CEE 6461 Syllabus

Math Applications in CEE, Section 1, 3 Credits

Fall 2026

Instructor Information

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General Course Information

Description

This is an engineering mathematics course for graduate students interested in developing their mathematical skills for solving a wide range of civil and environmental engineering problems. Each topic will be introduced/motivated by some real engineering/physical problems. Presentation of the basic topics will be rigorous but applications to problems in engineering and science will be stressed. The course content includes the following:

- Ordinary Differential Equations: First-Order ODEs, Second-Order Linear ODEs, Higher-Order Linear ODEs, Systems of ODEs
- Linear Algebra: Matrices, Vectors, Determinants, Linear Systems, Matrix Eigenvalue Problems
- Vector Calculus: Vector Differential Calculus, Grad, Div, Curl, Vector Integral Calculus, Integral Transforms
- Fourier Analysis: Fourier Series, Orthogonal Series, Generalized Fourier Transforms, Fourier Transform
- Partial Differential Equations: Basic Concepts of PDEs, Method of Separation of Variables, Examples of Important PDEs, including Wave and Heat Equations.

Course Learning Outcomes

Upon successful completion of this course, the student should have the mathematical background necessary for a degree in CEE, including the ability to:

- Solve basic ordinary differential equations.

- Understand the fundamentals of linear algebra.
- Understand the fundamentals of vector calculus.
- Understand the fundamentals of Fourier analysis.
- Solve basic partial differential equations.

Required Course Materials

Advanced Engineering Mathematics, 10th Edition by Erwin Kreyszig

Grading Policy:

Letter grade: A (90 and above), B (80-90), C(70-80), D (60-70), and F (below 60)

Assignments

- Homework 1: 10%
- Homework 2: 10%
- Homework 3: 10%
- Homework 4: 10%
- Homework 5: 10%
- Homework 6: 10%
- Homework 7: 10%
- Final Exam: 30%

Description of Graded Components

- Homework: 5 problems each
- Final Exam: 6 problems, in class and closed book and notes. Equation sheet allowed.

Course Policies

Attendance and/or Participation

This will be an active classroom, where you will be expected to participate. Attendance will be taken into account in determining letter grades, particularly for students whose final grades fall near a grade boundary.

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. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Core IMPACTS

Core IMPACTS is the University System of Georgia's General Education curriculum. If you are teaching a course that counts towards Core IMPACTS, you should include a syllabus statement about the Core area and associated career competencies. This resource developed by the Center for Excellence in Teaching and Learning and Online Education at Georgia State University includes template syllabus statements for each of the Core IMPACTS areas that you may adapt for your course.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

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. The Student-Faculty Expectations articulate some basic expectations 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.

Pre- &/or Co-Requisite

None

Collaboration, Group Work, and Use of Generative AI

You are allowed to work in groups on all homeworks, but any work you turn in must be written in your own hand. In-class tests and exams are to be your own work.

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

Late homework will be penalized accordingly. Make-up exams are given for illness, approved Institute activities or religious observances.