MATH 2568: LINEAR ALGEBRA

Instructor. Sachin Gautam. Office MW 640. `gautam.42@osu.edu`

Office hours. Thursdays 3-5PM via Zoom. Or, by appointment.

Zoom information. Available on Carmen. This class is scheduled to meet in-person. We will have office hours online via Zoom. The same Zoom meeting id/passcode will be used in the following events.

- University decides to suspend in-person classes. Or, the instructor gets sick (you will be notified via e-mail/carmen).
- If you get sick, please do not come to in-person class. Just let me know and we can schedule to meet online and go over the material covered in class.

Course Information

Homepage. `https://people.math.osu.edu/gautam.42/S22/LA/linear.html`
`https://carmen.osu.edu`

Class time and place. MWF 11.30am-12.25pm. Scott Lab E125.

Textbook. L.W. Johnson, R.D. Riess, J.T. Arnold: *Introduction to Linear Algebra*, 5th edition, Pearson.

Grading. The grade will be based on homework assignments (15%), three midterms (20% each), and the final exam (25%). Your course letter grade will then be determined based on: (1) your **course percentile** (your relative rank among your peers), and (2) my determination of the overall class performance level. A reasonable percentile-to-letter-grade **estimate** is the following:

Letter grade	A	A-	B+	B	B-	C+	C	C-	D	E
Percentile range	100-90	90-85	85-80	80-70	70-65	65-60	60-40	40-35	35-20	20-0

If your degree program requires a certain letter grade in this course, it is a good idea to think about the likelihood of you ending up in each of the above ranges above early in this semester.

Homework submissions: You will be submitting your homework assignments through Carmen, and **in pdf format**. This document can be generated in two ways which will not cause major disruptions to what you have been doing for past courses. For those of you who have access to a tablet, this should be simple (e.g. by using Notability on an Ipad). Otherwise, you can scan your handwritten solutions with your smartphone and generate a pdf. There are several apps and tutorials online for this, see for example:
`https://edu.gcfglobal.org/en/mobile-device-tips/how-to-scan-documents-with-a-smartphone/1/`

Homework: Homework is an essential component of this course. Problems will be assigned from the course's textbook. **The goal of each homework set is to help you understand the material and to prepare you for the tests.** It is thus imperative that you start working on

each assignment as soon as we view the material in class. Take time to understand the questions and think about how to solve each problem before seeking help from the instructors and your class-mates. Feel free to post questions on Carmen discussion board if you are stuck on a problem.

You are strongly encouraged to discuss the problems with me and your classmates, but your write ups must be your own. If you use other people's ideas, including from an online source, you must state this explicitly. Active participation on Carmen discussion forum will contribute towards your homework grade.

There will be a total of 11 homeworks this semester (see the course schedule for due dates). Each homework will be graded for correctness and clarity of explanations. Only three problems from each set will be graded. Each homework set will be worth 20 points (5 points per problem graded plus 5 extra points for completion). **No late homework will be accepted without medical excuse, but the lowest score will be dropped.**

Exams: There will be four exams: three midterms and one final exam.

Midterm 1:	Monday February 7, 2022.
	Topics: §$1.1 - 1.3, 1.5 - 1.7, 1.9$.
Midterm 2:	Monday March 7, 2022.
	Topics: §$2.1 - 2.4, 3.1 - 3.7$.
Midterm 3:	Monday April 11, 2022.
	Topics: §$5.1 - 5.4, 5.7 - 5.9, 6.1 - 6.4$.
Final:	Friday April 29, 2022 (12-1.45PM).
	Topics: cumulative, focused on §$4.1 - 4.7$.

Course content

The course will be divided into four parts (covering Chapters 1 through 6 of the textbook). In the first part, we will study matrices and linear systems of equations. In the second part, we will review vectors in the plane and in space, and extend this to higher dimensions. We will study the notion of a vector space in $\mathbb{R}^n$, subspaces, linear independence, dimension, bases of subspaces, orthonormal bases, and linear maps. In the third part, we will work with abstract vector spaces, and extend the constructions done for $\mathbb{R}^n$ to the abstract setting. We will also discuss determinants of square matrices and their properties. In the last part of the course we will discuss the notion of eigenvalues and eigenvectors, both over real and complex numbers. A detailed list of topics is given below.

COURSE SCHEDULE

The following schedule is tentative only. You will be notified of any changes via email and Carmen. The most recent version of this syllabus will remain available at
https://people.math.osu.edu/gautam.42/S22/LA/syllabus.pdf

Week	Topics	Homework
1. 1/10-14	§1.1, 1.2	HW1 due on 1/21
January 17 Monday - Martin Luther King day, no class		
2. 1/17-21	§1.2, 1.3	HW2 due on 1/28
3. 1/24-28	§1.5, 1.6, 1.9	HW3 due on 2/4
4. 2/1-5	§1.7, 2.1, 2.2	No homework
February 4. Last day to drop without W grade		
Mid term 1 on Monday February 7.		
5. 2/7-11	§2.3, 2.4	HW4 due on 2/18
6. 2/14-18	§3.1–3.4	HW5 due on 2/25
7. 2/21-25	§3.5, 3.6	HW6 due on 3/4
8. 2/28-3/4	§3.7, 5.1, 5.2	No homework
Mid term 2 on Monday March 7.		
9. 3/7-11	§5.3, 5.4, 5.7	HW7 due on 3/25
March 14-18 Spring Break. No classes		
March 25. Last day to drop without petition		
10. 3/21-25	§5.7–5.9	HW8 due on 4/1
11. 3/28-4/1	§6.1–6.3	HW9 due on 4/8
12. 4/4-8	§6.4, 4.1, 4.2	No homework
Mid term 3 on Monday April 11.		
13. 4/11-15	§4.4, 4.5, 4.7	HW10 due on 4/20 **Wednesday**
14. 4/18-22	§4.7, 4.6	HW11 due on 4/25 **Monday**
April 25. Review. Last day of classes.		
Final exam on April 29 Friday 12-1.45.		

Course technology

For office hours, you should be able to connect to CarmenZoom with audio, video and chat participation. Course annoncements will be made through Carmen. **It is strongly encouraged that you connect to Carmen regularly (at least three times a week).**

If you are concerned about privacy, you are welcome to use the virtual background feature provided by Zoom. For help setting up your personal background see:

https://support.zoom.us/hc/en-us/articles/210707503-Virtual-Background

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at

https://ocio.osu.edu/help/hours.

Support for urgent issues is available 24x7.

- *Self-Service and Chat support:* http://ocio.osu.edu/selfservice
- *Email:* 8help@osu.edu;   *Phone:* 614-688-HELP (4357);   *TDD:* 614-688-8743.

Health and safety policies

All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (see https://safeandhealthy.osu.edu), which includes following university mask policies. Non-compliance will be warned first and disciplinary actions will be taken for repeated offenses. You must self-isolate if running a fever or in other ways symptomatic.

Face masks must be worn in indoor settings, including, but not limited to: classrooms, residence halls, conference rooms, shared office spaces, hallways, buses, shared vehicles and common areas such as lobbies, study spaces and laundry facilities on all Ohio State campuses.

General policies

Academic Misconduct Statement: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-48.7). For additional information, see the Code of Student Conduct at http://studentlife.osu.edu/csc/.

Statement on Title IX: Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race).If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at http://titleix.osu.edu or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu

Disability Statement: The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services. If

you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; http://www.ods.osu.edu/; 098 Baker Hall, 113 W. 12th Avenue.

Your mental health: As a student you may experience a range of issues that can cause barriers to learning such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting https://ccs.osu.edu or calling 614- 292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766. Emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at https://suicidepreventionlifeline.org