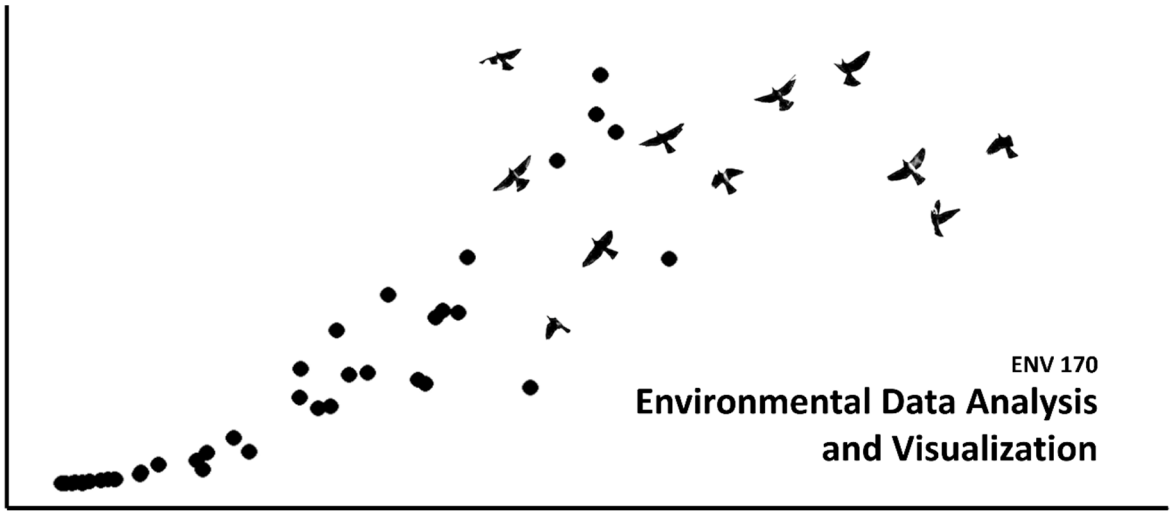
Environmental Studies
ENV 170 – ENVIRONMENTAL DATA ANALYSIS AND VISUALIZATION
Fall 2023



Understanding environmental problems requires working with different kinds of data collected in many ways, and the ever-increasing rate at which data are generated is creating new opportunities in environmental research, conservation, and management. This course is designed to develop skills and knowledge needed to assemble, manage, visualize, analyze, and communicate about environmental data. Students will learn fundamental concepts and data science and computational techniques needed to access data from a variety of sources; organize and reshape datasets to suit different purposes; plot data to evaluate patterns; assess the robustness and uniqueness of those patterns; and share their findings to different audiences. Students will also explore how aesthetic design choices contribute to the usefulness of visualizations for telling environmental stories and best practices for making data and open and accessible for public reuse. By the end of the course, students will be able to produce visualizations and analyses of data from a variety of sources and weave them together into effective narratives to address complex environmental issues.

Lecture
Tuesdays 4:30PM - 5:45PM, Tisch Library, Data Lab
Thursdays 4:30PM - 5:45PM, Tisch Library, Data Lab

Recitation
Wednesdays 6:30PM - 9:00PM, Tisch Library, Data Lab

Course structure
Lecture sessions are held for 75 minutes, twice per week. These will provide an opportunity to explore new concepts, engage in discussions and learning exercises, and prepare you for

assignments. Recitations (better thought of as lab sessions) are held for 2½ hours, once per week. These will be used to introduce you to different tools and techniques and will typically involve a structured lab demonstration followed by independent exercises. As the course progresses, more of the recitation session time will be devoted to completing projects. You are expected to attend all lecture and recitation sessions. Some lectures and recitations will have associated presentation slides published on Canvas but you should not rely solely on these for course notes.

Rooms and times may be subject to change. Please consult Tufts Student Information System (SIS) for up-to-date information. Any changes to the course structure as listed in this syllabus will be announced on Canvas.

Instructor
Ben Davies
benjamin.davies@tufts.edu
Bromfield Pearson 203
Office hours: Mondays 11 – 12 AM (virtual), Wednesdays 5 – 6 PM (in person)

Teaching Assistant
[redacted]

Office hours are scheduled times when you can meet with us to discuss anything related to the course or your educational experience. Virtual office hours will be held on Zoom; links will be posted on Canvas. Please feel free to stop by!

Course Readings
Some lecture sessions have associated readings, listed in this course outline and available through Canvas, that you are expected to read **before the corresponding lecture**. These readings have been chosen to enhance your understanding of the course topics, facilitate discussions for that week and assist you as you prepare your assignments. Optional readings will also be posted on Canvas to provide additional context for the course material.

Course Communications
My plan is to communicate with you using Canvas and your university email account. Please ensure that your correct e-mail address is in the system and that your inbox is not full. Failure to read a message will not be accepted as a reason for failure to perform.

Course Assessment
Final grades in this course are based on your performance on a series of assignments. Brief descriptions on the assignments can be found below; more detailed descriptions and grading criteria are available on Canvas.

Assessment	Weight	Due date(s)	Week number
Lab exercises	30%	Weekly	Weeks 1 - 12

Coding assignments	25%	Varies	Weeks 4, 6, 8, 10, 12
Visualization critique	10%	Varies	Starting Week 4
Project proposal	5%	October 17th	Week 7
Project notebook	15%	November 30th	Week 13
Project communication	15%	December 7th	Week 14

Lab exercises (30%)
The purpose of in-class exercises are to introduce data analysis and visualization concepts and to illustrate these using practical, worked examples. Exercises will typically be accompanied by coding demonstrations and interact, and will feature assistance from the instructor, teaching assistant, and lab assistants. These are designed to be completed within the allotted recitation and lecture sessions.

Coding assignments (25%)
Coding assignments are designed to reinforce learning from lectures and encourage creativity and independent problem-solving. Assignment types will vary, but will usually involve working from a dataset and/or existing code to produce an analysis and/or visualization. There will be **five coding assignments** throughout the semester, each worth 5 percent.

Visualization critique (10%)
Data visualizations are used to summarize and communicate key aspects and relationships in data. In this assignment, students will find published visualizations and write short critiques of their effectiveness. Each student will be assigned a week to present their visualization and discuss its strengths and weaknesses. The source and theme of the visualizations is up to the student, but must be discussed with the instructor prior to being presented in-class.

Final project (35%)
Final projects will focus on demonstrating command of the data science process and applying their knowledge to a topic of interest. Data used in this project should come from published sources, but original data collection will be considered if it fits within the scope of the project. This assignment will be assessed in three parts: 1) A short proposal outlining the research question and identifying potential sources of data to be submitted halfway through the course; 2) A coding notebook (e.g., Quarto document) with text, code, and outputs showing the steps taken to import, manipulate, analyze, and plot the data. This document should be aimed at maximizing replicability, and should include no less than 3 visualizations; 3) A poster that communicates the results of the project to a wider audience.

Submitting assignments
All assignments must be submitted in digital format via the course Canvas page unless otherwise indicated.

Extensions and late assignments
This course has assignments due at regular intervals, and students are advised to submit assignments on time to avoid becoming overwhelmed with work. Students will be given time to work on assignments during recitation sessions, and should reach out to the instructor and

teaching assistant for guidance and technical assistance if needed. **If an extension on an assignment due date is needed, please contact the instructor as soon as possible.** Extensions will be given in cases where there is a relevant and valid reason for your inability to complete the assignment on time – usually illness, accident, or bereavement. Reasonable accommodations will be sought, but the duration of any extension is ultimately at the discretion of the instructor. Assignments submitted late without an extension will be issued a grade penalty.

Course Policies

Academic Integrity

Academic Integrity Policy: Tufts holds its students strictly accountable for adherence to academic integrity. It is critical that you understand the requirements of ethical behavior and academic work as described in Tufts' Academic Integrity handbook. If you ever have a question about the expectations concerning a particular assignment or project in this course, be sure to ask for clarification.

Tufts Libraries has a helpful web resource, **Research Guides@Tufts**, that can help if you have questions about plagiarism and proper attribution.
Plagiarism: https://researchguides.library.tufts.edu/plagiarism
Citation Support: https://researchguides.library.tufts.edu/citation

Accommodations for Students with Disabilities

Tufts is committed to providing equal access and support to all qualified students through the provision of reasonable accommodations. If you have a disability that requires reasonable accommodations, contact the StAAR Center at StaarCenter@tufts.edu or 617-627-4539.

Religious Accommodations

Tufts University faculty, staff, and administration highly value and acknowledge the religious diversity of its student body. Students seeking religious accommodations related to their holy days are encouraged to collaborate with faculty to make arrangements during the first week of each semester.

Additional course policy statements

Additional course policy statements can be found on Canvas. If further clarification is needed, please contact the instructor.