

Fall 2019

BIOL-822* Long-Term Environmental Change

Term Offered: Fall, 8:30-11:30, Tuesday; Room 3112, Biosciences Building

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Overall Scope:

It is becoming increasingly clear that long-term environmental data are required to assess many global concerns. It is therefore not surprising that a large number of paleoenvironmental techniques and other approaches are currently being used to infer global and more local environmental changes.

The main focus of this course will be to review and assess the many techniques currently available to track long-term environmental change. An emphasis will be placed on biological approaches dealing with sedimentary analyses, but other proxy methods (e.g. ice cores, dendrochronology, etc.) will also be covered. Students have considerable latitude in choosing topics for presentation and for their final paper – the only condition being that it deals with some aspect of long-term environmental or ecological research (and not directly related to their theses).

Methods of Instruction and Hours per Week:

The class will typically meet for a ~3-hour class, once a week, on Tuesdays, between 8:30 and 11:30 AM in the Biosciences Complex (Earl Hall), Room 3112.

I will present some formal lectures, especially in the first part of the course, followed by presentations and discussions by the students (see below). Several guest lecturers will be invited as well.

Overall Goals:

1) To help provide a "working knowledge" of global environmental change research, with a focus on long-term studies.

A primary focus of this course is long-term global change. These areas of research are no longer simply parts of obscure university research programs, but are of interest to the general public and policy makers (frequently new findings are making front page news articles), and one of the fastest growing fields of science. It is hard to consider oneself an educated citizen without some knowledge of these fields.

We are fortunate at Queen's to have fairly broad expertise in a suite of global change fields. Yet, despite very good personal interactions between different faculty, staff, and students, I feel we have not been especially efficient in transferring ideas and research initiatives between and sometimes even within labs.

Queen's is somewhat unique in its expertise in these areas, and my concern has been that students are leaving Queen's with "less of the package" than they can potentially get. Hence, my overall goal for this course is to try and introduce students to as many approaches and techniques as possible, given the limited amount of time available for a ½ course. Certainly, we will not delve into any great detail, but I hope students will leave with a "working knowledge" of these fields. To some extent, the course is driven by the students' interests (and certainly in their choices of topics for presentations and final review paper).

2) To broaden your knowledge in specific areas of interest.

As will become evident below (in the section on evaluations and requirements) a large part of this course will be in the hands of the students themselves. We typically have a diverse group of students in this course (from many departments and even faculties), and so I am hoping to give enough flexibility that students can develop some expertise in specific areas that are of most interest to them. This will involve a significant research review paper, as well as a seminar on this material, presented to the class, in the last 2-3 weeks of class (see below; timing depends on the number of students in the course).

3) To help develop and hone communication skills in oral presentations and writing.

Effective communication skills are critical in all aspects of modern life, and certainly are important for scientists. These skills can be developed and honed in a variety of ways. In this course, we will hope to meet these goals by having each student make 2 oral presentations (a shorter summary of a paper of interest, and a more formal seminar on your research paper), as well as a final review paper. The seminars and final project will be assessed (hopefully with comments provided by me that will help you in future presentations and writing).

EVALUATION (See below for details):

Seminar #1: 10%

Review Paper: 65% (due December 9, 5pm)

Seminar #2: 25%

All components of this course will receive numerical marks. The final grade you receive for the course will be derived by converting your numerical course average to a letter grade according to Queen's Official Grade Conversion Scale:

Queen's Official Grade Conversion Scale

Grade	Numerical Course Average (Range)
A+	90-100
A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56
D-	50-52
F	49 and below

a) Journal Paper Seminar #1: 10%

In weeks 5 and 6, each student will provide a ~20 minute (may change depending on class size) seminar on a recent journal paper(s) of interest.

Each student will be required to choose a journal paper that would be of relatively broad interest to the class. This can be in your general area of research, or something totally outside your field. The only requirement is that it somehow relates to the broad subject coverage of this course. It seems that many papers in, for example, *Science* or *Nature* might be appropriate, but papers from any journal will do.

Students will be required to do the following. By week 3, each student should have a copy (or pdf) of all the papers that will be presented by you in the two slots in weeks 5 and 6. Each student will have approximately ~15 minutes for presentation of the paper, using PowerPoint or any aids you choose, to the class. Although the class will only be required to read your primary paper, it might well be appropriate for your presentation to bring in other papers and figures from supporting studies. The goal is to present a coherent summary of the overall work, why it is important, where it might lead to, what may be wrong with it, etc. You should also leave some time for discussion -- so the best budgeting of time might be about 15 minutes or so for an oral presentation, and a few minutes for discussion/comments (we will firm up times

once we know how many students are in the course). I suggest you practice and time your talk. We are hoping to get a smooth, coherent presentation from you, and this can rarely be done "off the cuff"!

The overall goal of this first exercise is to expose students to areas of research that they may not typically be aware of, and again to provide practice in communication skills.

b) Literature Review Paper: 65%

Each student will be required to submit a relatively thorough literature review paper on some aspect of the course. Again, the choice of topics here can be very broad BUT it cannot be on your thesis research. This is not meant to be a substitute for your literature review in your thesis. The main reason for doing this work is to broaden your scope. The topic should also be different from your first journal seminar.

It would be a good idea to discuss topics with me before you begin. Please start thinking and working on this paper early in the term. Remember, there are no exams, no written assignments, etc. in this course. It would be hard to complain about too much work here. Start on this early, and discipline your time.

I would expect most papers to typically be about 20 double-spaced pages, plus references. Also, with references, I expect this to be a primary review, not simply citing other reviews and book chapters, but a thorough search through the primary literature. The goal here would be to choose a topic that is broad enough to have enough literature on it, but not too broad so that your coverage will be superficial. For example, a paper on "pollen" or "diatoms" or "ice cores" would not work, but perhaps "using ice cores to track recent pollution" might?

Please start working on this now! In order to have the papers marked for my deadline at the grad school, I need them in my hands **MONDAY DECEMBER 9**. Remember, this paper represents the major part of your overall course evaluation. I will have to deduct 3% a day for late papers.

c) Seminar #2: 25%

In weeks, 10-11 (and possibly 12, depending on class size), each student will present a seminar on their research paper to the class. Please organize your talk and prepare your visual aids carefully. Each seminar should be about 25-30 minutes long (timing may change, depending on the number of students in the course), which gives some time for questions and discussion. I suggest practicing your talks. Timing will be important.

Please note: The deadlines are firm. Once we determine your seminar dates, you must present on that date. The final paper has to be in time so I can get them marked. Penalties will apply for late papers (departmental policy).

In summary, with the evaluation criteria for this course, my goal is to provide a vehicle for learning new concepts and ideas, and to improve communication skills. I do not feel that these assignments are too onerous. So please keep to schedule! In your career, you will have deadlines everywhere, so please watch and discipline your time accordingly.

Textbook:

There is no real textbook for this course, however one of my own textbooks does act as a general guide for at least paleolimnological and related approaches. It should be available at the Campus Bookstore and can also be ordered with links at:

<http://post.queensu.ca/~pearl/textbook.htm>. The library has a copy as well.

Smol, J.P. 2008. Pollution of Lakes and Rivers: A Paleoenvironmental Perspective. 2nd edition. Wiley-Blackwell Publishing, Oxford. 383 pp.

Prerequisite and Assumed Background:

None, except being "keen!"

Academic Integrity:

Academic integrity is constituted by the five core fundamental values of honesty, trust, fairness, respect and responsibility (see www.academicintegrity.org). These values are central to the building, nurturing and sustaining of an academic community in which all members of the community will thrive. Adherence to the values expressed through academic integrity forms a foundation for the "freedom of inquiry and exchange of ideas" essential to the intellectual life of the University (see the Senate Report on Principles and Priorities <http://www.queensu.ca/secretariat/policies/senateandtrustees/principlespriorities.html>).

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments conform to the principles of academic integrity. Information on academic integrity is available in the Arts and Science Calendar (see Academic Regulation 1 <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations/regulation-1>, on the Arts and Science website (see <https://www.queensu.ca/artsci/students-at-queens/academic-integrity>) and from the instructor of this course. Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

Tentative Schedule: (tentative – as schedule may change depending on number of students in class)

Week 1: Sept. 10: Introduction, overview of course; Video: "In Search of a Tropical Arctic".

Week 2: Sept. 17: JPS lectures on Ice Cores (lectures, slides, and video).

Week 3: Sept. 24. JPS lectures on global change and paleoenvironmental techniques. Students should distribute journal papers they will present in weeks 5 and 6.

Week 4: Oct 1. First students present their journal seminar. JPS lectures on other global change and paleoenvironmental techniques (time permitting).

Week 5: Oct. 8. Remaining students present their journal seminar. JPS lectures on other global change and paleoenvironmental techniques (time permitting).

Week 6: Oct. 15. Depending on number of students in course, we may continue with seminars or JPS lectures.

Week 7: Oct 22. Lecture on tree rings and then field trip to Geography!!! Presentations on varves and tree rings.

Week 8: Oct 29. Lecture by Dr. N. Michelutti and field trip to Geology to see isotope facilities.

Week 9: Nov 5. Lectures on other global environmental change techniques and approaches.

Week 10: Nov. 12. First group of students give out handouts and present final seminars. JPS may lecture as well.

Week 11: Nov 19. Remaining students give out handouts and present final seminars. JPS may lecture as well.

Week 12: Nov. 26. Remaining students (depending on numbers in course) give out handouts and present final seminars. Follow up (if needed).

Monday Dec. 9 – (5 pm): Deadline for submission of final paper. Each day late (or fraction thereof), 3% off per day.