 and 1.9 Finish Section 1.9	Balancing Equations
Week 7 10/7–10/11	M W	Section 1.10 EXAM 1 (Chapter 1)	Electrical Networks
Week 8 10/14–10/18	M W	Section 2.1 Section 2.2	Create A Geometric Design Flexibility and Stiffness Matrices
Week 9 10/21–10/25	M W	Section 2.3 Section 2.8	(De)Coding Messages Old School Computer Graphics
Week 10 10/28–11/1	M W	Sections 2.6 and 2.9 Section 3.1	Economic Demand vs. Production Cofactor Expansions
Week 11 11/4–11/8	M W	Sections 3.2 and 3.3 Section 5.1	Electrical Networks Revisited Eigenspaces
Week 12 11/11–11/15	M W	Section 5.2 EXAM 2 (Chapters 2-3)	A Psychologist's Experiment
Week 13 11/18–11/22	M W	Section 5.3 Finish Section 5.3	Population Evolution Model
Week 14 11/25–11/29	M W	<i>Thanksgiving Break – no class</i> <i>Thanksgiving Break – no class</i>	
Week 15 12/2–12/6	M W	Section 5.5 Chapter 6 Overview	Spiral Trajectories Least-Squares Regression
Week 16		FINAL EXAM (Chapters 1-3, 5)	