Biology 490, Section 5 Tuesday 1:00-2:40 TNR 457

Topics in Paleoecology & Paleolimnology

Fall 2015

COURSE DESCRIPTION:

Paleoecology is a subfield of ecology that uses fossils to reconstruct past ecosystems. This discipline requires knowledge of life cycles, an understanding of the interactions of the natural environment and biotic communities, and the ability to interpret how biotic and abiotic factors influence the presence of fossil species. We will specifically focus on a subfield of paleoecology known as paleolimnology. Paleolimnology involves the reconstruction and interpretation of past environments using physical, chemical and biological indicators that are contained in lake sediments. With a rapid expansion of this interdisciplinary field over the last 20 years, we will begin to examine current methods and the primary literature of the field. Students will explore how paleoecology is used to expand the temporal scale over which ecologists pose and investigate questions. Lectures topics will include but are not limited to:

- Dating methods
- Paleolimnological techniques including a survey of paleo proxies
- Current issues in paleolimnologic and how these topics relate to conservation and global climate change

FACILITATOR
Dr. Krista Slemmons
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Office Hours:
Tuesday 12:00-1:00
Wednesday 2:00-3:00
Thursday 10:00-11:00

COURSE GOALS:

1. Understand the importance of a long-term perspective in environmental research
2. Understand natural rates of variation in ecosystem change
3. Understand the most recent ideas and methodologies in the field of paleolimnology and how this informs our understanding of global environmental change
4. Gain experience in oral and written presentation of scientific data and concepts
5. Improve critical thinking skills when analyzing scientific literature

LEARNING OUTCOMES:

This is a University General Education Program Communication in the Major course and a capstone experience for the major. As such, this course has the following GEP learning outcomes:

Upon completing this requirement, students will be able to:

- Apply discipline-specific standards of oral and written communication (both scientific and popular) to compose an articulate, grammatically correct, and organized presentation/piece of writing with properly documented and supported ideas, evidence, and information suitable to the topic, purpose, and audience.
- Critique your own and others' writing/oral presentations to provide effective and useful feedback to improve communication.

COURSE OBJECTIVES:

- Critically review the scientific literature on your chosen topic
- Present a seminar on a topic
- Lead a discussion on a specific piece of paleoecological literature
- Write a review paper on that topic
- Write a popular science article on your topic
- Evaluate others written and oral presentations

TEXTS:

All reading material will be made available to you in the form of .pdf documents on D2L. Some of this material comes from the scientific literature but much of it is taken from the following texts:

- Cohen, A.S. (2003). Paleolimnology. The History and Evolution of Lake Systems. New York. Oxford University Press. ISBN: 9780195133530
- Hoffmann, Angelika (2013). Writing in the Biological Sciences. New York: Oxford University Press.
- Smol, JP (2008) Pollution of Lakes and Rivers: A Paleoenvironmental Perspective. Wiley-Blackwell.
- Last, W.M. and Smol, J.P. (editors), 2001. Tracking environmental change using lake sediments. Kluwer, Boston. 4 volumes

COURSE EVALUATION

ASSIGNMENT	POINTS
1. Participation and Professionalism	**75**
2. Scientific Paper	**200**
• Concept map & Annotated Bibliography	• 25
• Scientific Paper outline	• 10
• Scientific Paper 1st draft (5 articles)	• 25
• Scientific Paper 2nd draft	• 40
• Scientific Paper Final (9 articles)	• 100
3. Discussion	**100**
• Leadership & Questions (5)	• 50
• Topic Presentation	• 50
4. Popular Science Paper	**75**
• Article	• 50
• Poster presentation	• 25
5. Peer reviews (25 each review)	**50**
TOTAL	**500**

Letter Grade:

Final grades will be assigned based on the following percentages:

A	= ≥93%	B-	= 80-82%	D+	= 67-69%
A-	= 90-92%	C+	= 77-79%	D	= 60-66%
B+	= 87-89%	C	= 73-76%	F	= < 60%
B	= 83-86%	C-	= 70-72%		

PARTICIPATION AND PROFESSIONALISM

The success of this class and how much you gain from it is largely dependent on the effort you put into it. Your active involvement is vital! Participation and Professionalism points are based on class attendance, discussion participation and classroom behavior. This includes being to class on time, being actively engaged and alert, and offering questions and comments to the class discussion. You are also expected to be respectful and considerate of your colleagues. Cell phones and other electronic devices should be turned off while class is in session.

Assignments are expected to be turned in on time and attendance is expected. If you miss a class discussion in which you are leading you will need to reschedule that discussion ***prior to that discussion***. If you miss a class and you are not leading you will receive a deduction of 15 points from your final grade. Late assignments will not be accepted. The only valid reasons for excused absences are documented heath emergencies, death of immediate family members (documentation required), or UWSP sponsored sports event (I must be informed well before and receive documentation). *Please see the Core Values document for more detailed expectations.*

DISCUSSION

Each student will be required to give a 40-45 minute teaching segment on a topic in paleoecology of their choosing and lead the discussion the following week on a piece of recent primary literature investigating one component of that topic. Your topic and paper must be approved by me. You also must meet with me at least one week prior to your presentation to review the topic(s) you will cover. Your paper selection should be uploaded at least 1 week in advance of the discussion. Discussion leaders will be expected to provide relevant background material during the teaching segment so that your peers will have a basic understanding for the paper discussion. To facilitate discussion, on the day of the teaching segment, discussion leaders will be required to provide at least **five discussion questions** to the class. Your job as the discussion leader is to keep the conversation going and therefore it may behoove you to have additional questions for discussion beyond the required five. I would expect the discussion should last about 40 minutes.

Week 1: Topic approval

Week 2: Meet with me to discuss topic

Week 3: Teaching module

Week 3: Send out paper & 5 discussion questions

Week 4: Lead discussion

A large portion of your grade depends on how well you critique and synthesis content from the primary literature and in your efforts to discuss the material with the class. I expect you to read all articles assigned. You will not do well if you spend a few minutes scanning the article prior to class. **Tips for reading scientific literature and leading a discussion can be found in D2L.** Your presentation and discussion leadership will be evaluated based on the rubric found in D2L.

***Regardless of who is leading the discussion, each student is expected post a question or comment regarding the article on D2L *prior* to class.**

Hints for Presenters

Critical reading of primary literature is not an easy thing to master, and the only way to get good at it is to do it often. It is a skill that many of you will carry on into your professional careers. If you go on to graduate school, you may find yourself in a journal club with faculty and other graduate students doing exactly what we're doing in this seminar, reading and discussing current research. If you work for a government agency or if you are in graduate school, you will be expected to keep abreast of current research in your field of expertise, and you should be able to identify how these studies fit into your study, what are the strengths and weaknesses of the study, and how you might even improve or add to the study.

The most challenging part of reading primary literature is identifying the important points in the paper. As a presenter or discussion leader, it is your task to more or less summarize the paper and prioritize what should be discussed. Below is a rough sketch of how to go about this, but every paper is different so you want to keep an open mind.

Summarizing can be approached by taking notes on the following points:

1. *What questions (hypotheses) are being asked in the paper? What is the paper about?* This information is typically found in the introduction.

2. *How did the authors go about answering these questions? What is the experimental design?* This is found in the methods section. The biggest problem students have is figuring out how much time and effort to spend here. The short answer is don't focus too much time here. You do want to mention what they did (modeling, field studies, lab studies) and a bit of detail regarding design and statistics. As a presenter you don't need to go into too much detail on the model or statistics. However, this may be an important area of discussion later on if you identify flaws in the methodology, so all students should do their best to understand the experimental design.

3. What were the findings of the paper? What are the broader implications of this research? This information is found in the results and discussion section. To summarize the paper for the class you want to spend about 15-20 minutes. You should assume that all of the students have read the paper and have a copy of the paper in front of them. They should have notes and questions written down about the paper. However it is still beneficial to use overheads of the tables and figures you'd like to incorporate into your summary. You can if you choose, supplement your discussion with a PowerPoint or handout to organize the information.

Leading the discussion involves preparing a list of discussion questions and topics for the rest of the class. Ideally, the class will run the discussion, because **each person will have read the paper and will have written notes and questions they have regarding the paper**. Nevertheless, it is on the presenter to fill in the lulls with new discussion topics. Broad topics include:

- Was the methodology appropriate for the questions being asked?
- How could the experimental design be improved?
- Did the conclusions follow from the data clearly? Could other conclusions be drawn from the data that the authors did not mention?
- What are the backgrounds of the authors? How could this impact the study?

*Ideally, the discussion leader should be prepared with answers or at least thoughts regarding all of these questions.

SCIENTIFIC PAPER

Each student will write a review paper on a topic of their choice. Select a topic, hypothesis or question in the field of paleolimnology that you would like to investigate and prepare a summary of current understanding on the subject matter. This topic could or even should be the same topic that you selected for the teaching segment/discussion. Use at least 8 peer reviewed journal articles from the literature to develop your analysis and synthesis of current knowledge and research insights on the topic. You may use tables and figures to illustrate key points. Sources must be sited using the author and date format (Slemmons 2014). The paper is 8-10 pages (double spaced, 12 point font, 1 inch margins; title page, figure and references not included) and should consist of only peer-reviewed literature (no web sources). All references should be listed at the end of the paper using standard citation formats illustrated below. Papers will be graded based on the rubric found in D2L.

You must have at least five articles for the rough draft. I expect that you will approach this assignment as though you are writing a scientific review paper for a peer (classmates) reviewed journal where I serve as your editor.

- Topic approval
- Outline (concept map)
- Annotated bibliography
- First draft , instructor-edited (5 articles, 5 pages)
- Second draft, peer-edited
- Final submission

Formatting and referencing:

We will be using the formatting and referencing used by the Journal of Paleolimnology (see example article in D2L). References should be done in the following format:

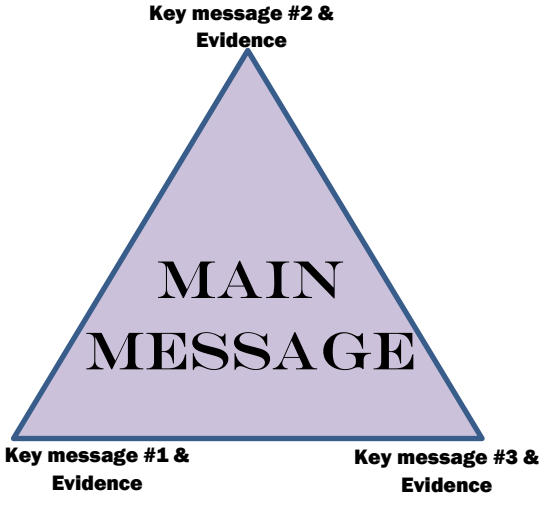
Author (Year) Title. Journal Volume: pages

Example:

POPULAR SCIENCE PAPER

Slemmons KEH, Saros JE (2012) Implications of nitrogen-rich glacial meltwater for phytoplankton diversity and productivity in alpine lakes. Limnol Oceanogr 57: 1651-1663.

Each student will write a popular science article based their scientific review paper. The intention of this assignment is to reframe a scientific paper for a lay audience. The paper should be relatively short (~2 pages) and appeal to a wide range of audiences. It should be catchy and intriguing. These papers will be posted on the class blog. Each student will then present their popular science paper to the class during the final weeks for the course. These presentations should be ~10 minutes in length. Students may choose to create a poster/flyer/PowerPoint for this presentation.



PEER REVIEWS

Each student will review the 2nd drafts of 2 other student's scientific review paper and provide written comments to the draft as well as suggesting an additional peer reviewed article to incorporate into the paper. A template for the peer reviews will be provided in D2L.

COURSE SCHEDULE

**Topics are subject to change at the instructor's discretion.*

Date	Topic(s)	Reading Due	Assignments
Sept 8	●Course Overview ●Science Communication ●What is Paleoecology?	Handouts (D2L) How to Write/Read Scientific Literature "Becoming the Messenger"	
Sept 15	●Introduction to Paleolimnology ●Lakes as archives of earth history	Fritz and Saros 2006 Paleolimnology and Paleohydrology Cohen Chapter 1	Paper topic due
Sept 22	●The Biological Environment of lakes ●Paleoindicators ●Concept mapping tools	Cohen Chapter 5 Smol Chapter 5	Paper thesis due
Sept 29	●Age determination in lake sediments ●Atmospheric Pollution	Cohen Chapter 6 Smol Chapter 8	
Oct 6	●Paleolimnology in deep time: the evolution of lake systems (Eutrophication, Acidification, landscape change)	Cohen Chapter 14 Smol Chapter 7, 11, 12	Outline & Annotated Bibliography Due
Oct 13	●Climate Change ●Artic and Alpine Areas	Smol Chapter 14 Smol Chapter 8	
Oct 20	●Paleolimnology: the past meets the future ●Conservation Topic #1 Presentation	Cohen Chapter 15 Smol Chapter 16	First Draft Scientific Paper Due
Oct 27	Discussion #1 Topic #6 Presentation		
Nov 3	Discussion #2 Topic #3 Presentation		
Nov 10	Discussion #3 Topic #4 Presentation		Second Draft Scientific Paper Due
Nov 17	Discussion #4 Topic #5 Presentation		
Nov 24	Discussion #5 Topic #6 Presentation		Peer reviews Due

Dec 1	Discussion #6 Topic #7 Presentation	Popular Science Article Draft Due
Dec 8	Discussion #7	Final Scientific Paper Due
Dec 15	Popular Science Article Presentations	Popular Science Article Final Due

Disabilities

UWSP abides by interpretations of the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973 that stipulates no student shall be denied the benefits of an education "solely by reason of a handicap." Disabilities covered by law include, but are not limited to, learning disabilities, hearing, sight, or mobility impairments, and other health related impairments. If you have a disability and require accommodations, please register with the Disability and Assistive Technology Center (6th floor Learning Resource Center in the Library) and let me know as soon as possible. These requests are confidential and will be most effective the sooner I am informed.

Academic Integrity

Plagiarism and cheating of any form are serious offenses and may result in an F for the assignment, the course, or expulsion from the university. The details of the UWSP Academic Integrity policy are found in the Student Handbook. It is your responsibility to read and understand the contents of that policy before you submit work to be graded. Questions regarding the policies and enforcement of the policies may be addressed to me during office hours.

UWSP Community Bill of Rights and Responsibilities:

UWSP values a safe, honest, respectful and inviting learning environment. A set of expectations for students and instructors, known as the Rights and Responsibilities document, is intended to help establish a positive living and learning environment. For more information go to http://www.uwsp.edu/stuaffairs/Pages/rightsandresponsibilities.aspx. The Rights and Responsibilities document also includes the policies regarding academic misconduct, which can be found at http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/ADA/rightsADAPolicyinfo.pdf.

Topic IDEAS:

Paleoindicators (select one: pollen, diatoms, chironomids, Ostracodes, Cladocerans, Chrysophyres, tree rings, algal pigments, alkenones)
Drought Signatures
Glacial signatures
Nitrogen signatures
Land Use Change
Marine Derived Nutrients
Ecological interactions
Fire disturbance
Stable isotopes
Eutrophication
Acidification
Salinity Reconstructions
Paleoclimates
Persistent Organic Pollutants/Contamination
Lake level modeling and aquatic habitat