Course Description

Introduction to linear algebra, including matrices and linear transformations, eigenvalues and eigenvectors. Content in this course is continued in MATH 430.

Course Format

In-Person, Location TBA
TuTh 2:00–3:20pm

Instructor Information

Sungju Moon, PhD

Primary Contact: Use the Inbox tool within Canvas
Office Location: Dawson 223
Phone: (702) 992-2725
Email: sungju.moon@nevadastate.edu

Instructors use the Canvas Inbox and announcements to communicate about course-specific topics. All other official University communication is conducted using Nevada State University-issued e-mail addresses (e.g., @students.nevadastate.edu) in order to comply with the Family Educational Rights and Privacy Act (FERPA). If you need assistance accessing your NS e-mail account, contact the NS Support Center at (702) 992-2400, menu option 3, or online at NS Support Center. For more about this, see the Student Responsibilities page.

Office Hours

MoWeFr 4:00–4:50pm or whenever my office door is open
Online meetings by appointment

E-mail Response Time

You can generally expect a response to emails within 24–48 hours (or slightly longer over weekends or holidays). Feedback for completed discussions, quizzes, and assignments depends on the length and complexity of the activity and could take up to 10 days. For questions on the status of a completed assignment, discussion, or test please contact me.

Required Text(s)

We will not be using a textbook in this course; however, students may be assigned some supplemental reading materials, which will be provided by the instructor.

Required Supplementary Material

Certain assignments (e.g., projects) will require having access to a linear algebra-based scientific computing software such as MATLAB or Octave. Most of the computing needs in this class will be met by a web version of Octave, Octave Online: https://octave-online.net.

Learning Outcomes

This is a first course in linear algebra with some additional materials to meet the needs of graduating data science majors. After finishing this course, you will be able to:

- Do computations involving matrices including Gauss–Jordan elimination, matrix multiplications, computation of determinants, finding eigenvalues and eigenvectors of a matrix.
- Explain using the language of vector spaces the theoretical underpinnings of linear algebra that make possible the above computations.

- Recognize real-life situations where the knowledge of linear algebra is applicable and be able to sketch out how such applications might be implemented.
- Have a basic understanding of numerical linear algebra and be able to use it in data science applications.

Class Schedule

See Page 6 of the course syllabus for the tentative course calendar.
All dates are subject to change.

Assignment Description & Due Dates

In-Class Participation (20%): Since this course is meant to be an independent study, students will actively participate in exploring the ideas fundamental to linear algebra during the in-person meetings. Students will be asked to self-evaluate their participation levels on a regular basis.

Wiki Notes (20%): Students will work together to build wiki notes (i.e., a shared LaTeX document) summarizing all the (re-)discoveries they have made during the meetings. Each week, we will review the document together to reiterate important items from it. The recommended categories to organize these wiki entries include: definitions, theorems (and proofs), examples, remarks (insights, cautions, notation, heuristics), etc.

Leftover Exercises (30%): We will occasionally run into examples that need further exploration, incomplete proofs, or simply exercises picked by the instructor. You will be asked to actively work on these "leftover" exercises by the next class meeting. You are encouraged to present your solution (you do not need to have figured out everything at this stage). If one student presents a solution, the other student will be tasked with writing it up neatly and turning it in as an assignment. If we do not have a solution by the end of the meeting, the instructor may provide additional hints and postpone the assignment to a later date.

Midterm Projects (30%): There will be 2–3 midterm projects (depending on how we manage time) showcasing some of the immediate applications of linear algebra. Details will be announced in class.

Exams

There are no exams in this course.

Late Policy

When students miss work for medical and/or personal reasons, they should access the Student Absence Notification System.

Some of the assignments in this course are of the "regular check-ups" type (weekly review of wiki notes, self-evaluations, checking in with the "leftover" exercises), for which a late policy is not applicable. The due dates for the intermediate steps to completing the midterm projects are suggestions only and students will not be penalized for not meeting these due dates as long as the final deliverable (project reports, presentations, etc) is turned in on time; however, students will not receive a passing grade without completing the major assessments, which include the completion of wiki notes and midterm projects.

Grading Criteria

Your grade will be determined by the following rubric:
(Course Point Totals)—100%

- In-Class Participation (20%)
- Wiki Notes (20%)
- Midterm Projects (30%)
- Leftover Exercises (30%)

Grading Scale (Letter Grade and Point Range):

A	93% or higher	C	73%–76.99%
A-	90%–92.99%	C-	70%–72.99%
B+	87%–89.99%	D+	67%–69.99%
B	83%–86.99%	D	63%–66.99%
B-	80%–82.99%	D-	60%–62.99%
C+	77%–79.99%	F	less than 60%

Accessing Grades and instructor feedback

To access your grades and find all of the instructor's feedback, click on Grades in the course navigation menu. Scroll through the list until you find the new graded assignment (indicated by the blue dot to the left of the assignment name). Then click on the assignment name. You will see your grade. Below it you can click on Show Rubric to see the marked up rubric. Click on the paper title if you want to download the original document. (The instructor's marks or comments will not appear on the downloaded document.) Click on the box to the right of the paper title to see the Turnitin report. Click on View Feedback to see the paper marked up with the instructor's comments/corrections in DocViewer. The instructor's feedback is on the right. Accessing Grades will take you step-by-step through how to find all instructor feedback and see the marked-up paper and rubric.

Student Responsibilities

Students are responsible for reading, understanding, and abiding by the policies listed on the Student Responsibilities page and LASB-specific policies, including, but not limited to:

- Americans with Disabilities Act (ADA) Accommodations
- Student Email Policy
- Diversity and Inclusion Statement
- Appropriate Online and Video-Conferencing Behavior
- Video- or Audio-Recording Lectures
- Withdrawing from a Course
- Academic Resources
- Student Absence Notification
- Enrollment Cancellation for Non-Attendance
- Technical Support and Minimum Technical Requirements
- Military and Veteran Students
- LASB Academic Conduct Policy

Plagiarism, cheating, and copyright infringement

Plagiarism can involve directly quoting, summarizing, or paraphrasing the work of others without specifically citing sources, or handing in work that is not your own. For more on this see the Copyright, Plagiarism, and Citing Sources page.

Cheating can involve deception about your own work or about the work of someone else, and can include unauthorized giving or receiving of information in exams or other exercises or assessments. The use of books, notes, mobile devices, or other reference materials and/or collaboration with other students is strictly prohibited on all quizzes and exams unless specific permissions have been given by the professor. Violating this rule is considered cheating. All assignments, quizzes, and exams, for both in-person and online classes, are to be completed by each student individually, unless otherwise documented by the instructor.

Copyright infringement includes sharing or posting course materials on external websites or other locations; NS instructors' course materials are their intellectual property and are protected under copyright.

Detailed explanations and examples of plagiarism, cheating, and other forms of academic misconduct can be found in the LASB Academic Conduct Policy and in the Academic Standards section of the NS Student Code of Conduct. *You are responsible for reading, understanding, and abiding by these policies.*

The grade of 0 or F may be assigned for any assignment, quiz, or exam in which plagiarism or cheating is discovered; depending on the severity of the incident (including whether the student has previous incidents), a grade of F may be assigned in the course and a Student Conduct charge may be filed. Evidence of such dishonesty will be kept on file, and will not be returned to the student. Instructors have the responsibility to report such incidents to the Dean and the NS Conduct Office. Serious penalties may be imposed, depending on the nature of the incident.

Turnitin

By taking this course, you agree that all required assignments may be submitted to Turnitin for detecting plagiarism. All submitted papers will be included as source documents in the Turnitin reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin service is subject to the Turnitin End-User License Agreement posted on the Turnitin site. If you do not agree, contact your instructor immediately.

Artificial Intelligence

Use Only With Acknowledgment. Students are allowed to use advanced automated tools (artificial intelligence or machine learning tools such as ChatGPT or Bard) on assignments in this course if that use is properly documented and credited. For example, text generated using ChatGPT version 4 (ChatGPT-4) should include a citation such as:

"ChatGPT-4. (YYYY, Month DD of query). "Text of your query." Generated using OpenAI. https://chat.openai.com/"

Material generated using other tools should follow a similar citation convention. Students are responsible for ensuring the accuracy of any information provided by an AI tool.

Source: Adapted from the University of Delaware:
https://ctal.udel.edu/advanced-automated-tools/

Student Success Resources

At some point in the semester, you may require assistance for a variety of issues. Here is a brief list of helpful resources:

- Academic Advising Center
- Academic Success Center
- Writing Center
- Student CARE Team
- Financial Aid Office
- Mental Health Counseling

The Academic Resources page has various academic resources including the academic calendar; disability accommodations; library guides; plagiarism, copyright, and citation information; and veteran concerns.

If life circumstances are making it difficult for you to succeed, please reach out to me and let me know. I am willing to work with you to devise a plan for success or make recommendations for other support services on campus. For example, I may connect you with an Academic Advisor who can develop a personalized success strategy that will keep you on track to graduate and discuss any impacts to your financial aid. You can also contact Academic Advising directly at (702) 992-2160 or at studentsuccess@nevadastate.edu.

Emergency CARE Services

Emergency CARE Services—If you are struggling with hunger, unstable housing, safety, mental health worries or any other concerns, contact case manager, Cassandra Crevling. Together, we can help meet those needs. E-mail: studentwellness@nevadastate.edu | Call: (702) 992-2514 | Website: https://nevadastate.edu/studentwellness/

Course Schedule

All Dates are Subject to Change

Date	Agenda	Deadlines[†]
Tue, Jan 16	Introduction, System of linear equations	
Thu, Jan 18	Gaussian elimination	
Tue, Jan 23	Problems: system of linear equations	
Thu, Jan 25	Vectors, linear combinations, span	
Tue, Jan 30	Network applications	Assign Project 1
Thu, Feb 1	TFAE theorem	
Tue, Feb 6	Linear independence, linear transformation	Self Evaluation 1
Thu, Feb 8	Matrix operations	Project 1 Draft
Tue, Feb 13	Invertibility	
Thu, Feb 15	Problems: matarix operations	
Tue, Feb 20	Project 1 Presentations	Project 1 due
Thu, Feb 22	Applications to graphics	Assign Project 2
Tue, Feb 27	Determinants: computation	
Thu, Feb 29	Determinants: theory	
Tue, Mar 5	Cramer's rule	Project 2 Outline
Thu, Mar 7	Problems: Determinants	
Tue, Mar 12	Spring Break	Self-Evaluation 2
Thu, Mar 14	Spring Break	
Tue, Mar 19	Project 2 Presentations	
Thu, Mar 21	Vector spaces	Project 2 Due
Tue, Mar 26	Bases and coordinate systems	
Thu, Mar 28	Change of coordinates	
Tue, Apr 2	Projections and norms	Self Evaluation 3
Thu, Apr 4	Applications of numerical linear algebra	Assign Project 3
Tue, Apr 9	Problems: vector spaces	
Thu, Apr 11	Eigenvalues & eigenvectors	
Tue, Apr 16	Characteristic equations	Project 3 Outline
Thu, Apr 18	Diagonalization: compuation	
Tue, Apr 23	Diagonalization: theory	
Thu, Apr 25	Problems: eigenvalues	Project 3 Draft
Tue, Apr 30	Complex eigenvalues	Self Evaluation 4
Thu, May 2	Project 3 Presentations	Project 3 Due

[†]Does not include weekly wiki note check ups, leftover exercises