CEE 6445 Syllabus

Geotechnical Earthquake Engineering, Section A, 3 Credits:3

Fall 2026

Instructor Information

Instructor: Jorge Macedo, Ph.D., P.E., Associate Professor, School of Civil and Environmental Engineering

Email: jorge.macedo@gatech.edu

General Course Information

Description

This course introduces graduate students to the field of geotechnical earthquake engineering. Lectures will describe how earthquake hazards are quantified; the course also exposes students to engineering methods used for seismic analysis and design of geotechnical engineering systems. Emerging trends in geotechnical earthquake engineering are also discussed.

Course Learning Outcomes

By enrolling in this course, students will:

1. Gain knowledge on how earthquakes are generated and how they impact infrastructure.
2. Gain knowledge on how seismic hazard is quantified in engineering projects.
3. Gain knowledge in performance-based seismic engineering design concepts.
4. Gain knowledge on seismic engineering design methods for geotechnical systems

Required Course Materials

Kramer, S. L., & Stewart, J. P. (2024). Geotechnical Earthquake Engineering (2nd ed.). CRC Press. Additional supplemental materials will be posted online.

Grading Policy:

Course grading will be based on the following components: homework (30%), midterm exam (20%), final exam (30%), course project (15%), and class participation (5%). The course project requires students to conduct a literature review on a selected topic in geotechnical earthquake

engineering, culminating in a written report and an oral presentation at the end of the semester. Homework assignments will be distributed throughout the semester. The table below summarizes the grading distribution.

Assessment	Allocation
Homework	30%
Course Project (Presentation and Report)	15%
Midterm Exam	20%
Final Exam	30%
Class Participation	5%

Grading Scale: A: 90–100%, B: 80–89.9%, C: 70–79.9%, D: 60–69.9%, F: below 60%

Description of Graded Components

Homework: Homework will align with the topics discussed in class. There will be seven homework assignments (HW) throughout the semester. Each HW is due by 11:59 PM on the specified due date and must be submitted via CANVAS.

Homework Plans (Weeks 3–15)

1. HW 1: General concepts of geotechnical earthquake engineering
2. HW 2: Use of ground motion models to quantify hazard
3. HW 3: Probabilistic Seismic Hazard Assessment
4. HW 4: Selection of ground motion time histories for seismic design.
5. HW5: Dynamic properties of geotechnical materials
6. HW6: Liquefaction
7. HW7: Seismic performance assessment of geotechnical systems

Homework Format Requirements:

1) Homework must be neat, legible, and organized.
2) The students' names, the Homework number, and the date must be on all assignments.
3) All graphs must be computer-generated. Hand-drawn graphs will not be graded.
4) Any assumptions students make in findings solutions must be clearly stated.

Midterm Exam: The midterm will be in week 9 and will cover topics through week 7 of the semester.

Final Exam: The final exam will cover all topics discussed in the class.

Course Project: The course project requires students to conduct a literature review on a selected topic in geotechnical earthquake engineering, culminating in a written report and an oral presentation at the end of the semester. The specific topic will be selected in coordination with the instructor during week 3 of the semester.

Course Policies

Attendance and/or Participation

Attendance at all lectures is encouraged. In accordance with the Institute's requirement, verification of participation in the class will be reported to the Registrar's Office and the Office of Scholarships and Financial Aid

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.

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

Late assignments will only be accepted without penalty if students have asked for permission (with a GT-approved excuse or for other extenuating circumstances) at least 48 hours before the assignment is due; a proposed submission date is required. Under other circumstances, homework scores will be reduced by 25% for each day late (including weekends). This applies to all late homework, for any reason, in the absence of an official GT excused absence.

Collaboration, Group Work, and Use of Generative AI

Students are expected to participate in class activities in accordance with the standards outlined in the Georgia Tech Academic Honor Code. Cheating of any kind is unethical and unacceptable; students should quote and attribute any words/ideas that are not their own.

For every assignment submission and the course project, students are requested to include a GenAI acknowledgment. The acknowledgment should include the following:

- Identification of the tool(s) used.
- An explanation of why the student decided to use the tool(s);
- A description of how the student used the tool(s) to manage assignment/project requirements.
- (If relevant) A description of the student's innovative use of GenAI; and
- A reflection on the student's experience using the tool(s), exploring what worked or didn't, and acknowledging the limitations of the tool(s) for the assignment, potential biases, etc.

If the student opts not to use GenAI tools when not required, the student should use the 'GenAI Acknowledgment' to highlight the non-GenAI approach.

Campus Resources for Students

Graduate Student Academic and Professional Success Resources:

A list of resources for graduate students is given on the Office of Graduate and Postdoctoral Education website. Specific information for current graduate students includes

- Academic Resources such as the Communications Center, Language Institute, Library, Catalog, Registrar, resources for conducting research, Advocacy and Conflict Resolution resources, and how to manage unexpected situations that may impact your academic performance;
- Student Resources such as Campus Services, Child Care/Family programs, Health & Wellness, Career Services, and the Student Resource Guide; and

- *Professional Development such as the programming from the Career Center and other professional development resources and events"*

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being (student-resource-guide (gatech.edu)