

ACMS 60690-01: Numerical Analysis I, Fall 2019

Class website: <http://www.nd.edu/~jhauenst/acms60690>
9:25 – 10:15 am MWF in DeBartolo Hall 244

Instructor: Jonathan Hauenstein (152C Hurley Hall, hauenstein@nd.edu)

Prerequisites: Calculus, Linear Algebra, Differential Equations, programming language (e.g., Matlab, C)

Recommended Books: *Numerical Analysis: Mathematics of Scientific Computing (3rd Ed.)* Kincaid-Cheney, 2002.

Additional Reading: *Numerical Linear Algebra.* Trefethen-Bau, 1997.

Introduction to Numerical Analysis. Stoer-Bulirsch, 2002.

Finite Difference Schemes and Partial Differential Equations (2nd Ed.). Strikwerda, 2004.

Finite Difference Methods for Ordinary and Partial Differential Equations. LeVeque, 2007.

Description: Numerical analysis consists of developing and analyzing algorithms for computing numerical solutions to problems. Algorithms are implemented via computer programs and are studied to provide insight into their behavior, such as convergence rates and forward and/or backward error analysis. This course will introduce students to the fundamental concepts, theory, and techniques in numerical analysis and scientific computing.

Topics: As time permits, this course will cover the following:

1. Convergence and conditioning
2. Numerically solving linear and nonlinear equations
3. Approximating functions
4. Numerical differentiation and integration
5. Numerically solving ordinary differential equations
6. Numerically solving partial differential equations

Software: Implementation of algorithms is essential for this course. Students are free to choose the language they will use, but in-class demonstrations will mainly use MATLAB (available for free to students from <http://oit.nd.edu>).