



GOSHEN COLLEGE
MATHEMATICS DEPARTMENT
MATH 301 LINEAR ALGEBRA – FALL 2023-24

Catalog Description	Linear systems of equations, vector spaces, linear transformations, matrices, determinants, characteristic vectors and values, inner products, computational aspects, and applications. Prerequisite: Math 211 and either Math 205 or 212. (3 credit hours)
Motivation	The simplest functions are linear. Yet, real-world phenomena as diverse as error-detecting codes, population change, digital image compression, and crystallography can be described with linear functions. This course is a study of linear functions and their applications.
Learning Objectives	Students will <ol style="list-style-type: none">1. Demonstrate knowledge of vectors, systems of linear equations, matrices, determinants, eigenvalues and eigenvectors, orthogonality, vector spaces, linear transformations, and inner products;2. Solve pure and applied problems and explore ideas by adeptly using mathematical concepts and techniques, problem solving heuristics, pattern recognition, deduction, and software tools;3. Learn mathematics by reading, listening, exploring, and conversing in an effective manner;4. Explain and critique mathematical reasoning through speaking and writing in a precise and articulate manner in both informal and formal settings;5. Exhibit curiosity, playfulness, creativity, confidence, perseverance, interest in multiple perspectives, and a collaborative spirit; and6. Describe applications of linear algebra and connections with other areas of mathematics.
Prerequisites	Math 211 Calculus I and either Math 212 Calculus II or Math 205 Discrete Mathematics. Some examples will use functions and calculus, and you will critique and write proofs.
Instructor	David Housman, SC 117, dhousman@goshen.edu, 535-7405 When he is available to meet with students are posted on his office door and on Moodle
Class Time	MWF 1:00-1:50 p.m. in WY 123.
Text	David Poole, Linear Algebra: A Modern Introduction, 4th edition, Brooks/Cole, Cengage Learning, 2015, ISBN-13: 978-1-285-46324-7. The Student Solution Manual is on Good Library reserve.
On-line	Moodle (moodle.goshen.edu) contains all course information. Announcements posted to the forum will be emailed to all students.
Software	GNU Octave is an open source application that is similar to MATLAB. Octave is available for free download (gnu.org/software/octave) and an online version (octave-online.net) is also available. We will also use SageMath (sagemath.org) and its collaborative notebook interface CoCalc (cocalc.com), which can also run Octave code.
Notebook	A one-inch three-ring binder with loose-leaf lined and graph paper is recommended so that you can keep printed copies of course resources and a written record of problem-solving attempts, questions, math concept and technique discoveries, and skill assessments.
Activities	Reading and investigating are important skills to develop. Reflective practice is the best way to develop these skills. You will be expected to read about and investigate a topic <u>before</u> participating in class. Read with paper and pencil in hand, and take an anticipatory approach: try to obtain solutions, explanations, and proofs before reading what the author provides. If you do

not understand something, write a question that is as specific as possible.

Class will complement your preparatory reading and investigating through mini-lectures, student presentations, discussion of course readings, and group activities.

An average student can obtain an average grade with an average of nine hours each week devoted to this course—adjust if you are not average or desire a grade that is not average.

Grading

Course grades will be based on performance on the activities listed in the table and further described below. The score for each activity is capped at 100. The course grade will be translated into letter grades in the following manner: 93 to A, 90 to A-, 87 to B+, 83 to B, 80 to B-, 77 to C+, 73 to C, 70 to C-, 67 to D+, 60 to D, and 0 to F.

Activity	Weight
Assignments	25%
Project Presentation	10%
Project Report	15%
Exam 1 (Wed Sep 27)	15%
Exam 2 (Wed Nov 1)	15%
Final Exam (Thu Dec 7, 3:30-5:30pm)	20%

Assignments

Achieve and exhibit understanding by solving problems, proving propositions, and writing explanations. Typically, written solutions will be due on a Tuesday and graded by Wednesday.

Exams

Exhibit your ability to solve problems and describe mathematical concepts without assistance or collaboration. There may be both in-class and take-home portions.

Project

Study a topic without instructor guidance and explain your findings to the class, listen actively and learn from your peers' presentations, and discuss your findings carefully and compellingly in a written paper. Topics will be chosen from the text explorations, applications, and vignettes. Projects will be completed independently or with a partner. Sign up for your topic on Moodle as soon as possible.

Extra Credit

Receive extra credit toward your assignments grade by doing one or more of the following: (1) find errors in the text or posted course materials and describe the error in writing; (2) attend a quantitative presentation (e.g., [Science Speakers](#)) or participate in a quantitatively based activity and describe in writing some interesting mathematical aspect of the presentation or activity; or (3) participate in a [Career Services](#) event and describe your most important discovery. The description should be a substantive paragraph or two and be submitted to the instructor on paper.

Tutoring

The Academic Success Center provides tutoring and writing support for free to all undergraduate students. Make an appointment at tutorcal.goshen.edu. Unfortunately, no current student has previously taken this course. Therefore, your best bet to receive assistance is to make use of David's office hours.

Accessibility Accommodations

Goshen College is committed to providing all students equitable access to programs and facilities. Students who need accommodations based on disability should contact the Academic Success Center (ASC). Students must register with the ASC before faculty are required to provide reasonable accommodations. For more information or to register, please contact the Director of Academic Success, Michelle Blank, Good Library 112, mblank@goshen.edu or 574-535-7526. To ensure that learning needs are met, contact the ASC the first week of classes. More information at: <https://www.goshen.edu/campuslife/asc/disability-services/>.

Collaboration and Academic Integrity

You are encouraged to use all available resources in order to learn the concepts and techniques discussed in this course. In particular, conversations with other students and the instructor can be an effective learning method. Reading other books and web pages can be another effective learning method. However, copying someone else's work subverts the learning process.

For assignments and projects, you may look at and discuss another student's work, but any written work developed during collaboration with another student should be destroyed before writing your own solutions. You should give written acknowledgement to people with whom you have had discussions and to any written materials (other than the text) that were helpful. For exams, you may *not* use any resources unless a specific exception is stated by the instructor.

Failure to observe the above rules will result in a zero on the homework assignment, project, or

exam. Any violation of academic integrity will be reported to the Associate Dean. Observation of the above rules will help you learn the material well and give you the satisfaction of knowing that you have earned your grade.

Due Date Policy

Class participation, assignments, projects, and exams can only be excused, rescheduled, or made up if (1) there is a serious medical problem, a death in the immediate family, or an irreconcilable conflict with another official Goshen College activity; (2) there is written documentation signed by proper authorities; and (3) the instructor is notified prior to the due date or as soon as possible afterwards.

Course Materials are for Private Use

Course materials (videos, assignments, exams, problem sets, etc) are for use in this course only. You may not upload them to external sites, share with any person outside this course, or post for public commentary without written permission from the professor. Sharing recordings outside of the class could lead to a copyright or FERPA violation. Goshen College prohibits any student from duplicating, downloading, or distributing class recordings with anyone outside of this class, for any reason.

Student Life Resources

Goshen College is committed to providing a safe, supportive, and equitable learning environment. If you encounter circumstances that impact your learning or personal safety, please contact someone from [Student Services](#) (studentservices@goshen.edu or 574.535.7474).

- Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students Gilberto Pérez Jr. (gperez@goshen.edu or 574.535.7434) for support.
- Adriana Ortiz, Director of Hispanic Student Recruitment and Family Engagement, is available to help commuter students (aortiz@goshen.edu or 574.535.7291).
- Resident Directors Kevin Schultz (kevints@goshen.edu or 574.535.7286) and Jordan Blank (jblank@goshen.edu or 574.535.7296) are available to assist residential students.
- If you experience safety issues on campus, please contact Chad Coleman, Director of Campus Safety (chadc@goshen.edu or 574.535.7292).

Goshen College does not condone and will not tolerate inappropriate conduct toward any individual based on the individual's sex, sexual orientation, national origin, race, ethnicity, documentation status or gender identity. Issues related to [gender](#) and [racial](#) discrimination or harassment can be reported online. You may also contact Dean of Students Gilberto Pérez Jr. (gperez@goshen.edu or 574.535.7434) or Deputy Title IX Coordinator Liz Andes (landes@goshen.edu or 574.535.7484).