RUTGERS
UNIVERSITY | NEWARK

NUMERICAL ANALYSIS

21:640:473 (3 credits)

COURSE DESCRIPTION:

Error analysis; interpolation theory; numerical solution of equations; polynomial approximations; numerical differentiation and integration; solution of differential equations.

PREREQUISITE:

21:198:101(Computers & Programming I), and 21:640:136 (Calculus II), or 156 (Honors Calculus II.).

TEXTBOOK:

"Numerical Methods," (4th edition), by Faires, published by Cengage.

DEPARTMENT WEB SITE: http://www.ncas.rutgers.edu/math

THIS COURSE COVERS THE FOLLOWING:

We will cover the following topics, not necessarily in order. For each numerical method we will discuss error and computer implementation. Projects will be discussed in detail. Practical instruction will be given on using calculators and spreadsheets effectively, and in using Maple.

1. Errors and computer arithmetic.

2. Root finding: bisection method, Newton's method.

3. Interpolation: Lagrange interpolation, divided differences, cubic spline interpolation.

4. Numerical integration and differentiation.

5. Approximation theory: least squares approximation.

6. Numerical solution of the heat equation and Black-Scholes equation.

7. Discrete Fourier transforms.

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