INSTITUTE OF MATHEMATICS
College of Science
University of the Philippines Diliman

Math 40 Course Syllabus

A. Course Catalogue Description

Course Number	Math 40
Course Title	Linear Algebra
Course Description	Vector spaces; linear transformations; matrices; eigenvalues; canonical forms; orthogonality; applications
Prerequisite	Math 22/equiv. or Math 30/equiv.
Course Credit	3 units
Number of Hours	3 hours/week

B. Course Content

I. Course Introduction

II. Matrices over a Field

1. Definition
2. Matrix operations and their properties
3. Transpose of a matrix
4. Special types of square matrices

III. Row/Column Operations

1. Echelon form of a matrix
2. Solution of systems of linear equations
3. Elementary matrices
4. Row equivalence
5. Rank of a matrix
6. Inverse of a matrix
7. Determinants

IV. Vector spaces over a Field

1. Definition and examples
2. Subspaces, their sums and intersections
3. Spanning sets, linear combination

V. Linear Independence

1. Definition
2. Basis and dimension
3. Isomorphism of vector spaces

VI. Linear Transformations

1. Definition and examples
2. Kernel, range, nullity and rank
3. Nonsingular linear transformations
4. Algebra of linear transformations
5. Matrix of a linear transformation and similarity

VII. Eigenvalues and Eigenvectors

1. Characteristic polynomial
2. Eigenvalues, eigenvectors and eigenspaces
3. Hamilton-Cayley Theorem (optional)
4. Diagonalization

VIII. Inner Product Spaces
  1. Inner product
  2. Gram-Schmidt orthogonalization
  3. Diagonalization of symmetric matrices
  4. Quadratic Forms

For a more detailed syllabus, send an email request to ddapr@math.upd.edu.ph.