MATH 1070 NUMERICAL MATHEMATICAL ANALYSIS

FALL 2016

Instructor: Catalin Trenchea, Thackeray 606, 624-5681,

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Office hours: MWF 2:00-3:00 and by appointment.

Lecture: MWF 10:00-10:50, 300 Old Engineering Hall.

Class web page: www.pitt.edu/~trenchea/Math1070_Fall_Semester_2016.html

Textbook: *Elementary Numerical Analysis*, 3rd edition, by K. Atkinson and W. Han.

Prerequisites: Single variable calculus. Knowledge of differential equations will be useful, but not required.

Content: This course is an introduction to modern numerical methods. Topics include polynomial and spline interpolation, numerical integration and differentiation, numerical solution of nonlinear equations and ordinary differential equations. Our goal will be to understand how and when the methods work. The concept of numerical error will be used to quantify the accuracy of approximation. We will also study the stability and the efficiency of the algorithms.

Topics to be covered:
- Chapter 1: Taylor polynomials
- Chapter 2: Computer representation of numbers, error
- Chapter 4, 4.1-4.3: Interpolation
- Chapter 5: Numerical integration and differentiation
- Chapter 3: Rootfinding
- Chapter 4, 4.4-4.7: Approximation of functions (if time permits)
- Chapter 8: Numerical solution of differential equations (if time permits)

Homework: Written homework and several computational projects will be assigned. Late homework will be accepted only by special permission of the instructor. Computer assignments will use Matlab, software by The MathWorks. The Matlab language provides extensive library of mathematical and scientific function calls entirely built-in. An introduction to Matlab will be given at the beginning of the course. A set of matlab codes implementing the numerical algorithms is provided by the authors of the text and is available on the class web page. The computer assignments will utilize this software and will emphasize analyzing the behavior of the algorithms rather than coding them.

Exams: Two exams will be given in class during the semester, at approximately five week intervals. A comprehensive final exam will be given during finals week. The final exam will give greater emphasis on material not previously tested by the midterm exams.

Grading Policy: The total of the two midterm exams will count 35% of the final grade. The homework will count 35% and the final exam will count 30%.