

Math 497A: Analytical and Numerical Methods for Differential Equations Spring 2008

Time: Thursdays, 02:30PM - 03:45PM

Place: 002 DEIKE

Instructors: Prof. Jinchao Xu and Prof. Xiantao Li

Office hours: Wed. 2:00 – 3:00 PM (Prof. Xiantao Li, McAllister 219C)
(Prof. Jinchao Xu, McAllister 205).

Textbook: ??

Course Summary: This course presents some basic numerical techniques in scientific computing. These are also essential elements in solve differential equations.

List of topics:

1. Solution of systems of linear equations
 - Direct methods: LU and Cholesky factorization
 - Indirect methods: Jacobi and Gauss-Seidel methods
2. Solution of nonlinear equations
 - Newton's method for nonlinear equation
 - Newton's method for system of nonlinear equations
3. Interpolation
 - Polynomial interpolation in one dimension
 - Spline interpolation
 - Interpolation in high dimension
4. Numerical differentiation and numerical integration
 - Numerical differentiation
 - Basic quadrature formulas
 - Gaussian quadrature
 - Numerical quadrature in high dimension
5. Pre-departure orientations