MATH 8442
Numerical Analysis and Scientific Computing

Spring 2017 — Lecture 1

Lecture: Mo, We, Fr   11:15 AM – 12:05 PM,   Vincent Hall 206

Lecturer: Matthias Maier
E-mail: `msmaier@umn.edu`
Office: 331 Vincent Hall
Office phone: (612) 625-0172
Office hours: We 1:30 – 2:30, Fr 1:30 – 3:30

Website: `http://www.math.umn.edu/~msmaier/math884x.shtml`

Text: Dr. Arnold's lecture notes:
                  `https://www.ima.umn.edu/~arnold/8441-8442.15-16/class-notes/notes.pdf`

                  A list of supplementary literature will be made available during the first week of class

Overview: Math 8441-2, Numerical Analysis and Scientific Computing, is a two semester course about the basic mathematical principles for devising and analysis of numerical methods. In particular we will cover approximation theory of functions, numerical integration, systems of nonliner equations and optimization, and numerical methods for ordinary differential equations, and elliptic partial differential equations (finite element and finite difference methods). Emphasis will be given as well to scientific computing aspects.

Topics for 8441, Fall 2016:

- Error and error propagation

- Lagrange interpolation and approximation

- Numerical integration

- Systems of nonlinear equations and optimization

- Introduction to ODEs

Topics for 8442, Spring 2017 (tentative):

- Numerical solution of ordinary differential equations

- Numerical solution of partial differential equations

- Iterative methods of numerical linear algebra

- (Numerical solution of eigenvalue problems)

Programming assignments: Part of the homework assignments will require to implement (short) numerical algorithms. For this course we will use the Python programming language. Details how to set up a python environment will be given in the first week of class and discussed in the first homework assignment.

Course assessment:

- Bi-weekly homework assignments (due on 1/27, 2/10, 2/24, 3/10, 3/31, 4/14, 4/28)

- Midterm (in class) on Friday, March 10, 11:15 AM – 12:05 PM, Vincent Hall 206

- Take-home Final due on Friday, May 5 (hand-out April 28)

Other policies: A link to other general policy statements—including statements about equal opportunity, disability accommodations, and mental health resources—appears on the course website above.