

MA322: Scientific Computing

Lecture 0: Introduction

Department of Mathematics
IIT Guwahati

Rajen Kumar Sinha

Overview: The main focus of this course is to make you familiar with various numerical methods for solving mathematical problems arise in science and engineering. The objectives of this course are:

- To develop computational procedures
- To study their performance (error analysis)
- To implement on the computer.

The main topics include: Iterative methods for nonlinear equations, interpolation, numerical differentiation and integration, one-step and multistep methods for ODEs, and BVPs in ODEs and the numerical solutions of PDEs by FDMs. For the detail course content:

<https://www.iitg.ac.in/maths/acads/>

Textbooks:

- ① D. Kincaid and W. Cheney, Numerical Analysis: Mathematics of Scientific Computing, 3rd Ed., AMS, 2002.
- ② G. D. Smith, Numerical Solutions of Partial Differential Equations, 3rd Ed., Calrendorn Press, 1985.

References:

- ① K. E. Atkinson, An Introduction to Numerical Analysis, Wiley, 1989.
- ② S. D. Conte and C. de Boor, Elementary Numerical Analysis - An Algorithmic Approach, McGraw-Hill, 1981.
- ③ R. Mitchell and S. D. F. Griffiths, The Finite Difference Methods in Partial Differential Equations, Wiley, 1980.

Software Requirement: MATLAB

Evaluation Policy: The evaluation for this course will be based on

- Mid-semester examination (20%)
- End semester examination (40%)
- Two quiz tests (20%; each test 10%)
- Lab assignments (20%)

Note: All assignments are to be submitted on or before the specified date. No submission will be accepted after the due date.

Class Schedule: Tuesday, Wednesday, Thursday (3:00 PM to 3:55 PM).

Lab Session: Tuesday (9:00 AM - 11:00 AM).

Teaching Assistant: Ms. Anjali Singh

End