Department of Mathematics | School of Science
Linear Algebra I | Short Syllabus

Course name and code: Linear Algebra I (0301241).
Credit hours: 3 hrs. **Prerequisite:** Calculus II (0301102).

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Course Description: Systems of linear equations; matrices and matrix operations; homogeneous and nonhomogeneous systems; Gaussian elimination; elementary matrices and a method for finding; determinants; Euclidean vector spaces; linear transformations from to and their properties; general vector spaces; subspaces; basis; dimension; row space; column space; null space of a matrix; rank and nullity; inner product spaces; eigenvalues and diagonalization; linear transformations.

Tests and evaluations: The final grade is calculated as follows:

Midterm Exam (30 %)	Second Exam (20 %)	Final Exam (50 %)

Contents and schedule: The following is a rough plan. I may include and/or delete new topics.

Topics	Week
SYSTEMS OF LINEAR EQUATIONS AND MATRICES • Introduction to Systems of Linear Equations • Gaussian Elimination • Matrices and Matrix Operations • Inverses; Rules of Matrix Arithmetic • Elementary Matrices and a Method for Finding A^{-1} • Further Results on Systems of Equations and Invertibility • Diagonal, Triangular, and Symmetric Matrices	1-3
DETERMINANTS • Determinants by Cofactor Expansion • Evaluating Determinants by Row Reduction • Properties of the Determinant Function • A Combinatorial Approach to Determinants	4-6
GENERAL VECTOR SPACES • Real Vector Spaces • Subspaces • Linear Independence • Basis and Dimension • Row Space, Column Space, and Nullspace • Rank and Nullity	7-9
INNER PRODUCT SPACES • Inner Products • Angle and Orthogonality in Inner Product Spaces • Orthonormal Bases; Gram-Schmidt Process	10
EIGENVALUES, EIGENVECTORS • Eigenvalues and Eigenvectors • Diagonalization	11-12
LINEAR TRANSFORMATIONS • General Linear Transformations • Kernel and Range • Inverse Linear Transformations	13-15

Textbooks: H. Anton and C. Rorres, *Elementary Linear Algebra* (11th edition), Wiley, 2005.