

# AE4803/8803 TENTATIVE Syllabus

Numerical Analysis & Algorithms, Sections A & Q, 3-0-0-3 Credits

MWF 12:30pm-1:20pm, Klaus Advanced Computing 1456

## Instructor Information

<b>Instructor</b> Elizabeth Qian	<b>Email</b> eqian@gatech.edu	<b>Drop-in Hours &amp; Location</b> TBD
<b>Teaching Assistant(s)</b> TBD	<b>Email</b> TBD	<b>Drop-in Hours &amp; Location</b> TBD

## General Information

### Description

This course covers fundamental algorithms used in computational analysis and design of engineering systems. Topics include numerical integration of ODEs, numerical solution of PDEs, optimization, uncertainty quantification, and function approximation (learning models from data). Students will both implement these algorithms and analyze their behavior theoretically. Model problems will be drawn from applications in aerospace engineering.

### Pre-Requisites

**Pre-requisites** (1) introductory programming course or equivalent experience: you should be proficient with **for** loops, **if/else** statements, logical operators (**and/or**), and array indexing. (2) Undergraduate math through multivariable calculus and differential equations (MATH 1551, 1552, 1553, 2551, 2552).

**Additional helpful background** Some of the material we cover will rely on an understanding of some mathematical concepts beyond those in the pre-requisites, primarily in linear algebra and in probability. I plan to cover what you need to know in class, but note that a full course in probability (MATH 3215 or 3670) or linear algebra (MATH 4305) would help you understand the material at a deeper level.

### Course Goals and Learning Outcomes

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

1. Explain the purpose and basic principles of computational methods commonly used for analysis and design of (aerospace) engineering systems.
2. Implement fundamental numerical algorithms for the solution of ODEs and PDEs, optimization, uncertainty quantification, and function approximation for model problems in aerospace engineering.
3. Apply basic theoretical techniques to analyze the behavior of computational methods.

## Course Requirements & Grading

### Description of Graded Components

Your final grade will be based on a combination of scribing, minute papers, homework, and assessments. TBD on exact weights and form of assessment.

### Grading Scale

I will use the following standard scale as a basis for assigning final letter grades at the end of term. I may adjust the boundaries slightly at the end of term, but only in your favor.

A 90-100%

B	80-89%
C	70-79%
D	60-69%
F	0-59%

## Course Materials

### Course Text

There is no required text for this course. The material will be drawn from a variety of sources, I will keep an updated list as the term progresses. The primary record of the material covered in class will be the scribed notes.

### Additional Materials/Resources

[to be updated closer to term]

### Course Website and Other Classroom Management Tools

We will use Canvas.

## Course Expectations & Guidelines

### Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Suspected honor code violations will be referred to the Office of Student Integrity for investigation and follow-up.

### Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, please contact me as soon as possible so we can make sure you have what you need. A formal accommodations letter can be arranged through the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>. With or without a formal letter, please contact me as early as possible to help things run smoothly.

### Attendance and/or Participation

Attendance is not required. Recordings for distance learners will be made available to all enrolled students. However, in-class exercises and minute responses will be due within 24 hours of the end of class. If you do not attend class you will still need to complete these on time (except for excused late submissions).

### Collaboration & Group Work

[TBD on collaboration, outside resources, how to report outside resources]

### Extensions, Late Assignments, & Re-Scheduled/Missed Exams

[TBD.]

### Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectation that you can have

of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

### **Student Use of Mobile Devices in the Classroom**

TBD.

### **Additional Course Policies**

Food and drink: drinks are fine in the classroom. Please step outside to eat snacks or other food.

Religious observances: Please contact me as early as possible if you require accommodation for religious observances.