

CEE4803C Hands-On Treatability and Design

Credits: 3-0-3

Fall 2026

Instructor Information

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General Course Information

Description

Welcome to CEE 4803C, where you will gain hands-on treatability experience on a contaminated wastewater, drinking water, groundwater, leachate, stormwater, and/or natural water body source. Related topics including literature reviews to identify testing approaches, regulatory reviews to identify pertinent limits and treatment goals, and conceptual engineering design will also be addressed. This class is intended for junior and senior CEE students and MS students interested in a short-term (not thesis level) hands-on treatability experience. The class enrollment is limited to 10 students to ensure each student has direct hands-on experience.

Course Learning Outcomes

Each semester, an actual contaminated water/wastewater source will be selected as a treatability case study. Ideally, this will be provided via an industrial, municipal, commercial, or state/federal client; if no client is available, a public or natural water body accessible source will be selected to create hands-on experience in setting up and running physical/chemical treatment processes. The course will include a primary client but may also test other samples such as a simulated textile wastewater to ensure exposure to different treatment techniques.

The class is intended to reflect the effort that would occur if an engineering firm were retained to assess a water/wastewater contamination issue, determine the pertinent regulatory limits, conduct hands-on treatability testing to determine a treatment approach, summarize test data, provide a conceptual engineering process flow diagram to implement that treatment, and prepare a treatability test letter report. If the test data shows technically significant conclusions and the client has not required confidentiality, students may elect to pursue subsequent preparation of a conference presentation, submission of a paper for publication, and/or entry

of the topic into a student design competition, with the professor's support. In two recent offerings of the class, a subset of the fall semester students have competed in spring semester student design competitions (after the class ended, but using data from the class), and won 3rd place overall (state-wide) in both 2025 and 2026.

By the end of this course, students will be able to complete these tasks:

- Conduct literature searches to identify treatments to test,
- Use or identify pertinent regulatory limits,
- Plan and prepare for testing,
- Conduct hands-on treatability testing to identify a treatment approach,
- Discuss test data and recommend follow-up actions,
- Prepare a Treatability Report including process flow diagram, and
- Demonstrate knowledge attained on a Final.

Due to the timing of a semester class, the focus of the class will typically be on physical/chemical treatment rather than biological treatment. Irrespective of the exact nature of the client's water/wastewater, the goal for the semester is to ensure hands-on experience on:

- powdered activated carbon (PAC) treatment with magnetic stir plates or shaker tables,
- precipitation (including use of coagulants and polymers) with a gang stirrer apparatus,
- air stripping with air stones and pumps,
- solids removal via filtration with syringe filters, vacuum filter apparatus, or bag filters,
- in-house analyses (pH, TDS, and HACH or similar),
- lime slurry and anionic polymer prep, and
- chemical dosing (prep and pipette, etc.).

Required Course Materials

The course will make use of on-line resources, client-provided data, and lecture slides. Students should expect to conduct independent research via literature searches and reviewing textbooks as needed. No textbook purchases are required; I have a variety of books in my office that will be made available.

Each student is responsible for having a lab coat; if cost is a barrier, some lab coats are available for borrowing but preference is for each student to have their own. Safety glasses and gloves are provided at the lab.

Grading Policy:

- 10% (Individual) – Attendance, participation/contribution, and safety training
- 8% (Individual) – Conduct literature searches to identify treatments to test,
- 5% (Individual) – Use or identify pertinent regulatory limits,
- 5% (Individual) – Plan and prepare for testing,
- 22% (Individual) – Conduct and document hands-on testing,

- 5% (2 or 3 person team) – Discuss test data and recommend follow-up,
- 20% (2 or 3 person team) – Prepare a Treatability Report including process flow diagram, and
- 25% (Individual) – Demonstrate knowledge attained on a Final.

Description of Graded Components

- Attendance and participation/contribution – is based on both presence and contribution to class discussions, as well as prompt completion of any lab safety training modules
- Literature searches – involves conducting a literature search to identify methods or setpoints likely to be usable for the sample
- Regulatory limits – consists of identifying what limits (local, federal, etc.) pertain to the selected wastestream; if the limits are pre-provided by the client, this task will instead be assigned as a homework to find and document regulatory limits for some other city or source
- Test plan – consists of identifying the materials and setpoints/approaches that you would recommend be used in testing, discussing your approach with the class, and determining as a class (with guidance by the professor) what tests to run
- Hands-on testing – grade is based on contribution in the lab, quality of work in the lab (carefulness, safety), accuracy/completeness/neatness of note taking, and follow-up documentation (mini-lab reports) as needed to document procedures and results
- Test data (team) – consists of discussing initial results to determine if more tests are needed, in a format suitable for informal class discussion
- Treatability Report (team) – involves a written summary of the results including a process flow diagram, in a format suitable for a client delivery
- Final – involves a test addressing the procedures and activities of the class; a study guide will be provided.

Course Policies

USG Required Course Policies [remove this heading in your final syllabus]

Attendance and/or Participation

Due to the nature of this class, class attendance is critical. For certain hands-on lab activities, students will have the opportunity to select from different time slots to gain experience.

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.

Additional Georgia Tech Required Policies [Remove this heading in your final syllabus]

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.

Campus Resources for Students

Undergraduate Student Academic Success Resources:

Academic Support: Academic Success and Advising (a unit in the Office of Undergraduate Education & Student Success) provides free support for your courses. Students can attend scheduled supplemental review (PLUS) sessions, stop by Drop-In Tutoring, or schedule a one-on-one appointment through Knack. To explore what options work best for you, please visit us online at success.gatech.edu/tutoring, email us at tutoring@gatech.edu, or come see us at Clough Undergraduate Learning Commons, Suite 283.

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 \(gatech.edu\)](#))