

**Tennessee Technological University
Mathematics Department**

MATH 4530-4540/5530-5540: Linear Algebra I-II

I. COURSE DESCRIPTION FROM CATALOG:

A theoretical study of vector spaces, bases and dimension, subspaces, linear transformations, dualspaces, eigenvalues and eigenvectors, inner product spaces, spectral theory, duality, quadratic and bilinear forms. Lec. 3-3. Credit 3-3.

II. PREREQUISITE(S):

MATH 4530 (5530): C or better in MATH 2010 and MATH 3400.

MATH 4540 (5540): C or better in MATH 4530 or 5530.

III. COURSE OBJECTIVE(S):

To introduce students to the theory of linear operators on (mostly) finite dimensional real and complex vector spaces.

IV. STUDENT LEARNING OUTCOMES:

MATH 4530/5530

Upon successful completion of the course students will understand the concepts of vector space, subspace, basis, eigenvector, eigenvalue, eigenspace, and linear transformation in an abstract context; understand the concepts of quotient space, direct sum, and isomorphism; and create proofs of simple results concerning the aforementioned concepts.

MATH 4540/5540

Upon successful completion of the course students will understand the concepts of an inner product space, orthonormal basis, orthogonal projection, and characteristic polynomial in an abstract context; understand the concepts of self-adjoint operator, normal operator, positive operator, isometry, generalized eigenvector, and minimal polynomial; understand and use the Gram-Schmidt Orthonormalization Procedure, Spectral Theorem, and Jordan canonical form to answer certain questions regarding vector spaces; and create proofs of simple results concerning the aforementioned concepts.

V. TOPICS TO BE COVERED:

MATH 4530/5530:

Chapter 4: Vector Spaces Definition Linear combinations, spanning sets
Subspaces Linear spans, Row space of a matrix Linear dependence and
independence Basis and dimension Rank of a matrix Sums and direct sums
Coordinates

Chapter 5: Linear Mappings Definition

VII. POSSIBLE TEXTS AND REFERENCES:

Advanced Linear Algebra, 3rd edition by Roman
Schaum's Outline of Linear Algebra, 4th edition, Lipschutz
Linear Algebra with Applications, J.T. Scheick
Linear Algebra Done Right, 2nd Edition by Axler
Advanced Linear Algebra, 2nd edition, by Roman

VIII. ANY TECHNOLOGY THAT MAY BE USED:

IX. STUDENT ACADEMIC MISCONDUCT POLICY:

Maintaining high standards of academic integrity in every class at Tennessee Tech is critical to the reputation of Tennessee Tech, its students, alumni, and the employers of Tennessee Tech graduates. The Student Academic Misconduct Policy describes the definitions of academic misconduct and policies and procedures for addressing Academic

Student Academic Misconduct at [Policy Central](#).