

MAT 221 LINEAR ALGEBRA

Block 1 August-September 2019

Instructor: Professor Scott Jordan

Email: sjordan@cornellcollege.edu

Office: West Science 310

Office Hours: By appointment.

Text: *Introduction to Linear Algebra (5th edition)* by Gilbert Strang ISBN: 978-0-9802327-7-6

Class Meeting Times: There will be Lecture/Discussion each morning from 9 a.m. until around 11 a.m. and afternoon class Monday through Friday from 1 p.m. until 3 p.m. We will meet in West Science 320.

Prerequisite(s): The prerequisites for Linear Algebra are Calculus of a Single Variable-MAT 120 or MAT 121, and Calculus of Several Variables-MAT 122 or Discrete Math for Computer Science-CSC 151.

Course Description from the Cornell Catalog: Existence and uniqueness of solutions to linear systems, linear transformations, linear independence, spanning vectors, vector spaces, basis and dimension, orthogonality, eigenvalues and eigenvectors. Students will be required to prepare written and/or oral presentations on a linear algebra application approved by the instructor.

Course Objectives:

Upon completion of MAT 221 a successful student will be able to

- determine when solutions to linear systems exist and if they are unique
- solve the system $Ax=b$
- understand the concept of the four subspaces related to the system $Ax=b$ and their relationship to the solution(s) of the system
- understand the concepts and be able to read and write proofs related to vector spaces and subspaces, linear independence, and basis vectors
- understand orthogonality of the four subspaces and how it is related to least squares approximations
- find the determinant of a matrix using expansion by cofactors
- use Cramer's Rule to find an inverse of a matrix and to solve the system $Ax=b$
- demonstrate a mastery of fundamental ideas and algorithms related to eigenvalues and eigenvectors, which include finding eigenvalues and eigenvectors, diagonalizing a matrix, symmetric matrices, positive definite matrices
- understand the concept of using singular value decomposition in image processing
- express an understanding in the application of linear algebra in topics outside of typical mathematics
- express an understanding that matrices are closely related to linear transformations

This course supports the Educational Priorities and Outcomes of Cornell College with emphasis on knowledge, inquiry, reasoning, and communication.

How to be successful in MAT 221:

Accept responsibility for your own learning.

Be prepared for class - read the text before class.

Complete quizzes and assignments on time.

Don't get behind. Complete assignments as soon as possible. Seek help as soon as you realize you need it.

Additional help for class:

MIT Professor Gilbert Strang has recorded lectures on Linear Algebra that may be useful to view. The lectures can be access on the web:

<http://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/video-lectures/>

Homework:

Homework is critical to your understanding of this course. The assignments are to help you prepare for the quizzes and exams. Make sure that your homework is worth grading. Failure to follow the following homework submission format will result in lost points, and may result in refusal of the submission entirely. I will collect homework in chapter packets. Homework will be due in my office by 5 pm on the day they are due. See schedule for due dates. In order for your work to be considered for full credit it needs to meet the following criteria.

1. Homework needs to be stapled together in the top left corner. Your name needs to be at the top right corner. If this is not followed, you will receive a 0 on your homework packet.
2. The homework problems and sections need to be in order. Failure to do this will result in the loss of points.
3. No frillies from spiral bound notebooks will be allowed. If there are, the homework will receive a zero.
4. Any homework pages that are not in the packet when turned in will not receive any points. This means that it is your responsibility to ensure that your homework contains all the required problems.
5. Homework problems are not to be put side by side in your work. All homework problems should go in order vertically. That means if I draw a horizontal line across the paper it should only cross one problem. Failure to do this will result in a zero.
6. No late homework will be accepted.

Quizzes:

There will be quiz assigned at the end of each chapter. It will contain questions that pertain to anything covered in that chapter. Quizzes will be taken in class.

Exams:

There will be three exams. They will be taken in class. Electronic devices are not allowed during exams unless otherwise specified.

Presentations

Students will be divided into groups and will create a presentation on one of the chapters from the book. Presentations will be graded on a group and individual effort. They will be given during the last week of the course.

Grade Distribution:

Homework	15%
Quizzes	30%
Presentation	10%
Exams	45%

Letter Grade Distribution:

Range	Letter	Range	Letter
>= 93.00	A	73.00 - 76.99	C
90.00 - 92.99	A-	70.00 - 72.99	C-
87.00 - 89.99	B+	67.00 - 69.99	D+
83.00 - 86.99	B	63.00 - 66.99	D
80.00 - 82.99	B-	60.00 - 62.99	D-
77.00 - 79.99	C+	<= 59.99	F

I reserve the right to adjust this grade distribution as needed.

Course Policies:

- **Communication and availability**

I am available most of the day. I leave my office sometime between 4-5 pm. I may be available to answer emails between 9-10 pm. If you email me after that time, don't expect a response till the next day.

- **Distractions**

Other than our classroom computer, no electronic devices may be used in our classroom while class is in session. Exceptions will be made in special cases, for example if these are used in an accommodation for a disability.

- **Drop**

I follow the college's policy on 15th day drops. i.e. in order to be eligible for a third Friday drop, you must attend class and complete all course work.

- **Academic Integrity**

Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to

explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgement of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading "Academic Honesty."

- **Accommodations**

Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Coordinator of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see <http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml>.