

MATH 8600 Section 1: Fall 2014

Introduction to Scientific Computing

Instructor: Timo Heister (heister@clemson.edu), (864) 656-0411

Homepage: <http://www.math.clemson.edu/~heister/>

Office: Martin O-14

Office Hours: Tue 2:00-4:00, Wed 10:00-11:30 and by appointment (see homepage for updates).

Prerequisites: CP SC 110, MATHSC 208, 311

Course Description:

This course is designed to introduce students to the appropriate numerical methods for approximating solutions to scientific problems.

Topical Outline:

1. Computer representation of number and floating point arithmetic,
2. Solution of non-linear equations,
3. Solution of linear systems
4. Least squares solution to equations,
5. Interpolation and curve fitting,
6. Numerical integration and differentiation,
7. Numerical approximation of Initial Value Problems.

Learning outcomes:

Upon successful completion of this course, a student will be able to:

1. Understand round-off error, floating point representation, and its consequences in computing
2. Derive, implement, analyze, and use algorithms for solving linear and nonlinear systems of equations
3. Analyze the condition of systems and draw conclusions about numerical stability
4. Approximate definite integrals with numerical methods, quantify errors
5. Solve ordinary differential equations with timestepping methods, error quantification
6. Proficient in implementing and using numerical methods

Attendance:

- Class meets TTH 12:30-01:45 in Martin M102
- Students are allowed two unexcused absences during the semester. More than two unexcused absences may result in a student being dropped from the course.
- Attendance at scheduled class tests and the final exam is MANDATORY, unless prior consent has been given by the

- instructor. No makeup tests will be given. In the event of an "excused absence" from a test that proportion of the students final grade will be added to that of the students final exam.
- Late Policy: If the Instructor is more than 15 minutes late, the class will be considered canceled.

Textbook:

required: "A First Course in Numerical Methods", Ascher and Greif, SIAM, ISBN: 978-0898719970

Course Assessment

Assessment for the class will be based upon class tests, homework assignments/quizzes, and a final exam.

First Midterm exam: 20%

Second Midterm exam: 20%

Final exam: 25%

Homework/assignments/quizzes: 35%

- Homework is due at the beginning of class.
- Late homework assignments will not be accepted! If your homework is late for a university approved absence, that assignment will not count for or against you.
- Partial Credit: The instructor reserves the right to assign negative partial credit to unrelated or extraneous answers.

Grading Scale

A = 90% - 100%, B = 80% - 89%, C = 70% - 79%,
D = 60% - 69%, F = Below 59%.

Course Etiquette

All course related interactions, including in the classroom and office meetings, will be conducted in a professional manner.

- Any e-mail correspondence with the instructor must adhere to proper professional standards.
- At least 24 hours notice is required for "by appt" office hours.

Academic Integrity

"As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately to charges of violations of academic integrity."

Integrity Policy:

<http://gradspace.editme.com/AcademicGrievancePolicyandProcedures#integritypolicy>

Disability Access Statement

"It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities.

Students with disabilities requesting accommodations should make an appointment with Dr. Arlene Stewart (656-6848), Director of Disability Services, to discuss specific needs within the first month of classes.

Students should present a Faculty Accommodation Letter from Student Disability Services when they meet with instructors. Accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester. Students are encouraged to contact Student Disability Services to discuss their individual needs for accommodation."

Title IX

"Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at <http://www.clemson.edu/campus-life/campus-services/access/title-ix/>"