

Mathematics 310  
**Linear Algebra (3)**  
(Effective Spring 2017)

**Prerequisite:** Math 160 or Math 314 or Math 251.

**Catalog Description:** Vectors, matrices, systems of linear equations, determinants, inverses of matrices, vector spaces, linear transformations, eigenvalues, and eigenvectors.

**Notes:**

1. Emphasize eigenvalues and eigenvectors (chapter six).
2. The applications should be dispersed throughout the semester. This course is to have an application, rather than theoretical, orientation. Students should also become capable of constructing valid formal proofs of basic, elementary results.

**Learning Outcomes for Major:** This course addresses one or more of the student learning outcomes for the major.

Upon completion of his/her degree from the University of Tennessee at Martin with a major in mathematics, the graduate will be able to:

- i. apply mathematical concepts and principles to perform numerical and symbolic computations.
- ii. use technology appropriately to investigate and solve mathematical and statistical problems.
- iii. write clear and precise proofs.
- iv. communicate effectively in both written and oral form.
- v. demonstrate the ability to read and learn mathematics and/or statistics independently.

**Teaching Objectives:** The student will:

1. Solve systems of equations using row echelon and reduced row echelon matrices.
2. Compute sums and products of matrices.
3. Calculate the inverse, if it exists, of a matrix.
4. Use determinants to solve systems of equations.
5. Define and illustrate vector spaces.
6. Calculate matrix representations of linear transformations.
7. Determine isomorphic linear transformations.
8. Determine isometric linear transformations.
9. Determine eigenvalues and eigenvectors.
10. Diagonalize matrices.
11. Orthogonally diagonalize symmetric matrices.

**Text(s):** Introduction to Linear Algebra, 5th Edition, Gilbert Strang, Wellesley–Cambridge Press, 2009. ISBN: 978-0-9802327-7-6.

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| <b>Outline:</b> | Chapter | Title (Sections)                           |
|                 | 2       | Solving Linear Equations (1-7)             |
|                 | 3       | Vector Spaces and Subspaces (1-5)          |
|                 | 4       | Orthogonality (1-4)                        |
|                 | 5       | Determinants (1-3)                         |
|                 | 6       | Eigenvalues and Eigenvectors (1, 2, 4, 5)  |
|                 | 7       | The Singular Value Decomposition (SVD) (2) |
|                 | 8       | Linear Transformations (1-3)               |

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