

42201 Numerical Computing I (3)

Knowledge

The students will know numerical methods for the solution of linear systems of equations, least-squares problems, ill-posed problems, polynomial interpolation, polynomial least-squares approximation, and their properties. Students will understand the properties of these methods and the effect of finiteprecision arithmetic on the computed solution.

Comprehension

Students should know the matrix factorizations used in the numerical methods, including LU and QR factorization, and the singular value decomposition, how they are computed, how they can be applied, and how they can be implemented in MATLAB. Students should be able to implement and apply the methods discussed in MATLAB. They also should know how numbers are represented on a computer, and how this representation may affect the computed results.

Application

The methods covered in the course are applied to a variety of problems, including GPS, information retrieval. Students solve these problems by writing MATLAB code.

Analysis

Students should know the mathematical background for the methods described as well as their properties.

Synthesis

The course forces students to apply and expand knowledge gained in Calculus I, Calculus II, and Linear Algebra.

Evaluation

Students should be able to solve problems in scientific computing by writing MATLAB code using the methods discussed in the course. Students also should know properties of these methods and how they are derived.

Class Activities

Discuss the methods, show their properties, and illustrate their performance.

Out of class Activities

Do weekly homework assignment that involves analysis, application, and implementation in MATLAB of the methods discussed.