Special Problems in CAE & Design

Course Information

Instructor: Roger Jiao (rjiao@me.gatech.edu)
Course Prefix and Number: ME 8913 JIA
Term: Fall 2026

Course Description

Individual studies and/or experimental investigations of problems of current interest in computer-aided engineering and design.

Course Learning Outcomes

1. **Communication**
    - Uses and understands professional and discipline-specific language
    - Expresses ideas orally in an organized, clear, and concise manner
    - Writes clearly and concisely using correct grammar, spelling, syntax, and sentence structure
    - Demonstrates an ability to interpret, evaluate, and create visual representations of ideas
2. **Creativity**
    - Shows ability to approach problems from different perspectives
    - Uses information in ways that demonstrate intellectual resourcefulness
    - Effectively connects multiple ideas/approaches
3. **Autonomy**
    - Demonstrates an ability to work independently and identify when guidance is needed
    - Accepts constructive criticism and uses feedback effectively
    - Uses time well to ensure work gets accomplished
4. **Ability to Deal with Obstacles**
    - Is not discouraged by setbacks or unforeseen events and perseveres when challenges are encountered
    - Shows flexibility and a willingness to take risks and try again
    - Troubleshoots problems and searches for ways to do things more effectively
5. **Intellectual Development**
    - Recognizes that problems are often more complicated than they first appear
    - Approaches problems with an understanding that there can be more than one right explanation or even none at all
    - Displays insights into the limits of their knowledge and an appreciation for what isn't known
6. **Critical Thinking and Problem Solving**

- Uses a reflective and iterative approach to problem solving
- Looks for the root causes of problems and develops or recognizes the most appropriate corrective actions
- Recognizes flaws, assumptions, and missing elements in arguments

7. **Practice & Process of Inquiry**
   - Demonstrates ability to formulate questions and hypotheses within the discipline
   - Demonstrates ability to properly identify and/or generate reliable data
   - Shows understanding of how knowledge is generated, validated, and communicated within the discipline
8. **Nature of Disciplinary Knowledge**
   - Shows understanding of the criteria for determining what is valued as a contribution in the discipline
   - Shows awareness of important contributions in the discipline and who was responsible for those contributions
   - Reads and applies information obtained from professional journals and other sources
9. **Project Knowledge and Skills**
   - Displays knowledge of key facts and concepts
   - Displays a grasp of relevant methods and is clear about how these methods apply to the research project
   - Demonstrates an appropriate mastery of skills needed to conduct the project
10. **Ethical Conduct**
    - Shows understanding of the importance of principles of Responsible Conduct of Research (RCR)

Required Course Materials

No textbooks or materials are required. Resources for research are determined in consultation with the instructor.

Grading Policy

This course is graded on a letter grade basis.

The grade will be assigned based on agreed upon objectives commensurate with the difficulty and scope of the project, the number of credit hours, as well as the technical proficiency of the student. It is the joint responsibility of the instructor and the student to discuss expectations and how meeting or not the expectations affects the final grade. The grading process will be clearly articulated to the student to allow reasonable prediction progress towards the final grade throughout the semester.

Attendance Policy

This course does not include scheduled class meetings. Students will engage in individual studies and experimental investigations on a regular basis commensurate with registered credit hours and as discussed with the instructor.

Academic and Research Honesty/Integrity Statement

Students are expected to maintain the highest standards of academic integrity. All work submitted must be original and properly cited. Plagiarism, cheating, or any form of academic dishonesty will result in immediate consequences as outlined in the university's academic integrity policy.

Core IMPACTS

This is a Core IMPACTS course that is part of the Arts, Humanities & Ethics area.
Core IMPACTS refers to the core curriculum, which provides students with essential knowledge in foundational academic areas. This course will help master course content, and support students' broad academic and career goals.
This course should direct students toward a broad Orienting Question: *How do I interpret the human experience through creative, linguistic, and philosophical works?*
Completion of this course should enable students to meet the following Learning Outcome: *Students will effectively analyze and interpret the meaning, cultural significance and ethical implications of literary/philosophical texts in English or other languages, or of works in the visual/performing arts.*
Course content, activities and exercises in this course should help students develop the following Career-Ready Competencies: Ethical Reasoning, Information Literacy, Intercultural Competence.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services 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

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 articulates some basic expectations that you can have of me and that I have of you. Additional information for research-related work is given in The Expectations of Advisors and Advisees. 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.

Campus Resources

For information on graduate research resources and support, contact the School of Mechanical Engineering at Georgia Tech. Students are encouraged to consult with the instructor regarding relevant resources for computer-aided engineering and design research.