

GEOG 3352A/9216A: Paleolimnology and Global Environmental Change

Course Outline: Section 001 Fall 2019

1. Course Information

1.1. Classroom Location:

Lectures: Wednesdays, 10:30am- 12:30pm, SSC 1302

Labs/Tutorials: Thursdays, 11:30am-1:30pm, SSC 1302

Field Trips: **Students are required to attend one field trip held on Saturday Sept. 21, from 8:30am-5:30pm. This is a critical and mandatory part of the course and attendance is required.**

1.2. Contact Information:

Instructor: Dr. Katrina Moser

Office: SSC 2407

Office Hours: Thursdays 1-2pm

Phone: 661-2111 x80115

Email: kmoser@uwo.ca

Teaching Assistant: Rebecca Doyle

Office: SSC 1430

Office Hours: Wednesdays 9:30-10:30am

Email: rdoyle25@uwo.ca

2. Calendar Description

2.1. Course Description

This course provides students with an introduction to paleolimnology, which uses the physical, chemical and biological characteristics of lake sediments to determine past environments.

2 lecture hours, 2 laboratory hours 0.5 course

Antirequisite(s): None

Prerequisite(s): One of [Geography 2310A/B](#), [Geography 2320A/B](#) or [Geography 2330A/B](#), or at least 3rd year standing in an Environmental Science or Earth Sciences program, or [Biology 2483A/B](#), [Biology 2485A/B](#).

Prerequisite checking is the student's responsibility.

2.2. Senate Regulations

Senate Regulations state, “unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.”

3. Textbook

Smol, J.P. 2008. *Pollution of Lakes and Rivers: A Paleoenvironmental Perspective Second Edition*. Blackwell Publishing, Oxford.

4. Course Format and Objectives

This course provides students with a “hands-on” learning experience in an area of environmental science, Paleolimnology. Students will practise formulating research questions and develop and test hypotheses. A one day field trip provides students with the opportunity to design a research project to address a research question. A sediment core is collected during the field trip, which provides the basis for research projects and class labs. Students will learn to make and record limnologic observations and measurements. Lectures provide the background materials necessary for understanding and interpreting the data collected by students.

Active participation from students, both for assessment, and to enhance the learning experience of the entire class is required. Active learning supports higher-level learning and improves retention of material (Prince, 2004). Lectures will include brainstorming, activities, work periods and discussion. Please come to class prepared to be involved and to be respectful to your classmates and the instructor team. Derogatory or offensive remarks and responses are not acceptable, nor are they effective forms of academic debate. Participation will be graded, and there are formal and informal expectations of involvement. We will discuss this more at the beginning of the course.

CONTENT OBJECTIVES

1. to provide students with an understanding of the importance of a long-term perspective in environmental research;
2. to provide students with a strong foundation and understanding of the most recent theories and methodologies in Paleolimnology;
3. to provide students with an understanding of the contributions of Paleolimnology to our understanding of global environmental change.

TECHNICAL OBJECTIVES

1. to provide students with an understanding of the scientific method;
2. to provide students with an opportunity to make field observations and measurements and assess the accuracy and precision of the measurements;
3. to provide students an opportunity to use the observations to test hypotheses;
4. to provide students with an overview of paleolimnological techniques and an opportunity to practice these techniques.

5. Program Learning Outcomes and Skills

Many of the learning outcomes and skills of the Geography program are incorporated into this course. These include:

Learning Outcomes

- ✓ Develop knowledge and critical understanding of the fundamental characteristics, processes, temporal changes and landscapes of social and biophysical systems and their interactions.
- ✓ Demonstrate informed awareness of geographical diversity through knowledge of different places and understanding of the processes that shape them spatially and over time.
- ✓ Combine breadth of knowledge of Geography with specialized understanding in selected sub-fields.
- ✓ Relate specialized understanding of the geography of biophysical systems to knowledge and practices in environmental and natural sciences
- ✓ Synthesize and evaluate geographical information from diverse sources, including geo-spatial data
- ✓ Collect, analyze and interpret geographical and geo-spatial data in relation to social and biophysical systems
- ✓ Describe, explain, analyze and interpret a range of geographical phenomena outside the classroom by engagement with people, places and environments
- ✓ Analyze real-world problems and policy applications using geographical concepts, skills and understanding.
- ✓ Communicate geographic ideas and understanding effectively to a variety of audiences in writing, orally, and graphically

Geographical Skills

- ✓ Field and/or lab methods: including observation, data collection (of all kinds), mapping
- ✓ Technological skills (computer hardware, software, instrumentation) including use of geographical and data analysis software.

Generic Skills

- ✓ Literature and secondary data sources: information search and retrieval, meta-analysis of published data, synthesis of information sources and literature, annotated bibliographies.
- ✓ Critical and reflective reading, listening, thinking.
- ✓ Writing – education and practice in writing essays, reports, notebooks.
- ✓ Visual presentation and graphical design: graphical design and production of : maps, diagrams, presentations, posters, web-based media
- ✓ Oral communication/presentation: -structured class discussions (seminars, small-group interaction, debates), individual and group presentations.
- ✓ Project planning, management and design: time management, independent major project, research proposals.
- ✓ Inter-personal skills: leadership, team facilitation

5. Evaluation

There will be five components to students' evaluation:

1. Paleoindicator Poster Presentations (15%)

Students will be required to make a poster presentation (~10-15 minutes) about a paleoindicator of their choice (excluding diatoms). Students will work individually or in pairs. Paleoindicators which may be selected include Diatoms, Chrysophycean algae, chironomids, Cladocera, molluscs, Protozoa, freshwater sponges (Porifera), freshwater ostracodes, phytoliths, biogeochemical signals (e.g. algal pigments, biogenic silica), charcoal, elemental geochemistry, contaminants, sedimentary characteristics, DNA etc. Students must consult with Dr. Moser about their choice of paleoindicator. Further information, including a grading rubric, will be provided when the project is assigned.

2. Field and Lab Exercises (30%)

During the class a field trip will be held in the London area. We will work from small boats and float tubes to collect a sediment core, which will form the basis of subsequent lab exercises. Short lab assignments will introduce students to a variety of paleo techniques including some of the following, site selection, field methods, sediment dating, core analyses, subsampling and pollen, diatom, loss-on-ignition, chrysophyte and charcoal analyses. Attending and actively participating in field trips and labs is critical to your success in the course. Labs will not all be weighted equally, and weightings are provided on the attached schedule along with lab due dates.

3. Mid Term Exams (20%)

There will be two midterm exams during the course each worth 10%. Midterm exams will be comprised of multiple choice, fill in the blank and short answer questions. No electronic devices will be allowed during quizzes. The quiz is to ensure you are learning the necessary material required for the final oral exam.

4. Final Report Presentation (10%) and Oral Exam (15%)

Students will prepare a final presentation to show their research project findings to the instructor and TA. Immediately following the presentation there will be a 20 minute oral exam where questions about their presentation and course material will be asked. Towards the star of class, but after the field trip, students will work in small groups to develop a research question. Students will use data collected during the ensuing labs to work towards formulating an answer to their question. For the final exam students will be required to make a five minute presentation on their findings. This will be followed by 15 minutes of questions. **The oral exam will occur during the final exam period.**

5. Participation and reflection (10%)

Participation will be a combination of self- assessment with adjustments/ approval by the instructor team. Class attendance and engagement is a critical for participation and attendance will be taken.

| Evaluation Component | Percentage of Course Grade | Due Date |
|--|----------------------------|------------------------|
| Lab 1: Thermal Stratification | 10% | October 3 |
| Lab 2: Dating and LOI | 10% | November 13 |
| Lab 3: Microscopes, Diatoms and Chrysophytes | 5% | November 14 |
| Lab 4: Pollen and Chironomids | 5% | November 21 |
| Poster Presentation | 15% | October 30 |
| Midterm 1 | 10% | October 16 |
| Midterm 2 | 10% | November 28 |
| Participation and reflection | 10% | Ongoing |
| Final Presentation | 10% | Exam Period: Dec 10-21 |
| Final Oral Exam | 15% | Exam Period: Dec 10-21 |

Evaluation for those registered in Geography 9216B will be the same as above, but graduate students will be held to a higher standard and will be required to submit three short critical reviews of readings assigned for each lecture. Graduate students will be responsible for reading all additional papers and will submit brief critiques on three of the papers. A reading list will be provided in the second week of the class. Lab assignments will only be worth 10% instead of 20%, and the critiques will be worth 10%. All other evaluations will be the same.

Students are responsible for material covered in the lectures as well as the assigned chapters/sections in the text. Students are expected to attend all lectures, labs/tutorials, and the field trip, and to complete the assigned readings. There are no exceptions to this. Extra assignments to improve grades **will NOT** be accepted.

If a student is unable to fulfil any of the evaluation deadlines they will be required to seek academic accommodations. Documentation for either medical or non-medical academic accommodation must be submitted by the student directly to the appropriate Faculty Dean`s office and not to the instructor. It will be the Dean`s office that will determine if accommodation is warranted.

For Western`s [NEW Policy on Accommodation for Illnesses](#) please refer to the Academic Calendar` section on [Academic Rights and Responsibilities](#).

Requesting Academic Consideration

Students who experience an extenuating circumstance (illness, injury, or other extenuating circumstance) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes:

- (i) Submitting a [Self-Reported Absence form](#) provided that the conditions for submission are met;

- (ii) For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner in order to be eligible for Academic Consideration; or
- (iii) For non-medical absences, submitting appropriate documentation (e.g., obituary, police report, accident report, court order, etc.) to Academic Counselling in their Faculty of registration in order to be eligible for academic consideration. Students are encouraged to contact their Academic Counselling unit to clarify what documentation is appropriate.

Students seeking academic consideration:

- are advised to consider carefully the implications of postponing tests or midterm exams or delaying handing in work;
- are encouraged to make appropriate decisions based on their specific circumstances, recognizing that minor ailments (upset stomach) or upsets (argument with a friend) are not normally an appropriate basis for a self-reported absence;
- **must communicate with their instructors no later than 24 hours** after the end of the period covered by either the self-reported absence or SMC, or immediately upon their return following a documented absence.

Academic consideration is not normally intended for the following circumstances:

- **Students who require academic accommodation based on an ongoing physical or mental illness (recurring or chronic) or an existing disability.** Students with an ongoing physical illness or mental disorder (recurring or chronic) or an existing disability are responsible, in consultation with their doctors or other health professionals, to determine if they are capable of pursuing their studies and, if so, with what accommodations. Students are expected to seek and arrange reasonable accommodations with Student Accessibility Services (SAS) as soon as possible in accordance with the Policy on Academic Accommodation for Students with Disability. Students with pre-existing accessibility plans arranged through SAS may not need to provide additional documentation when seeking academic consideration where such request for consideration relates to their disability and where their accessibility plans allow for coursework deferral or deadline extensions.
- **Students who experience high levels of stress related to academic performance** (including completing assignments, taking part in presentations, or writing tests or examinations). Students with academic or exam stress should access supports through Student Health and Wellness and Learning Skills Services in order to deal with this stress in a proactive and constructive manner.

Grades will not be adjusted on the basis of need. It is important to monitor your performance in the course. Remember: *You* are responsible for your grades in this course.

6. Make-up Examinations

Makeups will be granted with approved documentation only. All documentation for missed exams must be provided to the Academic Counselling Office within 48 hours of the scheduled exam, otherwise the instructor will assign a grade of zero.

The format and content of make-ups may differ substantially from the scheduled test or examination.

7. Use of Electronic Devices

No electronic devices will be allowed during tests and examinations. Although the use of lap tops and smart phones can be helpful during class, students are requested to refrain from using social media, texting and email during class. Participation and engagement are key to your success in this class.

8. Academic Offences

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

9. Western's Commitment to Accessibility

The Department of Geography strives at all times to provide accessibility to all faculty, staff, students and visitors in a way that respects the dignity and independence of people with disabilities.

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 519-661-2147 for any specific question regarding an accommodation. Information regarding accommodation of exams is available on the Registrar's website.

More information about "Accessibility at Western" is available.

10. Mental Health

If you or someone you know is experiencing distress, there are several resources here at Western to assist you. Please visit Western's Health and Wellness website for more information on mental health resources.

11. Support Services

Western's Support Services
Student Development Centre

12.Course Schedule

| Dates | Subject | Reading, Assignment, Notes |
|----------|---|---|
| Sept 11 | Lecture 1: Course Introduction What is Paleolimnology? | Smol, Chapter 2 and 3 |
| Sept 12 | Lecture 2: Water Field Work and Note Taking | Smol, Chapter 1 Field Trip Introduction |
| Sept 18 | Lecture 3: Lake Zones | Smol, Chapter 1 |
| Sept 19 | Lab 1: Thermal Stratification | Due Oct. 3 (10%) |
| Sept 21 | Field Trip 8:30am-5:30pm | |
| Sept 25 | Lecture 4: Lakes and their Sediments Field Note Collation | Smol, Chapter 3 |
| Sept 26 | Tutorial and time to work on Lab 1 | Attendance is optional, but strongly encouraged |
| Oct 2 | Lecture 5: Assigning Ages to Sediments | Smol, Chapter 4 |
| Oct 3 | No Lab | Lab 1 Due |
| Oct 9 | Lecture 6: Paleoindicators and Inferring Past Environments | Smol, Chapter 5 and 6 Paleoindicator Sign Up |
| Oct 10 | Research Questions and Hypotheses | Group Research Questions |
| Oct 16 | Midterm 1 | Midterm 1 (10%) |
| Oct 17 | Lab 2: Dating , LOI and Chlorophyll <i>a</i> | Due: Nov 13 (10%) |
| Oct 23 | Lecture 8: Erosion | Smol, Chapter 12 |
| Oct 24 | Poster Prep | |
| Oct 30 | Poster Show | Poster Presentation Due (15%) |
| Oct 31 | Lecture 9: Eutrophication | Smol, Chapter 11 |
| Nov 4-10 | FALL BREAK | |
| Nov 13 | Lecture 9: Atmospheric Pollution and Acidification | Smol, Chapter 7 and 8 Lab 2 Due |
| Nov 14 | Lab 3: Microscopes, diatoms and chrysophytes | Lab 3 Due (5%) |
| Nov 20 | Lecture 10: Climate Change | Smol, Chapter 14 |
| Nov 21 | Lab 4: Pollen, Vegetation and Climate | Lab 4 Due (5%) |
| Nov 27 | Lecture 11: Species Invasions | Smol, Chapter 13 |
| Nov 28 | Midterm 2 | Midterm 2 (10%) |
| Dec 4 | Dec 4 | Tutorial: Presentation Prep |
| Dec 5 | Class Wrap Up | |