

ROWAN UNIVERSITY
Department of Mathematics

Syllabus

Math 01.210 - Linear Algebra

CATALOG DESCRIPTION:

Math 01.210 Linear Algebra 3 s.h.

(Prerequisites: Math 01.131 Calculus II and either Math 03.150 Discrete Mathematics or Math 03.160 Discrete Structures, with a grade of C- or better in all prerequisites or permission of instructor)

This course includes: linear equations and matrices, vector spaces, linear dependence and independence, dimension and basis of a vector space, linear transformations, inner product and cross product, orthogonality, eigenvalues and eigenvectors. Use of graphing calculators is required and computers may be used at the option of the instructor.

OBJECTIVES:

The essential topics of linear algebra are prerequisite for many of the subsequent mathematics courses. In particular, certain linear algebra concepts are decidedly useful in multivariable calculus, differential equations and statistics. The purpose of the course is to provide an introduction to linear algebra at an elementary level to improve students' ability of abstract reasoning by its attention to mathematical proof.

CONTENT:

1. The Matrix

1.1 The Matrix and Matrix Operations

1.2 Inner Product and Cross Product

1.3 Geometric Vectors

1.4 Orthogonal Vectors

2. Systems of Linear Equations

2.1 Equivalent Systems of Equations

2.2 The General Solution of a Linear System

2.3 The Row-Reduced Form of a Matrix and Rank

2.4 Homogeneous Systems

3. Square Matrices

3.1 The Multiplicative Inverse of a Square Matrix

3.2 The Determinant of a Square Matrix

3.3 Cofactors and Inverses

3.4 The Determinant of a Product and Nonsingular Matrix

3.5 Eigenvalues and Eigenvectors

4. Vector Spaces

4.1 Vector Spaces and Subspaces

4.2 Linear Independence, Spanning Set and Basis

4.3 Coordinate and Dimension

4.4 Null Space, Row space and Column Space

4.5 Change of Basis

5. Linear Transformations

5.1 Linear Transformations

5.2 Matrix Representation

5.3 Composition of Transformations

5.4 Change of Basis

6. Diagonalization

6.1 Representation of a Linear Transformation by a Diagonal Matrix

6.2 The Eigenvalues and Eigenvectors of a Symmetric Matrix

6.3 Quadratic Form

6.4 Functions of a Square Matrix

7. Inner Product Spaces

7.1 Definition and examples

7.2 Cauchy-Schwartz inequality

7.3 Orthogonality

7.4 Orthonormal Basis and Gram-Schmidt Process

TEXTBOOK(S):

Elementary Linear Algebra: Applications Version, Howard Anton and Chris Rorres, 11/E Wiley

Elementary Linear Algebra w/Applications (Classic Version), Kolman & Hill, 9/E, Pearson

Linear Algebra and Its Applications, Lay, Lay and McDonald, 5/E, Pearson