

ADVANCED PALEOECOLOGY
GEOGRAPHY/GEOSCIENCES 523
UNIVERSITY OF WISCONSIN-MADISON
FALL 2020

Instructor: John (Jack) W. Williams, Professor, Department of Geography
Science Hall 207, jww@geography.wisc.edu
Office Hours: Tues 1:30-3pm and Weds noon-1:30pm by BBCollab:
<https://us.bbcollab.com/guest/08049732e99b49079a01ffa966088368>
Other times possible by appointment. Pronouns: he/him/his

When and Where: MW 4-5:15pm, Grainger Hall 2080 (seating capacity 135) or Outside (location TBD) or Online (**Zoom**):
<https://uwmadison.zoom.us/j/98431496136?pwd=ZytaaW1JaWRxTWJDcldrNTkyRVZNUT09>
Meeting ID: 984 3149 6136
Passcode: 977043

INTRODUCTION

The Quaternary (the last 2.4 million years) offers a natural laboratory for studying the responses of plant species and ecosystems to large-scale climatic and anthropogenic change. These climatic oscillations occurred frequently and often abruptly, and at glacial-interglacial timescales are closely linked to large swings in atmospheric CO₂. Humans dispersed across the world over the last 100,000 years, and, not coincidentally, many large vertebrate species, went extinct. In response to these environmental changes, the abundances and distributions of plant species changed dramatically during the Quaternary, and communities dissolved and reformed over time, often into novel mixtures with no modern analog. We can use the Quaternary to better understand the mechanisms driving ecological responses to past environmental change and to test and refine our models of species responses to environmental change, past and future.

The primary goals of this 3-credit course are: 1) Provide an advanced understanding of both the patterns of past ecological dynamics at timescales of centuries to millennia and the causal processes; 2) Connect past phenomena to current questions in global change ecology and conservation biology; 3) Provide both hands-on practice and a foundational understanding of the data resources, computational workflows, and statistical methods commonly used in large-scale quantitative analyses of Quaternary paleoecological data, and 4) Sharpen your critical-thinking and writing skills.

COURSE MECHANICS

OVERVIEW

There are three main components to this course: 1) **Discussions**, which focus on small-group discussion of primary readings from the scientific literature, with a few traditional powerpoint lectures mixed in; 2) **Labs**, which offer hands-on experience in quantitative methods for working with paleoecological data; and 3) a **Term Paper**, which gives you a chance to dig deeper and critically explore a topic of interest.

Discussion Classes: The Discussion readings are listed separately in the Reading List, where they are organized by topic and flagged as primary or supplemental readings. In general, you are always expected to have read all primary readings, while the supplemental readings are entirely optional and simply represent other good papers that might be of interest.

I'll typically assign 2-3 primary papers per class. Please come prepared with at least two written questions (or discussion topics) per paper. You should upload these questions/topics to Google Docs prior to class and be ready to bring them up during discussion. These questions can range from fundamental (e.g. what does this word or concept mean; what's the key message communicated by this figure) to deeper reflections (e.g. what is new about this paper; how does this paper shape our thinking). For each paper, one student will be assigned as lead discussant; their responsibility is to summarize the paper and launch the discussion. All are expected to participate in the discussion.

Lectures: A few classes, particularly the early ones, will be lecture-oriented, as I get you up to speed on some of the major paleoecological and paleoclimatic patterns of the recent geological past. For these classes, you should do the primary readings in advance of lecture, but you do not need to prepare discussion questions.

Labs: In lab classes, we'll get hands-on experience in working with paleoecological datasets, on-line data repositories, and statistical analyses. I'll usually begin with a short lecture, after which we'll do a hands-on exercise. These exercises will be due in class the following lab. There will usually be 1-2 readings that you should do ahead of time, to prepare you for lab, but you don't have to do turn in questions.

Term Paper: Will give you both a chance to delve deeper into a topic of interest and a chance to practice the peer-review process. Term papers will be due the Friday of the last week of classes. Three basic variants are possible: 1) A literature review, in which you explore one of the topics in this class in more depth; 2) A quantitative analysis, in which you apply the methods learned here to other datasets drawn from Neotoma or other sources; 3) Your own design. For more details, see the term paper instructions.

ON-LINE RESOURCES: We will use a couple of different platforms to meet and to share materials:

Zoom: Used for our online classes:

<https://zoom.us/j/98760748238?pwd=aVR0a0pIZ0JFbHdYUW0zc0UzYWlqQT09>

Meeting ID: 984 3149 6136

Passcode: 977043

Blackboard (BBCollab): Used for my office hours

<https://us.bbcollab.com/guest/08049732e99b49079a01ffa966088368>

LearnUW (<https://learnuw.wisc.edu/>): The course homepage, with links to other online resources.

Readings: Posted to WiscBox

(<https://uwmadison.box.com/s/6gv01f8tfuki173oxqk9z57mytcf2lwq>) with separate folders for the primary readings and the readings for the 3-credit option.

Questions: Can post these to individual docs found on Google Drive:

<https://drive.google.com/drive/folders/1LTATuELSVNzw7t2wF8sHt0uHAslaBaS0?usp=sharing>

COMPUTING AND SOFTWARE

Most of the labs will be based on the R statistical programming language; R Studio is a popular software interface for writing and running R code. You should install R and R Studio on a personal laptop that they can bring to class. I'm a Windows-PC person myself, but Apple or Linux should work OK. If this poses any difficulties, please contact me.

GRADING

Weekly Readings, Questions, Discussion	40%
Lab Exercises	40%
Term Paper	20%

CREDITS: 3 credits.

PREREQUISITES: Open to graduate students and advanced undergraduates. Although no formal course prerequisites are set, a familiarity with basic principles in ecology and physical geography is assumed. Useful prior courses include Geography 335 (Climatic Environments of the Past) and 338 (Biogeography). Prior coursework in univariate statistics and an at least an initial familiarity with R or other scripting language is assumed. If you don't have any prior experience with scripting, the learning curve will be steeper but doable.

ADDITIONAL RESOURCES

- McBurney Disability Resource Center. Provides services for an inclusive and accessible education. If you need accommodations, please talk to one of the instructors early in the semester or as soon as possible so we can plan to help you. <http://www.mcburney.wisc.edu/>
- Multicultural Student Center. Provides resources, advocacy and community particularly for students of color and historically underrepresented and underserved students on campus. <https://msc.wisc.edu>
- CALS Statistics Consulting Lab. Primarily serves students, staff, and faculty in CALS (College of Agricultural and Life Sciences) but can provide assistance to graduate students from other departments. <https://www.stat.wisc.edu/consulting-lab>
- UW Writing Center. Provides drop-in or scheduled appointments for help. They will help with just about any type of writing assignments/needs. <http://www.writing.wisc.edu/>
- UW Madison Smart Restart. The go-to portal for campus-related COVID information, where to get tested, what to do if you show symptoms, etc. <https://smartrestart.wisc.edu/>

TEACHING AND LEARNING IN A PANDEMIC

My dual goals this semester are 1) supporting our collective health and safety and 2) providing a top-notch learning environment. This is a small class, with a couple of intermixed formats, so

we have flexibility. We're all figuring this out as we go along, so I may try a couple of different options and will look to you for ideas and feedback. I also recognize that this is a challenging time for all of us. I promise to be humane and flexible in helping you meet these challenges.

Some starters:

- **Where will we meet?** Early on, I will experiment with on-line formats, meeting outside, and meeting in person in our assigned classroom. For the first two classes, which will be lecture-oriented, will be held online.
- **Masks:** Required at all times when 1) in indoor public spaces and 2) when class is in session, regardless of whether class is indoors or outdoors. Mask policy must be followed without exception by all students and staff. Mask must cover nose and mouth when worn and masks must comply with [CDC](#) guidelines. Instructors are required to wear both masks and face shields. We will try to have a few spare masks available, but every student has the responsibility to bring their own mask.
 - If a student has a health condition that prevents them from wearing a mask, we recommend enrolling in an online-only discussion section.
 - If any students are not wearing a mask in class, TAs are instructed to give a first verbal reminder to wear a mask or leave the class, then a second verbal reminder. If any student is still not wearing a mask after the second verbal reminder, the TA is instructed to cancel class (with students still responsible for completing work) and report the situation to the faculty instructors. Further reporting to the Dean of Students is possible.
- **Physical Distancing:** Standard physical distancing should be followed, with a recommended distance of 10' and a minimum distance of 6' between people at all times.
- **What to do if sick:** If you are feeling sick, do not attend class in person until the following two conditions are both met: 1) 10 days after symptoms began and 2) after 24 hours with no fever and no fever-reducing medication (source: [CDC](#)). If you test positive for COVID, follow [University Health Services](#) rules for reporting and quarantining. You are not required to report your test results or symptoms to the instructors, but you are welcome to, so that we can work with you on any accommodations to your coursework or mitigating risk for others in the class.