

Mathematics Department
Brooklyn College, City University of New York
Math 4701 (Numerical Analysis)
4 hours, 4 credits

Suggested Textbooks:

- Introduction to Numerical Analysis with C programs, by Attila Máté
- Numerical Analysis, by Richard Burden and Douglas Faires

1. Error Analysis

- Floating point numbers
- Absolute and relative errors
- Round-off and truncation errors
- Remainder term in Taylor's formula

2. Interpolation and Polynomial Approximation

- Lagrange interpolation
- Newton interpolation
- Hermite interpolation

3. Solution of nonlinear equations

- The Bisection Method
- Fixed-point iteration
- Aitken's acceleration
- Newton's method

4. Numerical Differentiation and Integration

- Numerical differentiation of tables
- Numerical differentiation of functions
- Simple numerical integration formulas
- Composite numerical integration formulas
- Adaptive integration (optional)
- Romberg integration (optional)

5. Initial-Value Problems for Ordinary Differential Equations

- Euler's method
- Higher-order Taylor Methods
- Runge-Kutta Methods
- Predictor-Corrector methods (optional)

6. Systems of linear equations and iterative techniques in Linear Algebra

- Gaussian elimination
- Cholesky factorization
- Jacobi and Gauss-Seidel iterations
- Cubic splines (optional)
- Power method for eigenvalues (optional)