



GOSHEN COLLEGE
MATHEMATICS DEPARTMENT
MATH 301 LINEAR ALGEBRA (3 Credit Hours) – FALL 2019-20

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.
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 draw upon your knowledge of functions and calculus, and you will be expected to critique, develop, and write proofs of mathematical propositions.
Instructor	David Housman, SC 117, dhousman@goshen.edu, 535-7405, 574-612-7185 (cell) Office hours posted on office door and on Moodle
Class Time	MWF 1:00-1:50 p.m. in SC 107.
Text	David Poole, Linear Algebra: A Modern Introduction, 4th edition, Brooks/Cole, Cengage Learning, 2015, Print ISBN-13: 978-1-285-46324-7 OR eText ISBN: 978-1-305-23061-3. A copy of the Student Solution Manual is on Good Library reserve.
On-line	Moodle https://moodle.goshen.edu contains all course information. Announcements posted to the forum will be emailed to all students.
Software	Sage (sagemath.org) and its collaborative notebook interface CoCalc (cocalc.com) will be used for computation. Free basic private server access will be provided.
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	<p>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.</p> <p>Class will complement your preparatory reading and investigating through mini-lectures, student presentations, discussion of course readings, and group activities.</p> <p>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.</p>

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 25)	15%
Exam 2 (Fri Nov 1)	15%
Final Exam (Wed Dec 11, 3:30-5:30pm)	20%

Assignments Achieve and exhibit understanding by solving problems, proving propositions, and writing explanations. Typically, written solutions will 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 individual tutoring by appointment. Go to tutorcal.goshen.edu.

Disability Services Goshen College is committed to providing all students equal access to programs and facilities. Students who need accommodations based on disability should contact the Director of the Academic Success Center (ASC). Students must register with ASC before faculty are required to provide reasonable accommodations. For more information or to register, please contact the Director of the ASC, Judy Weaver, Good Library 112, jweaver@goshen.edu or 574-535-7560. To ensure that learning needs are met, contact the director of the ASC the first week of classes.

Other Assistance 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) for support. Furthermore, please notify the instructor if you are comfortable in doing so. He may be able to provide additional assistance or flexibility in meeting the requirements of the course.

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.