CEE 6520 Syllabus

Behavior of Metal Structures

Fall 2026

Instructor Information

Instructor: Ryan J. Sherman, Ph.D., P.E.
Email: ryan.sherman@ce.gatech.edu

General Course Information

Description

This course examines specialized topics in the behavior and design of metallic structural components, connections, and systems, with respect to material properties, manufacturing processes, fatigue and fracture, repair and retrofit, and innovative technologies (e.g., metallic additive manufacturing). Case studies exploring forensic investigations, retrofit strategies, and field and laboratory experimentation will be presented throughout the course to enhance the practical application of the fundamental principles. Students will independently explore an innovative metallic structural engineering technology and share their findings through a term paper and short video with a peer-review component.

Course Learning Outcomes

During this course, the student will learn by actively participating in lectures and demonstrations, solving individual homework assignments, completing an independent research paper and video, and conducting a peer-review. After the student completes the course, they will be able to:

- Identify material properties and behavior of steel, including alloying, heat treatment, corrosion, and corrosion prevention
- Classify fatigue-prone details in cyclically-loaded structures
- Evaluate the remaining fatigue life using traditional fatigue analysis techniques
- Predict the fracture capacity of specific crack geometries
- Describe retrofit strategies for common steel structure repairs
- Summarize recent advances in metallic structure design and fabrication

Required Course Materials

There is no official textbook for the course. Course materials will be made available on Canvas. Many course references are available through the Georgia Tech Library.

References include, but are not limited to:

- AASHTO. (2020). LRFD Bridge Design Specifications, 9th Edition. Washington, DC.
- AASHTO/AWS. (2020). D1.5: Bridge Welding Code. Miami, FL.
- AISC. (2022). Manual of Steel Construction, 16th Edition. Chicago, IL.
- ASTM Standards (varies).

Grading Policy:

The final grade will be determined from the following grading scheme:

- Exams (2): (50%)
- Project(s): (30%)
- Homework: (20%)

A ≥ 90%; B ≥ 80%; C ≥ 70%; D ≥ 60%; F < 60%

Description of Graded Components

Homework

Homework assignments will be posted on Canvas. Please be concise and neat when submitting solutions. All students must submit their own homework assignments. Discussion of homework problems with other class members is highly encouraged. Utilizing another student's work to directly generate your own assignment is not allowed. Deliverables that show excessive similarities will receive a zero grade on the assignment. All assignments shall be submitted electronically via Canvas. Late homework is accepted with a 25% markdown per day, up to two days. No late homework will be accepted after the solutions are posted online. Late homework submitted due to medical reasons will be considered upon presentation of a doctor's note. Extensions for religious reasons, medical issues, or any other Institute-approved absence should be requested as soon as possible, prior to the homework being due.

Projects

Projects will be assigned throughout the semester (1 – 2 total). Each project will include reports and/or other deliverables that may require the student to conduct independent study, attend an SEMM seminar, and/or attend a professional conference virtually. Excessive similarities between deliverables will result in a zero grade on the project.

Make-up for projects completed during class will only be granted in exceptional circumstances and must be requested prior to the due date. Attendance may be taken during these classes to ensure fair participation of all group members.

Exams

There will be one midterm exam and a comprehensive final. Students will be permitted to use course-provided references and specifications for the exams. Exams may be either in-class or take-home format. No make-up exams will be provided unless arrangements have been made at least one week in advance.

Course Policies

Attendance and/or Participation

Students are expected to attend all lectures. Active participation is highly encouraged in all aspects of the course. Please notify the instructor well in advance of any known absences from class.

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.

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.

Use of Generative Artificial Intelligence (AI) Tools

Generative AI programs (e.g., ChatGPT) may be used in this course with instructor approval on specific assignments. Please be aware that the material generated may be inaccurate, incomplete, biased, or otherwise problematic. Per the Georgia Tech Honor Code, you may not submit any work generated by an AI program as your own. When submitting material generated by an AI program, it must be properly cited like any other reference material.

Recordings of Class Sessions and Required Permissions

Due to the increased use of distance learning, our class sessions may be audio-visually recorded for use by enrolled students. Any class recordings, lectures, and other classroom presentations delivered via video conferencing, as well as materials posted on Canvas, are for the sole purpose of educating the students enrolled in the course. Students may not record or share recordings, including screen capturing, unless the instructor states so or individual permission is obtained.

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.