Course Syllabus

Spring 2026

MATH 389 Special Topics

Advanced Topics in Algebra

Tu 11:00–12:20, CEB 232

Th 11:00–12:20, CEB 233

Tuesdays are dedicated to Abstract Algebra, and Thursdays are dedicated to Linear Algebra.

Instructor's Information

Name: Nandita Sahajpal & Sungju Moon
Primary Contact: Use the [Inbox tool](#) within Canvas.
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**Please note that all official University communication is conducted using NS-issued email addresses (e.g., @students.nevadastate.edu) in order to comply with the Family Educational Rights and Privacy Act (FERPA). If you need assistance finding or accessing your NS email account, please see the relevant section on the [LASB Course Policies and Guidelines](#) page.
Office Location: Dawson 223 (Moon), Dawson 210 (Sahajpal)

Office Hours: Prof. Sungju Moon: Tuesday and Wednesday: 12:30–1:30 PM,

Prof. Nandita Sahajpal : Mondays: 10:00 AM - 11:00 AM, Wednesdays: 11:00 AM - 12:00 PM,   Thursdays: 11:30 AM - 12:30 PM

Email & Classroom 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.

Course Description

Covers a specialized topic in Mathematics. Course may be repeated for up to 6 credits. Pre-requisite(s): Instructor approval.

Required Text(s) & Materials

Title: *Visual Group Theory*
Author: *Nathan Carter*

[Youtube Playlist](#)

You can buy your textbook from the [Nevada State University Bookstore](#), either online or at the Rogers Student Center physical location.

Optional Supplemental Materials:

- Trefethen, L. N. and Bau, D. B., *Numerical Linear Algebra*, SIAM
- Axler, S., *Linear Algebra Done Right*, 4ed, Springer

Course Learning Outcomes

This course formally combines the two secondary-sequence offerings in Abstract Algebra and Linear Algebra. It is designed so that students can engage meaningfully with both portions of the course, regardless of their prior background in algebra.
Part 1: Abstract Algebra - Visual Group Theory
This part focuses on the core ideas of group theory, the mathematics of actions and their combinations. Using examples such as rotations, reflections, and card shuffles, we uncover the defining features of a group: a do-nothing action, the ability to undo every action, and consistent rules for combining them. These principles expose the structures that appear across mathematics, from geometry to number theory. Emphasis will be on proof writing, conceptual

understanding, and visualization of algebraic structures.
Students can expect regular problem-solving, in-class presentations, and weekly assignments to strengthen their reasoning and proof skills.
Part 2: Applied Linear Algebra
This part builds on concepts first introduced in Linear Algebra I (MATH 330) with a focus on applications and modeling. Students will complete six numerical projects illustrating how linear algebra drives problems such as infectious disease modeling, the PageRank algorithm, linguistic analysis, nonlinear dynamics, and climate data. These projects introduce widely used numerical methods, including:

- matrix decomposition methods (including singular value decomposition)
- least squares fitting and regression analysis
- linear stability and bifurcation analysis
- principal component analysis and data assimilation (including Kalman filter)

Students can expect to gain proficiency in implementing algorithms, analyzing real data, and connecting linear algebra with dynamic systems and modern data science applications.

Class Schedule

Class schedule for the Linear Algebra Portion (Thursdays, 11:00 AM -12:20 PM) [download]

Class Schedule for Abstract Algebra Portion (Tuesdays, 11:00 AM -12:20 PM)

Assignment Description & Due Dates

Your active engagement, collaboration, and reflective learning are key to success in this course. Below are the assignment types, expectations, and grading breakdown:

Academic Integrity and AI Use:

The use of AI tools or external solution sources is **not permitted** for any assignment. All work must be original and based only on methods discussed in class. Any use of AI-generated content or other external sources constitutes plagiarism and may result in a failing grade for the assignment or an **F in the course**, in accordance with university policy.

Assignments for the Abstract Algebra Portion:

For detailed information about assignments and how the course is structured, **please read this document** carefully. I have also included a **checklist** you can use each week to stay on track.

The textbook, instructor, and any other resources provided by the instructor on the Canvas page must be your **only** sources. Any additional source you believe may be helpful must be approved by the instructor **in advance** before it may be used in completing the assignment.

1. Pre-Class Assignments (10% of the final grade)

What to do each week (before class):
- Watch the assigned videos.

- Read the assigned textbook sections.

- Take organized notes with headings such as:
  Main Ideas, Definitions, Examples, Theorems, Proofs.

- Submit a short written summary describing:

  - What was covered,

  - What you learned, and

  - Any questions or insights?

In class:
- Be prepared to show your notes and any worked examples.

- No notes = no credit for that week.

Goal: Arrive prepared to actively participate in problem-solving and discussion.

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2. In-Class Discussion, Problem Solving, and Participation (15% of the final grade)

What is expected:

- Work collaboratively on assigned problems.

- Engage in discussion by asking and answering questions.

- Be prepared to present solutions when called upon.

Presentations:

- You must present **detailed solutions at least twice** during the semester.

- Presentations must be clear, complete, and well-organized.

- You must volunteer **one week in advance** to present a selected problem.

Goal: Deepen understanding through collaboration and explanation.

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3. Weekly Reflection (5% of the final grade)

What to submit:

- A short reflection using the provided LaTeX template.

- Due **before the next class period**.

Your reflection must address:

- Your pre-class preparation, and

- Your in-class participation.

Goal: Reflect on your learning, identify gaps, and plan next steps.

Assignments for the Linear Algebra Portion

This portion will consist of six lab assignments. Each lab topic will typically be covered over the course of two weeks during Thursday class meetings. The lab assignments will require using scientific computing software such as Octave or MATLAB. Although most activities will be introduced in class, each lab assignment will require a final lab report accompanied by well-commented, runnable code. Students are encouraged to communicate and collaborate on the lab assignments, but each student must submit their own report. You will have the opportunity to polish your reports and run additional experiments based on instructor feedback for inclusion in your final portfolio.

Final Portfolio

The portfolio is a cumulative assignment consisting of three required parts: **Part 1** Abstract Algebra, **Part 2** Linear Algebra, and **Part 3** Extracurricular Activities. While all three parts must be completed, you may choose to focus on either Abstract Algebra or Linear Algebra based on your interests and background. You can discuss your intended focus with your instructor or let your performance guide this determination. If you're uncertain which area to emphasize, aim to do well in both. Your portfolio should be submitted as a single PDF document with all three parts clearly labeled. A more detailed portfolio guide with specific expectations and formatting recommendations may be provided later in the semester.

Instructions for Portfolio Part 1, Abstract Algebra:

You will submit a **Final Portfolio** that represents your best, revised work from the semester. The Final Portfolio may be submitted as a neatly organized handwritten document or as a typed document.

Requirements:

- Revised pre-class notes that incorporate instructor feedback

- Complete and clearly written solutions to assigned problems

- Proofs or well-structured proof sketches for all key theorems

- Diagrams and accompanying explanations that aid understanding

In addition, include a clearly labeled **revision index** that documents and summarizes all substantive changes made in response to instructor feedback.

Instructions for Portfolio Part 2, Applied Linear Algebra:

Submit revised versions of your **lab reports** for Labs 1–5, incorporating the feedback you have received throughout the semester (you will not have sufficient time to revise Lab 6, so this is excluded from the final portfolio).

Requirements:

- Each lab report must have a clear, descriptive title
- Follow the detailed instructions for lab report format and content provided when each lab was originally assigned
- Demonstrate substantive revisions based on instructor feedback
- Attach a ~1 page note at the end, summarizing the major changes you have made to your reports.

Instructions for Portfolio Part 3, Extracurricular Activities:

Throughout the semester, you will participate in enrichment activities beyond the core course content, such as mathematics colloquia, reading reflections, and other academic experiences. A separate guide detailing eligible extracurricular activities is available [here]. You must complete at least 3 activities of distinct types from the approved list. If you wish to propose an activity not on this list, please consult the instructors for approval.

Mid-Semester Check-In

You will complete a mid-semester check-in where you summarize the activities you have completed thus far and outline your plans for the remainder of the semester.

Final Portfolio Submission Requirements

For Part 3 of your Final Portfolio, submit a comprehensive summary of your extracurricular activities along with supporting artifacts. Structure your submission as follows:

1. **Narrative Summary** (one paragraph): Provide an overview of your activities and what you gained from them
2. **Supporting Materials**: Include artifacts or documentation for each activity completed

Exam Description & Due Dates

There are no exams in this course.

Late Work Policy & Attendance Expectations

If you experience a serious or ongoing medical or extenuating circumstance (e.g., a major medical event, hospitalization, family emergency, or any situation that significantly impacts your ability to attend class for an extended period), please report it through the Student Absence Notification System (SANS).
SANS is not intended for one-time absences, brief illnesses, or situations where you can communicate directly with your instructor. Once a SANS report is submitted, it will be reviewed, and both you and your instructor will be notified. Your instructor will then determine if and how missed or late work can be addressed.
All assignments are due by the posted deadline. No late work will be accepted unless students have approved accommodations or excusable circumstances arranged with the instructor.

Grading Criteria

Abstract Algebra assignments (PreClass Activities, In-Class Activities, Main Notebook) - 30%

Linear Algebra assignments (labs) - 30%

Final Portfolio - 40% (Parts 1 & 2 Abstract/Linear Algebra Portfolio 30%; Part 3 Extracurricular Activities 10%)

Grading Scale (Letter Grade and Point Range):

A 93% or higher

A- 90%-92.99%

B+ 87%-89.99%

B 83%-86.99%

B- 80%-82.99%

C+ 77%-79.99%

C 73%-76.99%

C- 70%-72.99%

D+ 67%-69.99%

D 63%-66.99%

D- 60%-62.99%

F less than 60%

Accessing Grades and Instructor Feedback: To access your grades and find the instructor's feedback, click on Grades in the left 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.

Artificial Intelligence (AI) Policy

WHAT IS AI?

AI tools are applications and other generative technologies capable of producing content (e.g., generating, summarizing), offering feedback (e.g., revising, translating), researching, assisting with coding, or other tasks typically done by humans.
Examples include, but are not limited to, ChatGPT, Grammarly, Bing Copilot, Google Gemini, Grok, Answers.AI, Quillbot, Claude AI, DeepL, DeepAI, DALL-E, etc.

AI TOOLS BANNED ON STATE-OWNED DEVICES

The State of Nevada has banned some AI tools (and other technology) due to security or intellectual property concerns. You cannot use these tools on University-owned computers or other devices:
• Grammarly (public version)
• DeepSeek AI
The State updates the banned technology list occasionally, so other tools may be added. You are responsible for checking the most updated list to ensure you are not using any banned tools on state-owned devices.

AI USE POLICY FOR THIS COURSE

Prohibited Uses. As a student in this course, you are not allowed to use AI on assignments in the following ways:

- Genenating full essays, video summaries, reflections, or academic papers
- Generating your class notebook or summary materials
- Generating answers for homework assignments or suggested problems
- Submitting AI-created code in programming assignments
- Generating plots and graphs for assignments and projects

Permitted Uses. You are allowed to use AI in the following ways:

- Checking grammar and spelling (with AI attribution)
- Brainstorming or outlining ideas for papers or projects (with AI attribution and instructor permission)
- Research assistance or finding sources (with AI attribution and instructor permission)
- Converting from one programming language to another for testing purposes (with AI attribution)
- Generating visualizations or mock data for your own use (not for submission)

If you are unsure how AI can be used for a specific assignment, talk to the instructor before you get started

AI CITATION

This course does not require a specific citation style. The example below, in AMS style, may be used for AI attribution:

[1] OpenAI ChatGPT-version chat response to prompt "Your Prompt Goes Here", 2026.

In-text citation example: "...according to ChatGPT [1]..."

CONSEQUENCES FOR MISUSE

Misuse of AI may result in plagiarism or academic misconduct penalties outlined in the NS Student Code of Conduct and/or the LASB Academic Conduct Policy (found under Resources & Policies). Continued misuse of AI in coursework or across courses will result in escalating consequences based on the severity and frequency of the violation, which could include receiving an F in the course, academic probation, suspension, or expulsion.

LASB Course Policies & Guidelines

All courses in the School of Liberal Arts, Sciences, and Business (LASB) are subject to LASB course policies and guidelines. You are responsible for reading, understanding, and abiding by these policies and guidelines.

Student Support & Resources

Academic Success Center (Tutoring)

The [Academic Success Center (ASC)](#) offers a range of services including free one-on-one and group tutoring sessions where students can review and practice course concepts and relevant study/test taking strategies with trained peer tutors.

NetTutor Online Tutoring. Did you know you can receive free on-demand academic support at your convenience when the ASC is closed? You can submit a question or request a drop-in session for a specific subject with an e-instructor. The majority of NetTutor e-instructors have a Master's or Ph.D. in the field. You can access NetTutor through Canvas by selecting the "NetTutor Online Tutoring" on the left-side navigation bar in each of your courses.

Writing Center

Supporting every NS student's ability to improve their process and product, the [Writing Center](#) provides trained readers for all writers, all projects, in all disciplines, and during all stages.

Academic Advising Center

The Academic Advising Center is a dedicated team of Advisors committed to your academic success at NS. By providing the right advice and guidance, we help students meet their educational and personal objectives. Please visit [Academic Advising Center](#)

Scorpion Success Network

If the instructor determines your performance in this class is placing you at academic risk, you may be referred to a member of the Academic Advising Center. An Academic Advisor will work with you to address issues and develop a student success strategy. Regardless of whether a referral has or has not been made, you are ultimately responsible for tracking your own progress in this course. If you would like to meet with an Advisor regarding any academic struggles you are experiencing, please contact Academic Advising at 702-992-2160 or at [studentsuccess@nevadastate.edu.](mailto:studentsuccess@nevadastate.edu)

Student Wellness Services

[Student Wellness Services](#) If you are struggling with hunger, unstable housing, safety, mental health worries, or ANY other concerns, contact Student Wellness. Email: studentwellness@nevadastate.edu | Call 702-992-2514

Disability Resources

At Nevada State University, we recognize our responsibility and embrace the opportunity to meet the unique educational needs of students with documented disabilities. The staff of the [Disability Resource Center (DRC)](#) is dedicated to providing a coordinated program of support services for students qualifying with disabilities under the Americans with Disabilities Act (ADA) and Section 504 Guidelines. Our mission is to ensure that all students qualifying with disabilities have equal access to participate in, contribute to, and benefit from all university programs, classes and activities.

Confidential, sensitive, and individualized services are provided free of charge, on a case-by-case basis.

Any student who believes s/he may need accommodations, based on the impact of a documented disability, should contact the DRC Office to speak privately with the Director of the DRC about specific needs. To make an appointment, please contact the DRC office at 702-992-2180 or by email at [drc@nevadastate.edu.](mailto:drc@nevadastate.edu)

Veteran Concerns

If you are a veteran who is struggling academically or have concerns please contact the DRC office at 702-992-2180 or by email at [drc@nevadastate.edu.](mailto:drc@nevadastate.edu)

STAR (Student Transition and Retention)

STAR (Student Transition and Retention) is the cornerstone of the student experience at Nevada State University. Our mission is to provide every Nevada State student with continuous support throughout their academic journey. Meet with our team to navigate campus resources, find a student community, develop time management skills and set and achieve personal and academic goals. Click on [Student Transition and Retention](#).