

Hunter College of The City University of New York

MATH 385 NUMERICAL METHODS I 3 hrs, 3cr.

There is no required textbook. Students are provided with lecture notes (no charge) the first day of classes.

This is a basic numerical methods course. Students must have background in Linear Algebra and Multivariate Calculus. Programming is in *Mathematica*.

Topics:

Basics

1. Basics of programming in *Mathematica*.
2. Errors in computation
3. Roots of functions using Newton's method and the secant method.
4. Solving linear systems of equations
5. Newton's method and max/min problems for functions of several variables

Interpolation

1. Polynomial interpolation
2. Bezier interpolation
3. Least squares fitting
4. Cubic splines and B-splines

Numerical Analysis

1. Finite differences
2. Finite difference method applied to a PDE
3. Numerical integration including the trapezoid method, Simpson's rule and Gaussian quadrature.
4. Euler forward method applied to an ODE