

CEE 6441 Syllabus - Spring 2022**Analysis of Earth Structures****Mondays & Wednesdays, 3:30 to 4:45 p.m., Location: Mason 1133****Instructor Information**

Instructor	Email	Office Hours & Location
David Frost, PhD, P.E.	david.frost@ce.gatech.edu	Open Mason 2278

General Information

CEE 6441 – Analysis of Earth Structures will include lectures, homework and mid-term/final exams. A field trip to a relevant construction site will be scheduled as opportunities/schedules permit.

Description

This course provides an integrated insight into natural and human constructed geotechnical grade separations and the role that slopes and retaining structures play in safely engineering and maintaining these separations. The course will cover an understanding of the forces that result when a grade separation exists and how that is managed from an engineering perspective to limit unbalanced stresses and displacements. The course will cover discussions on unreinforced and reinforced slopes and retaining structures. Separations achieved using both top-down and bottom-up construction approaches will be discussed and the various means of achieving unbalanced force restraint will be presented.

Pre- and/or Co-Requisites

CEE 4405 - Geotechnical Engineering, or equivalent introductory course on soil mechanics.

Course Goals and Learning Outcomes

This course has two primary objectives. The first is to provide exposure to techniques for assessing the stability of earth retaining structures including unreinforced slopes, reinforced slopes, free-standing retaining structures and reinforced retaining walls under static and dynamic load conditions. The second is to learn how to effectively use analytical software to “develop an understanding” for the critical component(s) in a structure. Finally, examples throughout the course will be used to illustrate a number of peripheral considerations in the conceptualization, design and construction of various grade separation structures. The course will use a number of case histories and design examples to illustrate pertinent considerations. There will be a field trip to at least one active project.

Course Requirements & Grading

Assignment*	Date	Weight (%)
Homeworks	Various	40%
Midterm	Week 8	15%
Final Exam	Week 16	45%

***Note:** or alternate means of in-class assignments, including open discussions, group exercises, in-class field trips for site reconnaissance, in-situ testing demonstrations, and in-class quizzes, as discussed in lecture sessions.

Description of Graded Components

Reading materials may be assigned 48 hours prior to class. Quizzes may be given at random to assess the students' understanding of the assigned reading materials.

Homework assignments usually involve calculations performed using computer software. Homework assignments should be submitted electronically as a single email pdf attachment to the Instructor by the assignment due date.

The midterm will be open notes and open book, and will include material covered up to the class prior to the exam. The final will also be open notes and open book, and will cover material from the entire course but will focus more on materials taught after the mid-term exam. The use of calculators, personal computers, phones or other electronic devices is permitted.

Extra Credit Opportunities

Normally, no extra credit problems or assignments are given, unless special circumstances occur.

Grading Scale

Your final grade will be assigned as a letter grade according to the following nominal scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Course Materials

There are no required purchased textbooks for this course. Course reading materials will be provided in the form of PDF notes of the lectures, supplemented with design manuals, technical documents, and selected papers and reports that are assigned by the Instructor.

Course Website and Other Classroom Management Tools

Reading materials, notices, homework assignments, and select papers/technical documents will be posted on Canvas for viewing and download by the class attendees.

Course Expectations & Guidelines

Please follow the best practices for teaching and learning at [Georgia Tech policies and procedures](#).

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. For information on Georgia Tech's Academic Honor Code, please visit

<http://www.catalog.gatech.edu/policies/honor-code/http://www.catalog.gatech.edu/rules/18/>

Any student suspected of cheating or plagiarizing 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 at (404) 894-2563 or <http://disabilityservices.gatech.edu/>

Attendance and/or Participation

The university requires that the Instructor report when each of the students last took classes, at set established deadlines during the semester term (usually during the first two weeks, and then again at final exam periods). While it is not mandatory to attend all classes, periodic sign-in sheets will be circulated during class so that the Instructor has some record as to who has attended or not, for reporting purposes.

Collaboration & Group Work

Students are expected to complete their own homework assignments in order to gain full credit on each task. Collaboration on overall strategies and procedures is permissible. However, copying someone else's work and merely changing one's name on the document is impermissible.

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

If a student must be excused from a midterm or final examination, coordinate with the Instructor as soon as possible for a make-up test.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and students, as detailed in:

<http://www.catalog.gatech.edu/rules/22/>

A simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, you are encouraged to remain committed to the ideals of Georgia Tech while in this class.

Student Use of Mobile Devices in the Classroom

Smart phones, computers, and tablets are permitted in the classrooms during lectures, in-class assignments, and/or demonstration sessions. Please refrain from texting, web browsing and emails during class. If needed, voice calls should be reserved for outside of the classroom for courtesy reasons.

Additional Course Policies - Food & Drink

Food and drink within reasonable quantities are okay in the classroom, excepting alcoholic beverages and other prohibited substances.

Campus Resources for Students

Additional resources for GT students include: the Gilbert Price Library, The Communication Center, The Center for Academic Success, Counseling Center, The Division of Student Life, and Women's Resource Center.

Draft Course Schedule* - CEE 6441 Analysis of Earth Structures - Spring 2022

Date	Topic	Instructor - Remarks
Jan. 10	Course overview/introduction	Frost
Jan. 12	EBB retaining wall construction	Frost
Jan. 17	MLK Day	Frost
Jan. 19	Slope stability analysis	Frost
Jan. 24	Lateral earth pressures	Frost
Jan. 26	Slope stability analysis software	Frost
Jan. 31	Seepage, flownets, base heave and piping	Frost (DF/Lifelines) - remote
Feb. 2	Method of fragments	Frost (DF/Lifelines) - remote
Feb. 7	XXXXX – guest – Atalay?	Guest (DF/I-Corps)
Feb. 9	XXXXX – guest – Atalay?	Guest (DF/I-Corps)
Feb. 14	Alternative grade separation systems	Frost
Feb. 16	Cantilever sheet pile walls	Frost
Feb. 21	Anchored sheet pile walls	Frost
Feb. 23	Soldier pile and lagging walls	Frost
Feb. 28	Mid-term Exam	Frost
Mar. 2	Construction changes - Calgary wall failure	Frost
Mar. 7	Tie-back anchors	Frost
Mar. 9	Soil nail walls	Frost
Mar. 14	Internally braced excavations	Frost
Mar. 16	Cellular cofferdams	Frost
Mar. 21-23	Spring Break	Frost
Mar. 28	Slurry trench stability	Frost
Mar. 30	Reinforced earth structures overview	Frost
Apr. 4	XXXXX – Tensar guest – Liew?	Guest (DF/CBBG)
Apr. 6	Reinforced earth structures – global/internal stability	Frost
Apr. 11	Global/local/internal stability	Frost
Apr. 13	Settlement of foundation and backfill	Frost
Apr. 18	Backfill selection effects – Barren River wall failure	Frost
Apr. 20	Performance of composite structures	Frost
Apr. 25	Monitoring of earth structures	Frost
Apr. 29	Final Exam (2:40 – 5:30 pm)	Frost

*Tentative based on scheduled meetings, weather, conferences, and other factors