

University of the Pacific

Linear Algebra for Data Science

Instructor: Dr. Anahita Zarei

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Schedule: We will have 2 different weeks: Live and Online. In “Live” weeks (Weeks 1, 3, 5, 6, 8, and 10), we meet on Saturdays in San Francisco at the University of the Pacific room 136C from 1:00-3:00 pm. We will also be meeting online on Tuesdays from 6:00-8:00 pm via WebEx. In “Online” weeks (Weeks 2, 4, 7, and 9), we will not meet in San Francisco. We will only be meeting online on Wednesdays from 6:00-8:00 pm via WebEx.

Textbook: “Linear Algebra and Its Applications” by David Lay, available on Pearson’s MyLab

Course Description: Linear algebra is the generalized study of solutions to systems of linear equations. This course will focus on developing a conceptual understanding of computational tools from linear algebra which are frequently employed in the analysis of data. These tools include formulating linear systems as matrixvector equations, solving systems of simultaneous equations using technology, performing basic computations involving matrix algebra, solving eigenvalueeigenvector problems using technology, diagonalization, and orthogonal projections. The use of software to perform computations will be emphasized.

Topics Covered:

1. Matrices and vectors
2. Matrix algebra
3. Introduction to systems of linear equations
4. Vector dot and cross product
5. Orthogonal matrices and projections
6. Least Squares
7. Eigenvalues, eigenvectors and applications
8. Principal component analysis
9. Symmetric Matrices
10. Singular Value Decomposition

Course Learning Objectives: Upon completion of this course students should be able to

1. Translate a scenario or problem, stated in words, into a mathematical model.
2. Solve mathematical problems using appropriate methods. These methods include the use of algorithms performed by hand and the use of appropriate software.
3. Interpret a mathematical solution in a way that is understandable to a layperson.
4. Convey solutions and the use of mathematical models clearly.
5. State and use theorems and concepts of Linear Algebra.

Assignments: The objective of the assignments is to provide you the opportunity to obtain a deeper understanding of the material and to see applications of the concepts discussed in lectures. There are two types of homework assignments.

1. Pearson's MyLab Assignments. You have one week to do these assignments and will be working on these individually. They are due on Sunday nights of odd weeks at 11:30 p.m..
2. Programming Assignments. You have two weeks to do these assignments and will be working on these in groups. They are due on Sunday nights of even weeks at 11:30 p.m.. You need to turn these assignments on Canvas.

Late assignments will not be accepted.

Participation: You're expected to participate in class and WebEx discussions and contribute to weekly group assignments. Your participation grade will be based on self and peer evaluations on each group assignment and instructor assessment.

Mid-term and Final Exams: There will be a one hour and 45minute exams on the the 5th and 10th week. Both exams will be proctored inclass. As such all students must attend class on these days.

There will be no makeups.

Grading: The final grade is calculated based on the following weightings:

- Assignments: 40%
- Participation: 10%
- Mid-term exam: 25%
- Final exam: 25%

The final grades will be assigned on a curve.

Continuation & Completion Policy: A grade of C or above is required on each course in order to pass. As students are required to pass all courses within the overall program in order to graduate, failure to achieve a passing grade in any one course will result in the student's inability to continue.

Collection of Work for Assessment: Student work may be retained to assess how course learning objectives are being met and for accreditation purposes.

Attendance Policy: Students are expected to attend all classroom sessions in person. Students who are unable to make any required session for unavoidable reasons must inform their instructor and gain approval for their impending absence in advance. Students are expected to make up the material covered when they are absent, and they are responsible for being aware of any announcements made during their absence(s).

Honor Code: The University Honor Codes states, “The University Honor Code is an essential element in academic integrity. It is a violation of the Honor Code to give or receive information from another student during an examination, use unauthorized sources for an examination or paper, or submit all or part of someone else’s work or ideas as one’s own.” Note: The full text of the University’s Academic Honesty Policy can be found at <http://web.pacific.edu/x30642.xml>.

The School of Engineering and Computer Science holds all of its students to a strict standard of academic integrity. In the case of a suspected violation of the University academic honor code, the faculty member will evaluate the alleged infraction and may take a range of actions up to and as severe as submitting an “F” or “No credit” for the course. The faculty member will also report it immediately to both the chair of the department, the School Assistant Dean’s office, and the Office of Student Conduct and Community Standards. The Assistant Dean’s Office and the Office of Judicial Affairs may pursue further sanctions, up to and as severe as disqualification from the University, based in part on the seriousness of the incident and any prior violations. Students may also be prevented from dropping or withdrawing from the course, even if the deadline to do so has not expired.

Support for Students with Disabilities: If you are a student with a disability who requires accommodations, please contact the Director of the Office of Services for Students with Disabilities (SSD) for information on how to obtain an Accommodations Request Letter. Requests are handled on a casebycase basis. To initiate the process, please contact the SSD Director by phone at (209)9463221 or by email at dnuss@pacific.edu. To ensure timeliness of services, it is preferable that you obtain the accommodation letter(s) from the Office of SSD at the start of the semester or earlier. After the instructor receives the accommodation letter, please schedule a meeting with the instructor during office hours or some other mutually convenient time to arrange the accommodation(s). The Office of Services for Students with Disabilities is located at the Stockton campus in the McCaffrey Center, Rm. 137.

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- Online: www.pacific.edu/disabilities

Week	Covered Topics	Textbook Sections
1 & 2	Matrices, Orthogonality, Least Squares	Chapter 6
3 & 4	Eigenvalues, Eigenvectors and applications	Chapter 5
5	Review/ Mid-term Exam	
6 & 7	Principal Component Analysis	Chapter 7
8 & 9	Symmetric Matrices and SVD	Chapter 7
10	Review/ Final Exam	