EAS 4420/6120: Environmental Field Methods Fall 2023

Lectures: Skiles 249 - MWF 9:30-10:20 am
Laboratory: L1155 EST - M 12:30-3:15 pm

I. Instructors

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Teaching Assistants:

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Linda Arterburn
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II. Overview and Objective

The objective of this course is to introduce students to the acquisition and analysis of environmental field data. The course will take place around Skidaway Island and focus on a coastal region that represents a transition from land to the ocean. Two field trips will be conducted during the semester to collect samples and data in salt marsh, estuarine, and shallow subsurface environments, as well as from the atmosphere around the island. To minimize conflicts with other courses, these field trips will have to be conducted mostly during week-ends. However, **two school days will be used (Sept. 18 and Oct. 23) for these field trips**.

A variety of physical, chemical, and biological environmental parameters will be collected and analyzed during these field trips. Undergraduate students will be assigned individual projects that relate to their expertise. Graduate students will write a two-page long proposal that describes their own research project for the course. Graduate students are also expected to gather information from two different angles (i.e., different types of measurements) on the same project.

EAS 4420/6120 emphasizes the completion of individual interpretations of diverse data sets, individual reports, a group report, and a group presentation to the EAS faculty, postdocs, and students. Each student will be responsible for an aspect of the group research related to their expertise and will contribute to the final report and presentation compiled during the final week of classes. This course will also include assignments and a mid-term (no final exam). Assignments will include regular homework on material covered in class, individual presentations on a topic related to the course, and individual reports after the field trips. Presentations will be 25 minutes long, including 5 minutes for discussion, and cover the research topic of the student. Presentations will include introduction, objective, methods, results, discussion, and conclusions and present at least one research paper on the topic of the student in addition to data collected by the student. Power point presentations can be sent to Drs. Taillefert and Handlos Wednesday before the presentation for feedback. The final presentation has to be submitted at the latest by 8:30 am on Friday. Individual reports will be 15 pages, not including figures and references, double-spaced and in standard 12-point font. They will have the format of a scientific paper with introduction, material and methods, results, discussion, conclusions, and scientific references. Reports have to be submitted on Canvas on the due dates. A 20% penalty per day late will be enforced.

The laboratory component will include a few lectures on the state-of-the-art of taking and reporting measurements, laboratory and field safety, cleanliness and behavior in the laboratory,

calculations, and other topics related to the course. The laboratory time should be used to set up experiments, instruments, or methods and process samples and data collected in the field.

III. Learning Outcome

Students will learn how to design field experiments, prepare equipment and material for field work, acquire samples and data in the field, analyze and interpret field data, write scientific reports, and interact with scientists across disciplines. Students will also gain knowledge on common environmental issues in the atmosphere, subsurface environments, and aquatic systems. Finally, students will learn how to interact with scientists across the disciplines of EAS.

IV. Course Material

Course material will consist of class notes, handouts, and assigned readings (no textbook).

V. Grading

20% Individual reports (total of 4 drafts)
10% Final group report
20% Laboratory activities
10% Mid-term exam (no final exam) - Extra questions for graduate students
15% Problem sets and related assignments (additional proposal for graduate students)
15% Presentations
10% Field activities, group interaction, contribution.

VI. Course Outline

1. Introduction: social context of environmental problems, key regulations
- Impact of coastal development: nutrient inputs, runoffs, eutrophication, hypoxia
- Atmospheric composition and pollution in coastal environments
- Climate change and catastrophic events

2. Geological evolution and structure of the coastal environment
- Deposition processes
- Tectonic background on the East coast
- Mineralogy, hydrology, and oceanic basins

3. Atmospheric measurements
- Aerosols and gases
- Satellites for oceanographic data (SSTs, chlorophyll a, turbidity, ocean color, winds)
- Satellites for land surface and near-surface data (carbon, hydrology, soils, topography, meteorology, radiation and clouds, snow, sea ice, oceans, vegetation)

4. Geophysical measurements
- Hydraulic conductivity (grain size analysis, water levels, permeameter analysis, DC resistivity, EM induction) and pore structure and microstructure (X-ray tomography)
- Geomorphology (ground penetrating radar, seismic tomography)
- Water composition (conductivity, salinity, temperature) and currents (ADCPs)

5. Geochemical measurements
- Water composition (oxygen, cation, anions, pH, alkalinity)
- Soil and sediment texture and composition
- Redox biogeochemical processes

VII. Tentative Schedule of Class

Aug. 21-23-25:	**Introduction and Organization** Class contact information Science section responsibilities (identify students' interests) Assignments for next two weeks: Subjects picked by students from a list and literature search on subject Schedule of student presentations
Aug. 28-30-Sep. 1:	**Chapter I Lectures** Report support responsibilities (identify leading student) Field trips logistics (food preference; Emergency form; Liability/Weaver form; What to bring for field trips) Student assignment for Ch. I (Sept. 1)
Sept. 4:	**Labor Day - No class**
Sept. 6-8:	**Chapter I cont. Lectures** Deadline: Homework 1 (Sept. 8) Deadline: Graduate Student Proposal due (Sept. 8) 1st student presentation (Sept. 8)
Sept. 11-13-15:	**Chapter II Lectures** Student assignment for Ch. II and 2nd student presentation (Sept. 15)
***Sept. 15-18:**	**Field trip 1** Site visit to Skidaway Institute of Oceanography, Savannah (GA). Leave Tech on Sept. 15 late afternoon. Work on the site Sept. 15-17 and return to ATL on Sept. 18.
Sept. 20-22:	**Chapter II cont. Lectures** Student assignment for Ch. II and 3rd student presentation (Sept. 22)
Sept. 25-27-29:	**Chapter III Lectures** Deadline: Draft of first individual report due (Sept. 29) Student assignment for Ch. III and 4th student presentation (Sept. 29)
Oct. 2-4-6:	**Chapter III cont. Lectures** Student assignment for Ch. III and 5th student presentation (Oct. 6)
Oct. 9:	**Fall Break**
Oct. 11-13:	**Chapter IV Lectures** Deadline: Second draft of individual report due (Oct. 13) Student assignment for Ch. IV and 6th student presentation (Oct. 13)
Oct. 16-18-20:	**Chapter IV cont. Lectures** Student assignment for Ch. IV and 7th student presentation (Oct. 20)

***Oct. 20-23:**	**Field trip 2** Second Site visit to Skidaway Institute of Oceanography, Savannah (GA). Leave Tech on Oct 20 at 4 pm. Work on the site Oct. 21-22 and return to ATL on Oct. 23.
Oct. 25-27:	**Chapter V Lectures** Mid-Term (Oct. 25) Student assignment for Ch. V and 8th student presentation (Oct. 27)
Oct. 30-Nov.-1-3:	**Chapter V cont. Lectures** Student assignment for Ch. V and 9th student presentation (Nov. 3)
Nov. 6-8-10	**Chapter V cont. Lectures** Student assignment for Ch. V and 10th student presentation (Nov. 10) Deadline: Third draft of individual report due (Nov. 10)
Nov. 13-15-17:	**Presentation and Discussion of Individual Projects** All students (presentation and discussion of individual results) 11th student presentation (Nov. 17)
Nov. 20:	**Group Report Discussion and Organization in Class** Deadline: Final individual report due (Nov. 20)
Nov. 22-24	**Thanksgiving Break**
Nov. 27-29-Dec. 1:	**Group Presentation Practice and Final Seminar (Dec 1, 3:30 pm)**
Dec. 13:	**Group Report Due**

*We will leave in the afternoon of Sept. 15 and Oct. 20. Sept. 18 and Oct. 23 are school days intended for field work. If these days conflict with other classes, send Drs. Taillefert and Handlos an e-mail with the course name and number, and the name and e-mail of the professor at least a week in advance. We will ask permission to excuse your absence during these two days only.

VIII. Class Guidelines and Expectations

Course Homeworks/Assignments/Papers

Paper copies of assignments along with scripts and figures should be submitted by 6 pm on the due date.

Mid-Term Exam

The mid-term exam will be offered in class using a closed book format.

Course Attendance and Participation

In-class attendance and participation are expected, but remote participation will be accommodated to students who have to isolate or quarantine (see below).

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 (https://catalog.gatech.edu/policies/honor-code). Any student suspected of cheating or plagiarizing on an assignment will be reported to the Office of Student Integrity.

AI-based assistance (e.g., ChatGPT, Copilot) is treated the same way as collaboration with other people: you are welcome to talk about your ideas and work with others, including AI-based assistants. However, all work you submit must be your own. Never include in your assignment anything that was not written directly by you without proper citation (including quotation marks and in-line citation for direct quotes). Anything you did not write without proper citation in an assignment will be treated as academic misconduct. The following heuristics may be useful:

1. Never hit "Copy" within your conversation with an AI assistant. Your own work can be copied into your own conversation, but do not copy anything from the conversation back into your assignment. Instead, use your interaction with the AI assistant as a learning experience, then let your assignment reflect your improved understanding.

2. Do not open the assignment and AI agent at the same time. Use your conversation with the AI as a learning experience, then close the interaction down, open your assignment, and let your assignment reflect your revised knowledge. This heuristic helps avoid integrating AI directly into your document: just as you should not let a classmate write content or code directly into your submission, you should also avoid using tools that directly add content to your submission.

Covid-19 Guidelines and On-Campus Help

Georgia Tech recognizes that Covid-19 vaccines and boosters offer safe, effective protection and urge all students, faculty, staff, and visitors to get vaccinated and/or boosted either on campus or with a local provider. Each of us has a responsibility to ourselves and our fellow classmates to be mindful of our shared commitment. We are all encouraged to familiarize ourselves with the latest guidance from the Institute available at: https://health.gatech.edu/coronavirus. If any of us tests positive during the semester, we should quarantine or isolate to avoid the risk of infection to others. Unless you are too ill to work, you should be able to complete your work remotely while in quarantine or isolation. We will work with you to ensure that you have access to lectures, materials, and any assignments during that period. If you are ill and unable to do course work, we will work with you personally to make sure you catch up with any work that you miss.

Students in need may request an accommodation through the Office of Disability Services (ODS). If you have been approved by ODS for an accommodation, we will work closely with you to understand and accommodate your needs.

If you need help in dealing with stress and mental health this semester, the CARE Center (https://care.gatech.edu), in coordination with Stamps Health Services (https://health.gatech.edu), provides help 24 hour a day, seven days a week. For more information, contact the Vice President and Dean of Students or the Division of Student Life (https://studentlife.gatech.edu).