



Linear Algebra

Point Loma Nazarene University, Spring 2024
Department of Mathematical, Information & Computer Sciences

Instructor: Kyle Havens	Course: Math 2033	Section: 1	Units: 3
Office: Rohr Science 210	Classroom: RLC 103	Time: 8:30-9:25am	
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Final Exam: The final exam is cumulative and will be held at the following time in our classroom.

Wednesday, May 1st from 7:30am to 10:00am

Required Materials: Please obtain the following materials by the end of the first week of class.

1. Textbook – *Linear Algebra and Its Applications*, 6th Edition by Lay, Lay, and McDonald (ISBN: 978-1292351216)
2. Calculator (I will use a TI-84+ when doing examples in class)

University Mission – Teach, Shape, Send: Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Department Mission: The Mathematical, Information, and Computer Sciences department at Point Loma Nazarene University is committed to maintaining a curriculum that provides its students with the tools to be productive, the passion to continue learning, and Christian perspectives to provide a basis for making sound value judgments.

Office Hours: I will be in my office most Mondays, Wednesdays, and Fridays before and after class, starting at 7:30am and leaving around 10:30am. I will be in my Zoom almost every Tuesday from 2:30-3:45pm. Please confirm with me before coming to make sure I will be there at that given day and time, as I may have conflicting meetings or obligations.

Course Description: A computational introduction to linear algebra with applications. A study of linear equations, matrix algebra, Euclidean spaces and subspaces, vector spaces, linear transformations, eigenvalues, eigenvectors, and inner products.

Student Learning Outcomes:

1. Student will be able to apply their mathematical knowledge to solve problems.
2. Students will be able to demonstrate facility with algebraic structures.
3. Students will be able to speak about their work with precision, clarity and organization.
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5. Students will collaborate effectively in teams.
6. Students will be able to identify, locate, evaluate, and effectively and responsibly use and cite information for the task at hand.
7. Students will be able to gather relevant information, examine information and form a conclusion based on that information.
8. Students will be able to understand and create arguments supported by quantitative evidence, and they can clearly communicate those arguments in a variety of formats.

Course Credit Hour Information: In the interest of providing sufficient time to accomplish the stated Course Learning Outcomes, this class meets the PLNU credit hour policy for a 3-unit class delivered over 15 weeks. Specific details about how the class meets the credit hour is provided to the right.

Activity	Hours Spent
Written Homework	50.0
Reading Text	35.0
Class Meetings	35.0
Midterms	2.5
Final Exam	2.5
Total	125.0

Class Performance: Your final grade in this course will be calculated based on the following system.

30%	Final Exam	Cumulative. You must get a "D" on the final exam to pass.
40%	Exam Average	The average score of your two in-class exams.
25%	Written Homework	Traditional written homework from the textbook.
5%	Activity Participation	Based on participation in group activities and attendance.

Letter Grade: The letter grade you receive will be based on your total score from the following system.

Above 92%: A	82-87%: B	70-77%: C
90-91%: A-	80-81%: B-	68-69%: C-
88-89%: B+	78-79%: C+	60-67%: D

All requests for an opportunity to improve your grade due to personal circumstances will be denied. Borderline grades may be rounded up if the student has good attendance (no more than one unexcused absence).

Final Exam: The final exam is cumulative and will be held at the following time in our classroom.

Wednesday, May 1st from 7:30am to 10:00am

Final Exam Info: Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the [Traditional Undergraduate Records: Final Exam Schedules](#) site. If you find yourself scheduled for three or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three or more exams on the same day, no requests for alternative final examinations will be granted.

Exams: Tests and the final exam will include problems and questions over material assigned in the text, readings and handouts, as well as material presented in class. No examination shall be missed without prior consent or a well-documented emergency beyond your control. A score of zero will be assigned for an examination that is missed without prior consent. This instructor does not intend to accept excuses such as poor communication with parents, benefactors, surf team sponsors and/or travel agents. There will be a total of two exams roughly every six weeks of the semester. Calculators are allowed on exams. Exams are weighted equally at 20% of your total grade. If you have good attendance throughout the semester (no more than one unexcused absence), I will adjust the weighted scale of the exams in your favor, 27.5% for the highest exam and 12.5% for the lowest.

Written Homework: Written homework assignments are to be written up on paper or tablet and uploaded to Canvas on or before the due date. Please submit your assignments as either a PDF or an image file. Problems will be posted each week in separate Canvas modules at least one week before the assignment is due. Some comments:

1. The assigned problems are the minimum amount of homework that is required but you may need to do several odd numbered problems as additional practice to fully grasp each problem.
2. A homework assignment is late if it is not uploaded on or before the due date. Generally, no late homework will be accepted except by prior arrangement or with a documented emergency. Up to two written homework assignments may be turned in late subject to a 10% penalty.
3. Please be sure that your homework is legible and the problems are in order.
4. Issues with a Canvas upload are your responsibility. If your work cannot be viewed it will be marked as missing.
5. Homework will be scored on both completeness and correctness. All work necessary to complete a problem must be shown to earn credit. A random selection (the same for each student) of problems will be graded.
6. Start working on your homework early, ideally the same day we cover the section in class. These problems are difficult and meant to be done a little at a time over the course of a few days.
7. When doing homework, please note it is normal to not be able to do every problem correct on the first attempt. Do not be discouraged, instead seek help.
8. I encourage you to help one another with homework, but directly copying another student's homework assignment is considered plagiarism and will not be tolerated.

Class Activity and Participation: Mathematics requires active participation. Participation means: asking questions, making conjectures and checking them, providing solutions to problems, sharing ideas with classmates. During class time we collectively will participate in the same way. I will act as the expert facilitator during class time, with a mixture of lecture, group problem solving, and integrated discussion. Attendance is expected at each class session. In the event of an absence, you are responsible for the material covered in class and the assignments given that day.

PLNU Attendance and Participation Policy: Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university withdrawal date or, after that date, receive an “F” grade.

Class Enrollment: It is the student’s responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

Artificial Intelligence (AI) Policy: Use of Artificial Intelligence (AI) tools (e.g, ChatGPT, iA Writer, Marmot, Botowski) is not permitted, and use of these tools will be treated as plagiarism. This includes AI which solves mathematics problems.

Spiritual Care: Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the [Office of Spiritual Development](#).

Copyright Policy: Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

State Authorization: State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student’s responsibility to notify the institution of any change in his or her physical location. Refer to the map on [State Authorization](#) to view which states allow online (distance education) outside of California.

Academic Honesty: Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one’s own when in reality they are the results of another person’s creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

Academic Accommodations: PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2486). Once a student’s eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan (“AP”) to all faculty who teach courses in which the student is enrolled each semester. PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course. Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student’s responsibility to make the first contact with EAC.

Syllabus is Subject to Change: This syllabus and schedule are subject to change due to unforeseen circumstances. If you are absent from class, it is your responsibility to check any announcements made while you were absent.

Course Schedule: The following provides a rough outline to the topics covered during class time.

<u>Week of</u>	<u>Monday</u>	<u>Wednesday</u>	<u>Friday</u>
1/8/2024	Course Welcome and Introduction	1.1 & 1.2: Linear Systems and Matrices	1.2: Row Operations and Echelon Forms
1/15/2024	<i>No Class</i> MLKJ Day	1.3: Vector Equations and Applications	1.4: The Matrix Equation $Ax=B$
1/22/2024	1.5: Solution Sets of Linear Systems	1.7: Linear Independence	1.8: Intro to Linear Transformations
1/29/2024	1.9: The Matrix of a Linear Transform	1.6 & 1.10: Applications of Linear Models	Open Day - Extra Topics, Homework, Catch Up
2/5/2024	2.1: Matrix Operations	2.2 & 2.3: The Inverse of a Matrix	Open Day - Review and Catch Up
2/12/2024	Exam #1	2.3 & 2.4: Invertibility and Partitioning	2.5: Matrix Factorizations
2/19/2024	3.1 & 3.2: Intro to Determinants	3.2 & 3.3: Cramer's Rule and Volume	Open Day - Extra Topics, Homework, Catch Up
2/26/2024	4.1: Vector Spaces and Subspaces	4.2: Null Spaces and Column Spaces	4.3: Linearly Independent Sets & Bases
3/4/2024	<i>Spring Break</i>		
3/11/2024	4.4: Coordinate Systems	4.5: The Dimension of a Vector Space	4.6: Rank
3/18/2024	5.1: Eigenvectors and Eigenvalues	5.2: The Characteristic Equation	Open Day - Review and Catch Up
3/25/2024	Exam #2	<i>Easter Break</i>	
4/1/2024	<i>No Class</i> Easter Break	5.3: Diagonalization	5.4: Eigenvectors and Linear Transformations
4/8/2024	5.5: Complex Eigenvalues	6.1: Inner Product, Length, and Orthogonality	Open Day - Extra Topics, Homework, Catch Up
4/15/2024	6.2/6.3: Orthogonal Sets and Projections	6.4: The Gram-Schmidt Process	6.5: Least-Squares Problems
4/22/2024	7.1: Diagonalization of Symmetric Matrices	Open Day - Review and Catch Up	<i>No Class</i> Prepare for Finals Week
4/29/2024	<i>No Class</i> Finals Week	Final Exam 7:30am-10:00am	<i>No Class</i> Finals Week