GEORGIA INSTITUTE OF TECHNOLOGY
The George W. Woodruff School of Mechanical Engineering

ME 4042 – Interactive Computer-Aided Design and Computer-Aided Engineering

Semester: Summer 2026

Instructor Information

Instructor: Dr. Raghu Pucha
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Lecture Hours:
See Oscar.gatech.edu

Office Hours:
See Canvas

Course Summary

This course covers the principles of geometric modeling, parametric curves and surfaces, finite element methods, and interactive computer graphics. Emphasis is placed on the integration of CAD and CAE tools for mechanical and thermal design problems, supported by hands-on design and analysis projects.

Course Goals

The goals of this course are to:

- Explain the fundamentals and theory of geometric modeling, computer graphics, and the finite element method (FEM)
- Demonstrate how geometric modeling, computer graphics, and FEM are integrated within CAD/CAE systems
- Provide hands-on experience using commercial CAD/CAE software
- Develop skills for the design and analysis of practical engineering problems

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Course Outcomes

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

- **Objective 1:** Explain the basics of geometric modeling and computer graphics
- **Objective 2:** Explain the theory behind the finite element method and understand its practical implications
- **Objective 3:** Design and analyze practical engineering problems using integrated geometric modeling, FEM, and computer graphics
- **Objective 4:** Use commercial CAD/CAE software effectively for design and analysis
- **Objective 5:** Validate and critically assess results obtained from numerical models

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Course Topics

I. Introduction
II. Features of CAD / CAE / CAM Systems
III. Geometric Modeling
IV. General Process of the Finite-Element Procedure
V. Finite-Element Theory
VI. Practical Aspects of Finite-Element Modeling
VII. Design Projects

References and Learning Resources

- I. Zeid, *Mastering CAD/CAM*, McGraw-Hill, 2005
- Michael Mortenson, *Geometric Modeling*, 3rd Edition, Industrial Press, 2006
- J. D. Foley and A. Van Dam, *Fundamentals of Interactive Computer Graphics*, Addison-Wesley
- D. Solomon, *Curves and Surfaces for Computer Graphics*, Springer, 2006
- Daryl L. Logan, *A First Course in the Finite Element Method*, 5th Edition, Cengage Learning, 2012
- Web-based notes and tutorials provided on Canvas

Grading Policy and Weighting

Final grades will be determined as follows:

- **Homework / Quizzes (including participation):** 25%
- **Prelab and Lab Work:** 10%
- **Midterm Exam:** 30%
    - Lecture (Theory): 15%
    - Lab (Practice): 15%
- **Project Status Updates and Final Presentation:** 5%
- **Project Final Report and Digital Poster:** 30%

Late Assignment Policy

- Late assignments will receive a **20% deduction for each 24-hour period** beyond the due date until the assignment is closed on Canvas.
- Email submissions are **not accepted** after an assignment is closed on Canvas.
- Students aware of scheduling conflicts must notify the instructor or TA **before the due date** to request consideration.

Labs and Prelab

- Prelabs are provided as weekly instructional videos on Canvas. Students typically have one week to complete each prelab, which must be completed **before** the corresponding lab session.
- In-person lab deliverables are due within **24 hours** of their assignment.
- Instructional lab videos are posted on Canvas at the beginning of each lab.
- Canvas discussion forums will be used for software- and assignment-related questions.

Academic Honesty / Academic Integrity

Students are expected to comply with the **Georgia Tech Academic Honor Code**.

Students should familiarize themselves with their rights and obligations by reviewing: https://osi.gatech.edu/content/honor-code

All submitted work must be the student's own unless collaboration is explicitly authorized. Violations will be handled in accordance with Georgia Tech policies.

Students with Disabilities / Office of Disability Services

Georgia Tech is committed to providing reasonable accommodations for students with documented disabilities.

Students requiring accommodation should register with the **Office of Disability Services (ODS)** and notify the instructor as early as possible.

ODS Contact Information:
Email: dsinfo@gatech.edu
Website: https://disabilityservices.gatech.edu
Phone: 404-894-2563 (voice) / 404-894-1664 (TDD)

Student–Faculty Expectations Agreement

Georgia Tech values a respectful, professional, and inclusive learning environment. By enrolling in this course, students and faculty agree to adhere to the **Student–Faculty Expectations Agreement**, which outlines mutual responsibilities for respectful communication, academic engagement, and professional conduct.

Course Communication

- All course announcements, materials, assignments, and grades will be managed through **Canvas**.
- Students are encouraged to use office hours and Canvas discussion forums for technical questions.

This syllabus satisfies University System of Georgia and Georgia Tech minimum syllabus requirements. The instructor reserves the right to make reasonable changes during the semester, which will be communicated through Canvas.