

Environmental Geochemistry Lab (Tuesday OR Wednesday, 3:30pm-6:15 pm; ES&T L1155)

Lab Instructor: Jennifer Glass
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Office Hours: xx

Tuesday TA: xx
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Overview

The Environmental Geochemistry laboratory will consist of two parts: 1) a fieldwork portion where students will learn basic environmental sampling techniques and 2) a hands-on laboratory portion in which you will learn basic laboratory techniques used by geochemists. Over the course of the semester, you will develop skill sets that will allow you to compare and contrast the geochemistry of different natural environments in an urban setting and build the confidence to present your findings in a poster session to members of the EAS community.

We are sampling natural environments. To this end, even I do not know what our findings will be at the end of the semester. This lab is intended to simulate the scientific process within geochemistry, while exposing you to the uncertainty of not knowing the results when you start sampling.

Learning Objectives

Upon successful completion of this course a student will be able to:

- 1) Characterize and describe various sampling sites.
- 2) Select appropriate sampling methods and sample preservation techniques.
- 3) Practice and master common analytical techniques used to quantify various environmental chemical species.
- 4) Analyze data and apply the results to understand “real-world” environmental situations.

General Laboratory Sequence

Lab modules are designed to be completed in the 3-hour lab period and incorporate environmental and quantitative chemical elements from lecture and general chemistry. Prior to lab exercises, you will complete a pre-lab quiz posted on Canvas. During the lab, you will work with a partner on each lab assignment and maintain individual lab notebooks. The first lab will be an organizational meeting and an introduction of the students, Dr. Glass, and your TA. Two labs will involve sampling and describing sites both on and off campus for spatial and temporal comparisons.

a) Environmental Sampling

We will take water, soil, and sediment samples from several different sites on and off campus to introduce you to field measurements. These will be brought back to the laboratory where they will be further analyzed during subsequent laboratory modules.

b) Analytical Chemical Analyses

Weeks spent in the geochemistry lab are designed to introduce basic wet chemical techniques and improve quantitative skills in a chemistry lab (e.g. making standards and quantitative solutions, calibration methods, mathematics and dimensional analyses, and modeling). In these labs, students will analyze real samples previously collected and each group will post their findings in the class notebook (Canvas).

c) Lab Report

There will be a lab report after the final sample analysis.

d) Final Poster

All members of each section of 4221 will compile a group final poster that will detail and discuss the chemical differences and similarities between our different sampling sites. Details for the final poster are listed in the supplemental packet that the instructor will provide later in the semester and your TAs will make sure to help you with this compilation. Each individual is responsible for describing 1-2 key points of our study.

Evaluation and Grading

Labs 4, 5, 6, 8, 9 and 10 will consist of a pre-lab quiz, laboratory exercise, data collection, and post lab data analysis which will be posted in the class workbook. All data collected and calculations will be recorded in an online laboratory workbook which will be inspected weekly by the laboratory instructors. You will post your data to Canvas so we can discuss as the semester progresses. Grades will be posted in Canvas weekly. There will be a mid-term lab quiz focused on a proposed (not actual) research project using the instrumentation available in the lab and the class will conclude with a final poster (group work) where you will work on an assigned sub-category.

Pre-lab Quizzes:	20%
Lab Notebook (weekly checks):	10%
Updated Group Data (spreadsheet checked weekly):	20%
Midterm Quiz:	15%
Lab Report:	10%

Final Poster:

25%

We use the same letter grading scale as the lecture portion of the class. A 90% average is an A and 80% is a B, etc.

Attendance and Participation Policy:

Laboratory attendance is required. However, if you have an official GT excuse for missing a lab, a makeup will be scheduled with your TA or Dr. Glass. If you have a conflict and would like to attend the other lab section, this request must be received by Dr. Glass via email one week prior to your scheduled lab.

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/> or
<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/>, as soon as possible, to make an appointment to discuss your needs and to obtain an accommodations letter. Please also e-mail me as soon as possible to set up a time to discuss your accommodation preferences.

Laboratory Experiments and Tentative Schedule (subject to revision)

Lab 1 (Aug 19/20): Laboratory Introduction, Safety Training

Lab 2 (Aug 26/27): Field Methods (MoSE and Eco-commons Wetlands)

Lab 3 (SUNDAY, Sept 7):

Off Campus Site Visit to the Chattahoochee River

Lab 4 (Sept 9/10): Flame Atomic Absorption Spectroscopy (FAAS): Major Cations

Lab 5 (Sept 16/17): FAAS Part 2: Quantifying Major Cations

Lab 6 (Sept 23/24): Phosphate Analysis via Spectrophotometry

Lab 7 (Sept 30/Oct 1): **Lab Midterm Quiz**

Lab 8 (Oct 7/8): Introduction to Titration Methods: Alkalinity

Lab 9 (Oct 14/15): Ion Chromatography: Quantifying Major Anions

Lab 10 (Oct 21/22): Spectrophotometry II: Nitrate and Nitrite with Fe Analysis

NO Lab (Oct 28/29): Lab Report Due 6pm October 29th

Lab 11 (Nov 4/5): Data Analysis (Reanalysis)/Poster Preparation

Lab 12 (Nov 11/12): Final Data Compilation/Finalize Poster/Final lab clean-up

POSTER SESSION Tuesday, November 18, 11am (Ford First Floor Atrium)