



Math 317–Linear Algebra Course Syllabus

Course description: Matrices, systems of linear equations, linear vector spaces, functions from \mathbb{R}^n to \mathbb{R}^m , determinants, eigenvalues and eigenvectors.

Credit hours: 3

Course Prerequisites and Corequisites: MTH 311 or MTH 234 and consent of instructor.

Course outline:	<u>Approximate time spent</u>
• Vector Spaces	20%
○ Vector spaces and subspaces	
○ Linear combinations and systems of linear equations	
○ Linear independence	
○ Basis and dimension	
• Linear Transformations and Matrices	15%
○ Linear transformations, null spaces, ranges	
○ Matrix representation of a linear transformation	
○ Composition of linear transformations and matrix multiplication	
○ Invertibility and isomorphisms	
○ Change of coordinate matrix	
• Elementary Matrix Operations and Systems of Equations	15%
○ Elementary matrix operations and elementary matrices	
○ Rank and inverse of a matrix	
○ Systems of linear equations	
• Determinants	10%
○ Properties of determinants	
• Diagonalization	20%
○ Eigenvalues and eigenvectors	
○ Diagonalizability	
• Inner Product Spaces	15%
○ Inner products and norms	
○ Gram-Schmidt Orthogonalization and orthogonal compliments	
○ Adjoint of a linear operator	
○ Normal and self-adjoint operators	
○ Unitary and orthogonal operators and their matrices	

Student Learning Outcomes (SLO): At the end of MTH 317, a student who has studied and learned the material should be able to:

1. Solve linear systems of equations either explicitly or numerically. [PLO: 1,2,4]
2. Demonstrate understanding of abstract vector spaces and inner product spaces. [PLO: 1,2,3,4]
3. Demonstrate understanding of linear transformations and their importance to pure and applied science. [PLO: 1,2,3,4]
4. Demonstrate understanding of the symbiotic relationship between linear operators and matrices. [PLO: 1,3,4]

Program Learning Outcomes (PLO):

Students graduating from SFASU with a B.S. Degree and a major in mathematics will:

1. Demonstrate comprehension of core mathematical concepts. [**Concepts**]
(notion of theorem, mathematical proof, logical argument)
2. Execute mathematical procedures accurately, appropriately, and efficiently. [**Skills**]
(calculus, algebra, routine, nonroutine, applied)
3. Apply principles of logic to develop and analyze conjectures and proofs. [**Logical Reasoning**]
(quantifiers, breaking down mathematical statements, counterexamples)
4. Demonstrate competence in using various mathematical tools, including technology, to formulate, represent, and solve problems. [**Problem Solving**]
(calculus tools, algebra tools, applied tools, nonstandard problem solving)