

Hunter College of The City University of New York

MATH 485 Advanced Numerical Methods II

3 hrs, 3 cr

This course is primarily for Macaulay Honors College students. No student may take this course without departmental approval.

Knowledge of *Mathematica* is required. All students will complete a semester project.

The course is concerned with the mathematical foundations for numerical processes used to solve differential equations.

This is a lecture course without textbook.

Topics:

- **Finite Difference Method**
 1. Basics of FDM
 2. von Neumann Stability Analysis
 3. Extended Differences
 4. Lax Convergence Theorem
- **Finite Element Method**
 1. Basics, Elements, Nodes, Degrees of Freedom and Interpolating Polynomials
 2. Basics of Sobolev Spaces
 3. Lax Milgram Existence Theorem for Elliptical Equations
 4. Hilbert
 5. Convergence and Super Convergence
- **Local and Global Collocation**
 1. Basics
 2. Hermite Interpolation and Quadrature
 3. Convergence for Collocation