Math112
Introduction to Linear Algebra
Course outline

Introduction to real vectors and matrices

- Definition of a vector, geometric representation of vectors

- Basic operations on vectors and concepts, e.g. addition, multiplication by a scalar, dot product, vector norm, etc.

- Definition of a matrix.

- Binary operations on matrices (addition, multiplication, multiplication by a scalar) and their properties. Applications.

- Unary operations on matrices such as finding transpose, trace, determinant, inverse. Applications.

Linear equations

- Nature of solutions to linear equations

- Systematic approaches of finding solutions to linear equations, e.g. row reduced echelon form method, Cramers's rule, etc.

- Application of systems of linear equations.

Linear transformations and inverses

- Introduction of linear transformations. Properties.

- Inverse of a linear transformation.

- Matrix representation of linear transformations.

- Geometric interpretation

Characteristic value problem

- Problem statement

- Finding eigenvalues and eigenvectors

Discrete dynamical systems

- Examples of discrete dynamical systems

- State space representation. Finding solution to the initial value problem

- Higher order difference equations.