

Fall 2024, Math 524: Linear Algebra

Lecture 4-5:15 PM MW, Classroom E-300
(Sometimes lectures use Zoom <https://SDSU.zoom.us/j/8161233359>)

Office Hours 1-2 PM WM in Room GMCS 575
(Sometimes office hours in Zoom: <https://SDSU.zoom.us/j/84229680588>)

Instructor: Professor Samuel Shen (*Call me Sam*) Office: GMCS575
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LAND ACKNOWLEDGMENT

For millennia, the Kumeyaay people have been a part of this land. This land has nourished, healed, protected and embraced them for many generations in a relationship of balance and harmony. As members of the San Diego State University community, we acknowledge this legacy. We promote this balance and harmony. We find inspiration from this land, the land of the Kumeyaay.

Textbook: *“Interactive Linear Algebra with R and Python”* Lecture notes authored by Samuel Shen. The lecture notes will be posted on Canvas, available to students for free.

Prerequisites: Mathematics 245 and either 254 or 342A with a grade of C (2.0) or better in each course.

Topics covered in this course: Vector spaces, linear transformations, orthogonality, eigenvalues and eigenvectors, normal forms for complex matrices, positive definite matrices, visualization of matrices, singular value decomposition, matrices for data science, matrices for statistics, matrices for machine learning, congruence, and R coding.

Grading Policy:

The final grades for this class will be determined as follows:

Homework assignments 30%

Midterm exam (Oct 16/Wednesday) 16%

[The midterm will be a take home exam. The Canvas submission deadline is 11:59 PM of next day.]

Research project report (due Dec 4/Wed) 11%

Class attendance (8%) and discussion (5%) 13%

Final exam (3:30 PM Dec 16/Mon) 30%

[The final is also a take home, and the Canvas submission deadline is 11:59 PM of next day. The final covers all the materials taught in the entire semester.]

Total----- 100%

Class Attendance and Discussion:

The students must attend all classes and submit their “learning share” via the Canvas Discussion. You share your feelings about math modeling with

the entire class and me. Your learning share can be about the materials we have discussed in class. You may begin with “Sam talked about SVD in class today. I never knew ... I can use it to ...” **Minimum ten (10) Discussion submissions are required for each student to earn the 5% credit.** Each submission must have more than 100 words and at least one figure, drawn by your hand or computer, a photo, or another source. You can also use formulas. Other students and I can comment on your sharing, but the comments do not count toward the total of ten.

A student can be absent three times due to various emergency cases without deducting from the 8% attendance credit. Each additional absence will result in a deduction of 1%.

Computing: Students are required to bring a laptop computer to each class. R will be the computer program used for this course and will be taught in class from the beginning. R and RStudio are free and can be downloaded and installed easily for either PC or Mac. Please install R first and then RStudio. You must install both. YouTube R tutorials can be found from <https://climatestatistics.sdsu.edu/main/public.html#>

Note-taking: Each student should build computer portfolio/folder for this class. The folder should include the pdf textbook, references, exam preparation materials, research project materials, R codes, and datasets. Students should take class notes either on paper or computer.

Learning outcome: Students are expected to master the basic concept of mathematical modeling in science and engineering. Students will be able to develop and understand introductory mathematical models. They will also be able to solve the models analytically or numerically and visualize the modeling results by R code. They will master basic principles of model sensitivity, model validation by observed data, and model revision for improvements. They can interpret their math model and its results. Students can write a linear algebra consulting report for a problem with practical applications, high-quality tables, figures, and visualization movies. Students will be able to convey the mathematical model contributions from people of color and understand the importance of equity, inclusion, and diversity. They can work in a diverse environment and technically consider cultural and social needs.

DEI Statements: Racism has no place in this class. All the students and the instructor are equal and respected. You are all invited to discuss linear algebra topics in classes.

Resources and Information for Students

Use of Canvas

Canvas will be used to disseminate and collect information related to the course. Student support for Canvas is provided by the Library Computing Hub, located on the 2nd floor of Love Library. They can be reached at 619-594-3189 or hub@mail.sdsu.edu

Students with Disabilities

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. You can also learn more about the services provided by visiting the [Student Disability Services](#) website. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services. Your cooperation is appreciated.

Academic Honesty

The University adheres to a strict policy prohibiting cheating and plagiarism. Examples of academic dishonesty include but are not limited to:

- copying, in part or in whole, from another's test or other examination;
- obtaining copies of a test, an examination, or other course material without the permission of the instructor;
- collaborating with another or others in work to be presented without the permission of the instructor;
- falsifying records, laboratory work, or other course data;
- submitting work previously presented in another course, if contrary to the rules of the course;
- altering or interfering with grading procedures;
- assisting another student in any of the above;
- using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work);
- copying and pasting work from an online or offline source directly and calling it your own;
- using information you find from an online or offline source without giving the author credit;
- replacing words or phrases from another source and inserting your own words or phrases.

The California State University system requires instructors to report all instances of academic misconduct to the Center for Student Rights and Responsibilities. Academic dishonesty will result in disciplinary review by the University and may lead to probation, suspension, or expulsion. Instructors may also, at their discretion, penalize student grades on any assignment or assessment discovered to have been produced in an academically dishonest manner.

Academic resources for students

A complete list of all academic support services--including the [Writing Center](#) and [Math Learning Center](#). [Counseling and Psychological Services \(619-594-5220\)](#) offers confidential

counseling services by licensed therapists; you can Live Chat with a counselor at <https://www.optumsandiego.com/content/sandiego/en/access---crisis-line.html> 4:00pm and 10:00pm, or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.

Sexual violence / Title IX mandated reporting

As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I am a mandated reporter in my role as an SDSU employee. It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep the information you share private to the greatest extent possible. However, I am required to share information regarding sexual violence on SDSU's campus with the Title IX coordinator, Jessica Rentto 619-594-6017. She (or her designee) will contact you to let you know about accommodations and support services at SDSU and possibilities for holding accountable the person who harmed you. Know that you will not be forced to share information you do not wish to disclose and your level of involvement will be your choice. If you do not want the Title IX Officer notified, instead of disclosing this information to your instructor, you can speak confidentially with the following people on campus and in the community. They can connect you with support services and discuss options for pursuing a University or criminal investigation. Sexual Violence Victim Advocate 619-594-0210 or Counseling and Psychological Services 619-594-5220, psycserv@sdsu.edu. For more information regarding your university rights and options as a survivor of sexual misconduct or sexual violence, please visit titleix.sdsu.edu or sdsutalks.sdsu.edu.

Classroom Conduct Standards

SDSU students are expected to abide by the terms of the Student Conduct Code in classrooms and other instructional settings. Prohibited conduct includes:

- Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.
- Participating in an activity that substantially and materially disrupts the normal operations of the University or infringes on the rights of members of the University community.
- Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.
- Conduct that threatens or endangers the health or safety of any person within or related to the University community, including
 - physical abuse, threats, intimidation, or harassment.
 - sexual misconduct.

Violation of these standards will result in referral to appropriate campus authorities.

Medical-related absences

Students are instructed to contact their professor/instructor/coach in the event they need to miss class, etc. due to an illness, injury or emergency. All decisions about the impact of an absence, as well as any arrangements for making up work, rest with the instructors. [Student Health Services](#) (SHS) does not provide medical excuses for short-term absences due to illness or injury. When a medical-related absence persists beyond five days, SHS will work with students to provide appropriate documentation. When a student is hospitalized or has a serious, ongoing illness or injury, SHS will, at the student's request and with the student's consent, communicate with the student's instructors via the Vice President for Student Affairs and may communicate with the student's Assistant Dean and/or the [Student Ability Success Center](#).

SDSU Economic Crisis Response Team

If you or a friend are experiencing food or housing insecurity, or any unforeseen financial crisis, visit https://sacd.sdsu.edu/ecrt?utm_source=www&utm_medium=redirect&utm_campaign=ecrt, email ecrt@sdsu.edu, or walk-in to Well-being & Health Promotion on the 3rd floor of Calpulli Center.