

Math 2101.002 (old 147) Linear Algebra¹ (3 Credit Course)

Fall 2009 [Tues & Thurs 11:00-12:20 Barton Hall 401,](#)

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Office Hours: Mon: 9:00-11:00, T & Th 8:30-10:30, 1-2, others by arrangement

Text: [Introductory Linear Algebra \(an Applied First Course\) 8th Edition](#), by B. Kolman and D. Hill, Pearson Prentice Hall, ISBN 0-13-143740-2,

Prerequisites: 2 terms of calculus

Topics covered include: Matrices, matrix algebra, matrix transformations, linear systems of equations, lines of best fit, the determinant, eigenvalues and eigenvectors, vector spaces, inner product, inner product spaces, orthogonal sets, and linear transformations. Applications.

(This material will be drawn from portions of Chapters: 1-8, 10.)

GRADING GUIDE

A(100-92), A- (91-90)

B+(89-88), B(87-82), B-(81-80)

C+(79-78), C(77-72), C-(71-70)

D+(69-68), D(67-62), D-(61-60)

F – below 60%

This course will integrate the use of MATLAB as a tool for linear algebra and applications.

Grading: Homework/quizzes/participation..... 20%
Exams (take home & in-class)80%
(Two exams and a **final (12/15, 10:30-12:30)**.
First exam in about 4 weeks.)

Policies:

Late homework is unacceptable. No make-ups.

No cell phones, No texting, No ipods/MP3 players, No ear buds/head phones, ETC. in class.

Read material in the book BEFORE coming to class. Questions and class discussions are welcome.

Homework: "Naked numbers are not acceptable." Solutions must include the steps used to arrive at your answer together with explanations describing the problem, your solution technique, and procedural details.

All things must be clearly labeled with your name and course number.

Groups: It is helpful to have a small group that studies together. However, on exercises that are to be collected or take home test questions, **individual work is required.**

**"Why pretend that the life they are preparing for is easy? It is not and never will be."
That is, this is a hard course. You must work at it.**

By the end of the course, students should be able to:

- Use the Gaussian elimination procedure to determine whether a given system of simultaneous linear equations is consistent, and if so to find the general solution.
- Invert a matrix by the Gaussian elimination method.
- Understand the concepts of vector space and subspace, and apply the subspace test to determine whether a given subset of a vector space is a subspace.
- Understand the concepts of linear combination of vectors, linear independence, linear dependence, spanning set, and basis.
- Determine whether or not a given set of vectors in \mathbb{R}^n is linearly independent and/or spans \mathbb{R}^n .
- Find a basis for a subspace, defined either as the span of a given set of vectors, or as the solution space of a system of homogeneous equations.
- Calculate the rank of a given matrix and, from that, the dimension of the solution space of the corresponding system of homogeneous linear equations.
- Understand the concept of inner product in general, and calculate the usual Euclidean inner product of two given vectors in \mathbb{R}^n .
- Understand the meaning of a least squares and be able to compute a least squares line for a set of data from \mathbb{R}^2 .
- Be familiar with the Gram-Schmidt method to convert a given basis for a subspace of \mathbb{R}^n to an orthonormal basis.
- Find the coordinates of a given element of \mathbb{R}^n in terms of a given basis - especially in the case of an orthogonal or orthonormal basis.
- Understand the concepts of linear transformation, range and null space.
- Compute the characteristic polynomial of a square matrix and (in simple cases) factorize to find the eigenvalues.
- Determine whether a given square matrix is diagonalizable, and if so find a diagonalizing matrix.

Any student with special needs relevant to disabilities should see me privately. (Contact the Disabilities Resource & Services Office in 100 Ritter Annex, 215-204-1280.)

To withdraw a student must obtain an adviser's signature.

Last day to drop a course: Monday, September 14

Last Day to withdraw: Monday, November 2

No withdrawals after the 9th week of class. A student may withdraw from no more than 5 courses (taken after 9/1/2003) during their undergraduate career. A student may NOT withdraw from the same course more than once.

Beginning in the fall of 2003, the calculation of grades for a repeated course is: all grades for the repeated course except the lowest will be averaged together and used for the GPA calculation.

Final Exams are Monday, December 14-Saturday, December 19

TEMPLE E-MAIL: ALL students are required to obtain a Temple e-mail address. BY September 4th you must have sent me an e-mail message from your Temple account with your NAME & indicating that you are in my Math 2101.002 class. Send to: dhill001@temple.edu