

Paleoenvironmental Reconstructions
EAR 400/600, sections 20754/20757

Fall 2019 sections:
Tuesdays/Thursdays 9:30-10:50 AM
Heroy Geology Laboratory (HGL) Room 217

Instructor:

Dr. Melissa Chipman
Assistant Professor, Department of Earth Sciences
Office: HGL 317
Email: mlchipma@syr.edu

Office hours: Mondays 9:30-11:00 AM or email for appointment

Course Description

How do we study climate and environments of the past? In particular, what geological and biological information can we derive from archives such as tree rings, lake cores, and ocean sediments? In this course, we will explore various techniques for reconstructing environments of the past. Students will learn about current issues in paleoenvironmental science, and will get hands-on experience using several paleo techniques. We will read and discuss literature on various topics (no textbook required). In-class activities may include reading and discussing literature and/or hand-on labs such as splitting lake-sediment cores, describing stratigraphic changes, sieving and weighing sediment fractions, analyzing samples on a core-logging system to extract geochemical data, isolating insect remains and charcoal under a dissecting microscope, and using field guides to correctly identify fossil material.

Course Objectives:

1. Critically examine literature on paleoenvironmental reconstructions and discuss the opportunities and limitations of paleo-based approaches.
2. Acquire hand-on experience in lab techniques for analyzing paleodata.
3. Explore methods for reconstructing climate and environmental change with biological data

Course Content and Format

This course will explore topics throughout the semester using a combination of lectures, paper discussions, and lab activities.

Course materials will be housed on **Blackboard** and updated regularly. Materials include:

1. Course schedule - readings and links to online data will be updated on this syllabus each week. ***Content on the hard copy of the course schedule handed out on the first day is likely to change. All updates will be online.***
2. All handouts and reading assignments will be posted weekly in Blackboard.
3. After each lecture, PowerPoint presentations will be uploaded for students to use as supplements to notes taken in class
4. I will also post optional material occasionally, in case you are interested. These materials are not required for the course.

Course Evaluation:

Final grades will be assigned based on the following rubric:

Discussion/Participation (20% of total): There is no textbook for this course. While this saves everyone a bit of money, it means that the background information you need for assignments will be given DURING THE LECTURE and through ASSIGNED READINGS. Active participation in the group discussions is valuable to everyone's learning experience. Students are expected to read all assigned articles, attend class, and participate in weekly discussions. I realize some folks are introverts or just plain nervous about speaking in a group. Thus, we will discuss papers in a way that facilitates participation from everyone.

In-Class Activities (20% of total): Students will turn in a physical or electronic document at the end of all in-class activities (specifics of this will be included as part of each assignment). Because there is often a group component to these activities, keep in mind that your labmates are depending on you being present and prepared.

Midterm Exam (20% of total): Short-answer and multiple-choice exam

Final Paper (20% of total): Includes a written report with figures on an assigned topic. This will be considered the final exam grade.

Semester project components (20% of total): Components of your final paper are due in parts throughout the semester so that you can get feedback to improve it for the final report that is due on the last day of class. These will be graded and returned with comments for improvement.

Field trip: We have two daytrips scheduled for this semester, and will join Dr. Chris Scholz and his students from the sed/strat class. It would be beneficial if you can come to both field trips (as they are hands-on and a lot of fun). However, I realize this can be difficult if you have a lot of Tuesday courses, so I will only require that you attend ONE of them. PLEASE LET YOUR OTHER INSTRUCTORS KNOW ASAP which day(s) you will miss. I can provide a letter for you if needed.

- *Sandy Lake*: Tuesday, Sept. 3rd. We will take short sediment cores across a lake and sand-bar transect to examine changes in sediment character.
- *Senecca Lake*: Tuesday Sept 24th. We will board a ship to take seismic data and retrieve long lake-sediment cores

Final Grade	Minimum Percentage
A	93% and above
A-	90%
B+	87%
B	83%
B-	80%
C+	77%
C	73%
C-	70%
D	60%
F	59% and below

Course schedule (subject to revision) - updated weekly on Blackboard

Date	Day	TOPIC	Semester Project (Final Paper)
27-Aug	T	Introduction LECTURE: Why do we study environmental change?	Brainstorm ideas for semester project
29-Aug	R	Paleolimnology - Introduction LECTURE: What can lakes tell us about the past?	Choose teams and propose a topic
3-Sep	T	Paleolimnology - How to core a lake FIELD TRIP: Sandy Lake	
5-Sep	R	Depositional Environments - Introduction LECTURE: What can we learn from sedimentary changes? PAPER DISCUSSION: TBD	Finalize team topics (get approval)
10-Sep	T	Depositional Environments - Sediment and Geochemical Data ACTIVITY: Core splitting and scanning (MSCL)	
12-Sep	R	Biological Proxies LECTURE: An introduction to biological data in the paleorecord PAPER DISCUSSION: TBD	Introduction paragraphs due
17-Sep	T	Species Assemblages and Community Change LECTURE: Ecological interpretations of assemblage data ACTIVITY: Interpreting community trends through time	
19-Sep	R	Paleo databases ACTIVITY: Explore online repositories, download data	Download paleodata (start in class)
24-Sep	T	Paleolimnology and Basin Analysis FIELD TRIP: Seneca Lake	
26-Sep	R	Age-Depth Models LECTURE: What time is it? An intro to dating methods	Data choice summary and refs due
1-Oct	T	Macrofossils ACTIVITY: Extracting and identifying macrofossil remains from sediment archives	
3-Oct	R	Quantitative Paleoecology LECTURE: Quantitative methods for community data - modern analogues and transfer functions PAPER DISCUSSION: TBD	Proxy data paragraphs due
8-Oct	T	Plotting Paleodata ACTIVITY: Plotting stratigraphic data	Start plotting the data (in class)
10-Oct	R	Paleovegetation LECTURE: Using the pollen record to reconstruct terrestrial vegetation change	
15-Oct	T	Midterm Exam	
17-Oct	R	Reconstructing Aquatic Communities LECTURE: Reconstructing aquatic environments using microfossils PAPER DISCUSSION: TBD	
22-Oct	T	Microfossils I ACTIVITY: Using SEM to identify microfossils	Chronology paragraphs due
24-Oct	R	TBD	

29-Oct	T	Regional Paleodata ACTIVITY: Creating regional composites of paleodata	Work on final figures (in class)
31-Oct	R	Paleoclimate - Late Quaternary Archives LECTURE: Ice cores, glaciers, and megafauna PAPER DISCUSSION: TBD	
5-Nov	T	Paleoclimate - Annual data ACTIVITY: Obtaining climate information from tree rings	
7-Nov	R	Disturbance Regimes LECTURE: Quantifying disturbance in the paleorecord PAPER DISCUSSION: TBD	Final figures due
12-Nov	T	Microfossils II ACTIVITY: Diatom identification	
14-Nov	R	Regime Shifts and Ecological Resilience LECTURE: Identifying regime shifts in the paleorecord PAPER DISCUSSION: TBD	
19-Nov	T	Paleoclimate - Fossil Record LECTURE: What fossil leaves and marine sediments can tell us about past climate and atmospheric composition	
21-Nov	R	Paleoclimate - Leaf morphology ACTIVITY: Measuring leaf morphometry PAPER DISCUSSION: TBD	Interpretation paragraphs due
26-Nov	T	Thanksgiving Break	
28-Nov	R	Thanksgiving Break	
3-Dec	T	Interactions and Feedbacks LECTURE: Disentangling feedbacks in the paleorecord PAPER DISCUSSION: TBD	Start pulling final papers together with a conclusion section
5-Dec	R	Humans and the Paleorecord LECTURE: What is "natural"?	
10-Dec	T	Work on final papers!!	
12-Dec	R	Final Papers Due via Email (by midnight)	FINAL PAPER DUE

Expectations and Classroom Policies:

Students are expected to attend all classes, do weekly reading and homework assignments, and participate in all classroom discussions.

For classroom discussions, all opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to respectfully comment on ideas, but not the people who present those ideas. This statement is intended to help cultivate a respectful environment, and it should not be used in a way that limits expression or restricts academic freedom at Syracuse University and at ESF.

University Policies that will be enforced in this class:

Drop Deadline: September 16, 2019. Dropping the course after this will result on a WD on your transcript.

Attendance Policy: Attendance in classes is expected in all courses at Syracuse University. It is a federal requirement that faculty promptly notify the university of students who do not attend or cease to attend any class. Faculty will use Early-Semester Progress Reports and Mid-Semester Progress Reports in

Orange SUccess to alert the Registrar and Financial Aid Office on non-attendance. For more information visit: <http://registrar.syr.edu/students/non-attendance/>. Students may contact the Office of Student Assistance in cases where they are absent from class for an extended period of time (48 hours or more) due to illness or other medical condition. The Office of Student Assistance will utilize Orange SUccess to send absence notifications to faculty. For illnesses lasting less than 48 hours, the student should discuss academic arrangements with their faculty. Additional information may be found at: <http://studentassistance.syr.edu/our-services/absence-notifications.html>

Syracuse University Academic Integrity: Syracuse University's Academic Integrity Policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the policy, students found in violation are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered as described in the Violation and Sanction Classification Rubric. Syracuse University students are required to read an online summary of the University's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice.

SUNY-ESF Academic Integrity Policy: Academic dishonesty is a breach of trust between a student, one's fellow students, and/or the instructor(s). By registering for courses at ESF you acknowledge your awareness of the ESF Code of Student Conduct (<http://www.esf.edu/students/handbook>), in particular academic dishonesty includes but is not limited to plagiarism and cheating, and other forms of academic misconduct. The Academic Integrity Handbook contains further information and guidance (<http://www.esf.edu/students/integrity/>). Infractions of the academic integrity code may lead to academic penalties as per the ESF Grading Policy (<https://www.esf.edu/provost/documents/GradingPolicy.11.12.2013.pdf>)

Disability-Related Accommodations: Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. There may be aspects of the instruction or design of this course that result in barriers to your inclusion and full participation in this course. I invite any student to meet with me to discuss strategies and/or accommodations (academic adjustments) that may be essential to your success and to collaborate with the Office of Disability Services (ODS) in this process. Students at both Syracuse University and SUNY-ESF who need academic adjustments (accommodations) for a disability can contact the Office of Disability Services (ODS) at Syracuse University, who is responsible for coordinating disability related accommodations. If you would like to discuss disability-accommodations or register with ODS, please visit their website at <http://disabilityservices.syr.edu>. Please call (315) 443-4498 or email disabilityservices@syr.edu for more detailed information. ODS is responsible for coordinating disability-related academic accommodations and will work with the student to develop an access plan. Since academic accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible to begin this process.

Other Policies: Students should review Syracuse University's policies regarding: Diversity and Disability <https://www.syracuse.edu/life/accessibilitydiversity/>; the Religious Observances Notification and Policy http://supolicies.syr.edu/studs/religious_observance.htm; and Orange SUccess - <http://orangesuccess.syr.edu/getting-started-2/>