# MATH 3650 Section 2: Fall 2016
# Numerical Methods for Engineers

**Instructor**: Timo Heister (heister@clemson.edu), (864) 656-0411
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**Office**: Martin O-14
**Office Hours**: (see my homepage)

## Course Description

This course is designed to introduce students to the appropriate scientific methods for numerically approximating the solution to engineering related problems.

## Topical Outline

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

## Learning outcomes

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

1. Understand round-off error and its consequences in computing.
2. Master algorithms for solving scalar nonlinear equations.
3. Solve square linear systems with Gaussian elimination method with partial pivoting.
4. Use the power method to find the largest eigenvalue of a matrix, and know when it will work and when it might not.
5. Interpolate functions with polynomials and piecewise polynomials
6. Approximate derivatives with finite difference methods, and quantify the error.
7. Approximate definite integrals with numerical methods, and quantify the error.
8. Solve ordinary differential equations with timestepping method such as forward and backward Euler, and quantify the error.
9. Be proficient at basic Matlab programming.

## Attendance

- Class meets TTH 11:00-12:15 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 textbook:
Scientific Computing for Scientists and Engineers, T. Heister and L. Rebholz, ISBN: 978-3-11-035940-4
see http://www.math.clemson.edu/~heister/scicompbook/ for details.

## Course Assessment

Assessment for the class will be based upon class tests, homework assignments, and exams.
First and second Midterm exam: 45%
Take-Home Final exam: 20%
- more details will be announced in class

Homework/assignments/quizzes: 35%
- Homework is due at the beginning of class.
- Late homework assignments will not be accepted! An assignment will be considered late if it is not handed in at the beginning of class on the due date. If your HW 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.

## Inclement Weather

“Any exam that was scheduled at the time of a class cancellation due to inclement weather will be given at the next class meeting unless contacted by the instructor. Any assignments due at the time of a class cancellation due to inclement weather will be due at the next class meeting unless contacted by the instructor. Any extension or postponement of assignments or exams must be granted by the instructor via email or Blackboard within 24 hours of the weather related cancellation.”

## 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.”
You can access further information here:
http://www.clemson.edu/academics/integrity/

## Accessibility Statement

“Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848, by emailing studentaccess@lists.clemson.edu, or by visiting Suite 239 in the Academic Success Center building. Appointments are strongly

encouraged – drop-ins will be seen if at all possible, but there could be a significant wait due to scheduled appointments. Students who receive Academic Access Letters are strongly encouraged to request, obtain and present these to their professors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester."
You can access further information here:
http://www.clemson.edu/campus-life/campus-services/sds/

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