MAT 343- 23868 Applied Linear Algebra
Spring 2026

Instructor Contact Information:

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Contact: For questions outside of class or office hours, please email me at joel.nishimura@asu.edu. You may also use Canvas messages, but please expect delays for responses sent through Canvas. Please do not use the WebAssign message system to contact the Professor. If a question isn't answered within 1 business day, please feel free to resend it.

Course Description

Solving linear systems, matrices, determinants, vector spaces, bases, linear transformations, eigenvectors, norms, inner products, decompositions, applications. Problem solving using MATLAB.

Enrollment Requirements

Prerequisite(s): MAT 266 or 271 with C or better; Credit is allowed for only MAT 342 or MAT 343 OR Visiting University Student.

Course Overview

Linear Algebra is the fundamental mathematical toolkit to understand structures and relationships in many dimensions. As such, linear algebra is extremely useful throughout the quantitative sciences and engineering. The role of linear algebra in your future classes will be roughly analogous to the role of regular algebra in many of the introductory math, science, and engineering courses you may have taken. In such introductory courses, algebra is quickly used as a tool for manipulating an equation to quickly return a key insight. Ideally, because the students are well versed in algebra, the algebraic manipulation appears easy and quick to the students, and the presentation can then return to discussing the actual topic of the presentation.

Similar to the way that algebraic manipulation has reappeared throughout many of your science, math, and engineering courses, linear algebra and its associated algebraic manipulations will begin to appear in many of your future courses. In this class, we will become fluent in linear algebra in a way that will empower your future dealings with multi-dimensional objects.

In order to support our learning, I've found the following class values to be helpful.

Class Values: The following are the main values of the class and all of us will need to work together to ensure that we all uphold them:

- **Belonging**: We all belong in this class. With enough work nothing in MAT 343 is impossible.
- **Comradery**: Your learning is important because you are important. Your classmate's learning is important because they are important.
- **Discovery**: Math is often hard, but it can also be beautiful and rewarding and exploring how includes the development of your personal mathematical aesthetics.
- **Intellectual Integrity**: We must help each other, but also be honest.

Course Objectives

By the end of a successful semester, students in this class will have developed:

- Beginning fluency in linear algebra
- Beginning fluency in mathematical proof and logic
- Self-knowledge about their mathematical aesthetics
- Familiarity with computational linear algebra tools
- The necessary linear algebra knowledge for their undergraduate programs and/or study

Expected Learning Outcomes

By the end of the course, successful students will be able to:
1. Use MATLAB to represent and solve linear algebra problems.
2. Write and evaluate written mathematical proofs in linear algebra.
3. Use elementary row operations to solve systems of linear equations by reducing systems reduced row echelon form, and interpret systems of linear equations in reduced row echelon form.
4. Understand the implications of linear dependence and independence for a set of vectors.
5. Manipulate matrix equations using matrix algebra.
6. Solve systems of equations using matrix inverses, and can determine whether a matrix is invertible or singular.
7. Find a basis for a subspace and thus determine that subspace's dimension.
8. Interpret matrices as linear transformations.
9. Find the eigenvalues and eigenvectors of matrices by solving the characteristic polynomial.
10. Find and interpret the determinant of an nxn matrix.
11. Given a basis, use Gram-Schmidt orthogonalization to find an orthogonal basis.
12. Utilize the spectral theorem to simplify statements for diagonalizable matrices.
13. Understand how Vector Spaces are a generalization of the algebraic structures in linear algebra.
14. Relate linear regression to the projection operation and pseudo inverses.
15. Use the Singular Value Decomposition to understand matrix multiplication and solve matrix equations.

Required Book

Linear Algebra: A Modern Introduction, 4th Ed, by David Poole.
The required materials for this course, WebAssign for Poole's Linear Algebra: A Modern Introduction, Multi-Term, will be integrated into Canvas and made available to you at a special discounted price of

$112.00, plus tax. You have the option to opt out of this program by clicking this link: https://includedcp.follett.com/1233*, but please be advised that access to this courseware is required to take this course, and if you do opt out you will need to purchase elsewhere at current market rates, which will be more expensive. The charge for the materials will appear on your student account under the item type Digital Integrated Course Mtrl after drop/add. Content will be accessed through the publisher link in Canvas. If you need assistance, please fill out a ticket here: https://forms.gle/uD4GhBxMoixnbwYx5

Computer languages

We will use the mathematical software package MATLAB which is accessible through ASU's myApps. If you prefer, you may use Python instead of MATLAB to complete assignments but be warned that the majority of the instruction and course-based support will be tailored for MATLAB and you'll need to rewrite the lab templates in Python yourself.

Assignments

We will have three kinds of assignments in this course. First, WebAssign homework will be assigned for most sections of the book. Grading on the WebAssign portion of homework will be done automatically by the software. Since we will move through book sections at about 1 to 2 per week, you should expect about 1 to 2 WebAssign assignments due per week. WebAssign assignments tend to be focused on computing correct numerical answers, and should feel familiar in flavor to your previous math courses.

Second, we will have five computational labs, where the goal is to automate a linear algebra algorithm, and/or solve and interpret large-scale problems. Computational labs will be due at least two weeks after they are assigned. Third, we will have five pencil and paper assignments that involve more proof /deductive reasoning than the WebAssign assignments. These assignments will be staggered with the computational labs.

The lowest WebAssign homework, and the lowest will each be dropped. Collaboration is encouraged, but sharing, reading or copying another's finished work is not allowed.

Late work should be avoided, but may be accepted under the following parameters. Late WebAssign assignments require an extension requested through the WebAssign system, and will receive a 5% point deduction. Computational Labs and Pencil and Paper Homework later than 1 week require extenuating circumstances or authorization by the dean of students. All late computational labs are subject to a 20% point deduction.

Exams

There will be one in-class midterm and a cumulative final exam. Following the midterm, we will also have test corrections, where you will have an opportunity to earn back a percentage of the points you may have missed on the midterm.

Course Itinerary

We will attempt to adhere the following schedule, but the instructor reserves the right to spend more or less time based on class performance.

Week 1-2: Chapter 1: Vectors
Week 3-4: Chapter 2: Systems of Linear Equations
Week 5-7: Chapter 3: Matrices
Week 8: Review and Exam
Week 9-10: Chapter 4: Eigenvalues and Eigenvectors
Week 11-13: Chapter 5: Orthogonality
Week 14: Sections 6.1 & 6.2: Vector Spaces
Week 15: Sections 7.3 & 7.4: Linear Regression and Singular Value Decomposition

Grading

Your final grade for this course will be based on the percentage of points obtained. No make-up exams will be given.

WebAssign	*25% of final grade*
Computational Labs	*15% of final grade*
Pencil and Paper Assignments	*10% of final grade*
Midterm and Corrections	*20% of final grade*
Cumulative Final Exam	*25% of final grade*
Attendance & Participation	*5% of final grade*

The following standards will be used:

A+ : 97-100%,   A : 94-97%,   A-: 90-94% | D: 60-70%
B+ : 87-90%,   B : 84-87%,   B-: 80-84% | E: below 60%
C+ : 76-80%   C : 70-76%

* The professor reserves the right to curve grades up.

Changes to the Syllabus

If, due to unforeseen events throughout a semester, the instructor decides to make changes to this syllabus, those changes and an updated syllabus will announced on Canvas.

ASU Academic Integrity

Academic honesty is expected of all students in all examinations, papers, laboratory work, academic transactions, and records. Students in this class must adhere to ASU's academic integrity policy. Students are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. All academic integrity violations will be reported to the New College Academic Integrity Office (AIO). The possible sanctions include but are not limited to appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course

failure due to academic dishonesty (indicated on the transcript as a grade of XE), loss of registration privileges, disqualification, and dismissal The AIO maintains records of all violations and has access to academic integrity violations committed in all other ASU college/schools.

Generative AI is permitted, with parameters

The use of AI tools and techniques on *specified* assignments (according to individual assignment descriptions) is permitted, provided that the following guidelines are followed:

- AI tools may augment the student's work, but should not be the sole basis for the assignment.
- The use of AI tools should be appropriately acknowledged and documented, with proper citations and references. For reference, see this website: How to Cite ChatGPT in APA Format.
- The ethical and social implications of using AI should be considered when deciding to use AI tools in assignments.
- Students should not use AI tools to engage in academic dishonesty or plagiarism. Students should be familiar with ASU's Academic Integrity Policy and should reach out to the instructor with any questions regarding use of generative AI on individual assignments. Additional information can be found on the Office of the University Provost's Generative AI FAQ website.

ASU Student Code of Conduct

Students are expected to follow the ASU Student Code of Conduct, especially when communicating with peers, staff, and instructors. Violations of the student code of conduct may result in withdrawal from the class.

Academic Status Reports

This course incorporates an early alert reporting system called Academic Status Reports (ASRs) to give you helpful updates throughout the semester. An ASR will let you know if you are progressing well or if there are concerns related to your class performance. Concerns may be related to missing classes, missing assignments, or the quality of your work. ASR notifications will be sent to your ASU email address and are visible on My ASU in the My Classes box. The ASR may provide recommended actions, such as meeting with your instructor, TA, or academic advisor. If you receive an ASR, don't ignore it and keep calm (it might be good news).

Read the message, follow the suggested instructions, and don't delay. Information for making an appointment with your academic advisor can be found on My ASU in the Academic Support Team box. Students should view ASRs as confirmation of good work or use them as a catalyst to make changes, seek assistance, and improve in the course.

You can learn more about ASRs on the Academic Status Report Resources page.
https://students.asu.edu/academic-status-report

Assessments

Please be aware that student scores on exams or other graded work may be used to assess program goals of degrees offered by the School of Mathematical and Natural Sciences.

Attendance/Absence Policies

In addition to the instructor's general policy on absences and missed work, excused absences and conditions for making up work include Accommodation of Religious Practices and Missed Classes Due to University-Sanctioned Activities. Students must notify their instructors of these absences as early as possible in the semester.

Copyright Infringement

All course content and materials are copyrighted materials. Students may not share outside the class, upload to online websites not approved by the instructor, sell, or distribute course content or notes taken during the conduct of the course [see Academic Affairs Manual policy 304–06: Commercial Note Taking Services and Student Code of Conduct policy 5-308 F.14 Prohibited Conduct (page 10) for more information]. This includes lectures, recorded lectures, and lectures administered and recorded using Zoom. Students must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum material that is not the student's original work unless the students first comply with all applicable copyright laws. Faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

Course/Instructor Evaluation

The course/instructor evaluation for this course will typically be conducted online 7-10 days before the last official day of classes of each semester or summer session. Your response(s) to the course/instructor is anonymous and will not be returned to your instructor until after grades have been submitted. The use of a course/instructor evaluation is an important process that allows our college to (1) help faculty improve their instruction, (2) help administrators evaluate instructional quality, (3) ensure high standards of teaching, and (4) ultimately improve instruction and student learning over time. Completing the evaluation is not required for you to pass this class and will not affect your grade, but your cooperation and participation in this process are critical. About two weeks before the class finishes, watch for an e-mail with "NCIAS Course/Instructor Evaluation" in the subject heading. The e-mail will be sent to your official ASU e-mail address.

Emergencies/Campus Power Outage

In the event of a campus power outage or other event affecting the ability of the University to deliver classes, any decision to cancel classes will be announced using the ASU emergency notification system. For this reason, it is imperative that students register with ASU's emergency notification system LiveSafe. In cases where a limited number of buildings are affected, students should check the University website and/or call the School office at (602) 543-6050.

Emergency Evacuation

In the event that an evacuation occurs during the lecture period, do the following:
- If time permits, take your personal items.
- Walk to the designated exit and down the stairwell.

- Do not use the elevators. If you are unable to walk down the stairs and require special assistance, please inform your instructor.
- Gather outside at the designated area where your instructor will take roll and account for all personnel.
- Wait for notification that it is safe to re-enter the building; if the fire alarm turns off, that does not mean it is safe to re-enter. You must wait for the "ALL CLEAR," from the fire department or appropriate ASU personnel.

It is important that any individuals who need assistance with stairs and/ or are unable to take the stairs, are identified right away, so please walk the students through the evacuation route for your classroom. In the event of an emergency evacuation, proceed to the designated area. The designated areas for the CLCC building are Fletcher Lawn (primary), and the breezeway between FAB and UCB (secondary). Students who cannot physically walk down the stairs will have to wait in the designated "Area of Refuge." **You will need to alert emergency personnel of the person(s) and their location."**

Final Exam Make-up Policy

ASU's [Final Exam Schedule](#) will be strictly followed. Exceptions to the schedule and requests for make-up examinations can be granted only by the Associate Director of the School of Mathematical and Natural Sciences for one of the following reasons: 1) religious conflict; 2) the student has more than three exams scheduled on the same day; 3) two finals are scheduled to occur at the same time. Make-up exams will NOT be given for any of the following reasons: non-refundable airline tickets, vacation plans, work schedules, weddings, family reunions, or other such activities. Students should consult the final exam schedule before making end-of-semester travel plans.

If there is a last-minute personal or medical emergency, the student may receive a grade of Incomplete and make up the final within one calendar month. The student must provide written documentation and be passing the class at the time to receive an incomplete. A signed [Request for Grade of Incomplete](#) must be submitted by the student and approved by the student's instructor and the Associate Director of the School of Mathematical and Natural Sciences.

Incomplete

A mark of "I" (incomplete) is given by the instructor when you are otherwise doing acceptable work but are unable to complete the course because of illness or other conditions beyond your control. You are required to arrange with the instructor for the completion of the course requirements. The arrangement is recorded on the [Request for Grade of Incomplete form](#). Do not re-register or pay fees to complete the course. The completion date is determined by the instructor but may not exceed one calendar year from the date the mark of "I" is recorded. When you complete the course, the instructor must submit an online grade change request. If you receive an "I" in an undergraduate course, your grade will be automatically changed to a failing grade "E" if you do not complete the course within one calendar year. If you receive an "I" in a graduate course (500-level or above) your "I" grade will become a permanent part of your transcript if you do not complete the course within one year, and you will have to reregister and pay fees to repeat the course for credit. Marks of "I" are changed to a grade of "E" (0.00) for purposes of evaluating graduation requirements for undergraduate students.

A signed [Request for Grade of Incomplete Form](#) must be submitted by the student and approved by the student's instructor and the Associate Director of the School of Mathematical and Natural Sciences prior to the last day of classes. **A grade of incomplete will NOT be awarded unless there is documented evidence of extreme personal or immediate family hardship, and the student must have a passing grade at the time of the request.** Changes in work hours or other similar personal problems will not be approved as reasons for awarding incompletes. The Associate Director of the School of Mathematical and Natural Sciences must approve any incomplete grade requests.

Grade Grievances

Any student seeking to appeal a grade must follow the following steps. This process does not address academic integrity allegations or faculty misconduct. Student grade appeals must be processed in the regular semester immediately following the issuance of the grade in dispute (by commencement for Fall or Spring semesters), regardless of whether the student is enrolled at the University. There are two stages to the grievance process: the informal process and the formal process. Each process contains a series of steps that must be followed in order. The informal process, outlined below and facilitated by the School of Mathematical and Natural Sciences, must be followed prior to escalation to the formal process:

1. A one-on-one meeting must be scheduled with the instructor. During this meeting, a student must state the reason for questioning that the grade was not given properly/in good faith. The instructor must review the matter, explain the grading procedure, and explain how the grade was determined. The student and the instructor must work toward resolution, and grade grievances should ideally be resolved at this level.
2. If the issue is unresolved, the student can appeal to the School of Math and Natural Sciences Grievances committee (MNSgrievances@asu.edu). The student must provide a written rationale and evidence that the grade was not given appropriately as well as a summary of the instructor's response/the meeting with the instructor.
3. If MNS Grievances policy do not resolve the issue, the student can appeal to the Associate Director and Director of the School of Math and Natural Sciences.
4. If the issue is not resolved at the level of the School of Math and Natural Sciences, the student can confer with the Dean's Representative in the New College of Interdisciplinary Arts and Sciences (Executive Director of Academic Services and Strategic Initiatives) who will review the case and explain the formal process to the student.

Policy against Threatening Behavior

In the classroom and out, students are required to conduct themselves in a manner that promotes an environment that is safe and conducive to learning and conducting other university-related business. All incidents and allegations of violent or threatening conduct by an ASU student will be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students. Such incidents will be dealt with in accordance with the policies and procedures described in [Section 104-02 of the Student Services Manual](#).

Potentially Offensive Content

If you find any of the content in your class offensive, please bring your concerns to the instructor immediately. If raising the issue with the instructor is problematic, these concerns should be

brought to the attention of the Director and Associate Director of the School of Mathematical and Natural Sciences.

Reasonable Accommodations for Students with Disabilities

Student Accessibility and Inclusive Learning Services (SAILS) provide information and services to students with any documented disability who are attending ASU. Individualized program strategies and recommendations are available for each student as well as current information regarding community resources. Students also may have access to specialized equipment and supportive services and should contact the instructor for accommodations necessary for course completion.

Respectful Communications

As a beacon for critical thought and the advancement of knowledge, ASU values dissenting opinions. Acknowledging that someone else's opinion matters as much as our own is the first step to creating a respectful dialogue. However, we must also distinguish between opinion, fact, and policy. Valuing and respecting those opinions that are different from our own does not mandate acquiescence or violation of policy. We expect all written, e-mail, verbal, and otherwise communications to be conducted with a respectful tone and tenor, and in compliance with established protocols and the ASU Code of Conduct.

Title IX

It is a federal law that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the University. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at ASU's website for Sexual Violence Awareness, Prevention, and Response. As mandated reporters, faculty are obligated to report any information of which they become aware regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services are available if you wish to discuss any concerns confidentially and privately.

Withdrawals

Specifically, students should be aware that non-attendance will **NOT** automatically result in being dropped from the course. Therefore, if a student does not attend class during the first week or for any extended period of time during the semester, they should not presume that they are no longer registered. **It is the student's responsibility to be aware of their registration status. Any withdrawal transaction must be completed by the deadline date in accordance to the appropriate session at the registrar's office. If not, you will still be officially enrolled and receive a grade based on your completed work.** For additional information about ASU's withdrawal policy and the possible consequences of withdrawing from a class, contact Registration Services or your academic counselor.

Table 1: Some Calendar Reminders –

	Session A	Session B	Session C
Session Start Date	1/12/2026	3/16/2026	1/12/2026
Session End Date	3/3/2026	5/1/2026	5/1/2026

	*Session B ASU Online & iCourses may end 05/05/2026; Session C finals 05/04–05/09		
Drop Deadline (No W)	1/18/2026	3/22/2026	1/25/2026
100% Tuition Refund Deadline	1/18/2026	3/22/2026	1/25/2026
Course Withdrawal Deadline	1/30/2026	4/3/2026	4/5/2026
Complete Session Withdrawal Deadline	3/3/2026	5/1/2026	5/1/2026
Martin Luther King Jr. Holiday	01/19/2026 –Classes Excused/ University Closed		
Spring Break	03/08/2026–03/15/2026 –Classes Excused/ University Open		

[ASU's Full Academic Calendar](#)

*As part of a complete session withdrawal, a student must withdraw from all classes in that session. Beginning the first day of classes, undergraduate students are required to work with a Student Retention Coordinator to facilitate the withdrawal process. Please refer to the [ASU Registrar's webpage How to Drop, Add, and Withdrawal](#).