

# BIOL 527

## Paleolimnology and Global Environmental Change

Winter Term (2020)

### CALENDAR DESCRIPTION

The main aim of this course is to provide students with a background in studies of long-term environmental change, with a focus on research that is especially relevant to today's environmental problems. Key topics include: climatic change, lake pollution, atmospheric deposition of contaminants and related topics. Lake sediment analyses will be highlighted, but other approaches (such as ice cores, tree rings, corals) will also be explored. RECOMMENDATION BIOL335

### SCHEDULE -

Seminar Course: Tuesday 2:30-5:30; BIOSC 3112

Instructor	Brian Cumming, Professor and Head, Rm. 3102
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Office Hours	Before or after class; e-mail for appointment

**LEARNING OBJECTIVES** - The overall goals of this course are to: i) provide an overview of the complexity of environmental issues we are facing today, and how long-term paleoenvironmental data can help inform many of these issues; and ii) provide the opportunity to improve your synthesis and communication skills. In order to be a successful scientist (and citizen), you must be able to assimilate information, organize information, and be able to present information effectively in both oral (e.g., seminars) and written (e.g., final paper) forms. These skills will be further developed in this course.

### Learning Hours

<i>Teaching method</i>		<i>Average hours per week</i>	<i>Number of weeks</i>	<i>Total hours</i>
In-	Lecture	2.5	4	10
	Seminar	3	8	24
Other	Online activity			
	Off-campus activity			
	Private study	8	12	96
Total hours on task				130

### Textbook

Smol, J.P. 2009. Pollution of Lakes and Rivers: A Paleoenvironmental Perspective

([https://www.wiley.com/en-](https://www.wiley.com/en-ca/Pollution+of+Lakes+and+Rivers%3A+A+Paleoenvironmental+Perspective%2C+2nd+Edition-p-)

[ca/Pollution+of+Lakes+and+Rivers%3A+A+Paleoenvironmental+Perspective%2C+2nd+Edition-p-](https://www.wiley.com/en-ca/Pollution+of+Lakes+and+Rivers%3A+A+Paleoenvironmental+Perspective%2C+2nd+Edition-p-)

9781444307573). Both paperback and e-books are available from this site. Note: used versions are fine -- there are no access codes or supplemental information associated with this publication. A copy of this book has also been put on 3-hour reserve in the library

**COURSE OUTLINE** - There is a growing realization that long-term data are vital for understanding many ecological and environmental problems. Unfortunately, such data are rarely available, and so indirect proxy methods must be used to reconstruct long-term records. One of the leading approaches for inferring long-term environmental trends is paleolimnology and related paleoenvironmental fields. Paleolimnology is a multi-disciplinary science that uses physical, chemical, and biological information preserved in sedimentary profiles from aquatic systems to reconstruct past environmental conditions. Paleolimnological reconstructions of environmental change are being used increasingly in a large number of projects around the world. For example, paleolimnology played a key role in recent international environmental problems, such as lake acidification, eutrophication, and climate change.

The first part of this course (my lectures) is structured to give you the necessary background on presentation strategies as well as a general introduction to the field of paleolimnology. The remainder of the course is structured to help develop your synthesis, presentation and writing skills. The topics and papers that I have chosen for your first seminar will highlight the various approaches that have been successfully developed over the years in the field of paleolimnology.

**General advice on seminars** - Please practice your seminars in advance. Your seminar is not meant to be an informal chat, but a coordinated presentation. Tell the audience in your introduction why the work that you will be presenting is important, and how it fits into the "big picture". Give the audience enough background so that they will understand what is involved in the study or subject. At the same time, try not to bog everyone down in details. You should plan your seminar carefully and practice it, especially with regards to length. Following your presentation, there will be time for some questions and discussion. For each of the first seminars, I have also assigned a reader, who will be responsible reading the papers in detail and asking the initial questions following the presentation. All other students are encouraged to read the chapters prior to the seminar.

**Seminar #1 (15% of final grade)** - This first seminar will be based primarily on assigned topic based on a book chapter, review article, and/or journal papers (see Course Outline in table below). The length of this seminar will be a maximum of 25 minutes with 5 minutes for questions/discussion. However, you are free to use other sources for your seminar. The papers have been chosen to emphasize different techniques and issues in the paleolimnological literature, as well as a number of interesting topics that the paleolimnological approach can cover. In many cases, the assigned chapters are quite large, and so you may need to focus on only some aspects of the review or study in question. **Please structure your seminar provide a summary of the importance of the papers assigned, the paleolimnological approaches used to study this issue, and how this approach contributed to our understanding of the topic.** You will be required to provide a concise handout to the class (14 copies) of your seminar that contains the essential figures used in your presentation. You are not expected to present all the information in these articles – the information and number of articles is to provide you with more than a superficial background on the material which you will be presenting. It is important to carefully choose and organize the material in your presentation (i.e., don't try and cover everything in detail! You will need to be selective).

As part of this course, you will not only be responsible for presenting a topic, but also for being a 'reader' on the papers used for **one** of the first set of seminars presented by your peers (this seminar is assigned in the table below). The role of the reader is to comprehensively read the assigned papers for that topic, and for starting the questioning following the seminar. Your participation as a reader will contribute to your

participation grade.

**Seminar #2 (25% of final grade)** - Your second seminar, and the topic of your research paper, will deal with a specific question or approach that is relevant to understanding long-term environmental or ecological change. The length of this seminar will be a maximum of 40 minutes with 5 minutes for questions/discussion. In many ways, this final seminar will be more of a challenge than the first one, as you will have more material to work with. Your topic can be a review on any subject that you have chosen related to long-term environmental or ecological research. It can, but doesn't have to deal with paleolimnology. The only restraint on your choice of topics is that it has to be on a different topic from your first seminar. A frequent problem seems to be that either a topic has been chosen that is just too broad, or sometimes too narrow or new, and not enough literature is available. There are lots of good subjects out there, so take some time researching an idea before you commit yourself.

There are many places you can get good ideas for a topic including the course textbook as well as articles in journals. For example, see Seddon et al. 2014 (<http://dx.doi.org/10.1111/1365-2745.12195>), issues or special issues of *Quaternary Science Review* (<http://www.journals.elsevier.com/quaternary-science-reviews/special-issues/>), the NOAA webpage (<http://www.climate.gov>), and many other journals including the *Journal of Paleolimnology*, *Quaternary Research*, *Quaternary International*, *Palaeogeography*, *Palaeoclimatology and Palaeoecology*, and *The Holocene*.

By Week 3, you should have a general idea of the topic that you would like to pursue for your second seminar and research paper. By Week 4, you will be required to hand in a summary (title, summary of the objectives of your paper, and key references) of the topic you will be pursuing (**10% of your final grade**).

**Research Paper (40% of final grade)** – Your research paper is worth 40% of your mark in this course, and so I am hoping to get a professional review of the subject you have chosen. I strongly urge you to start working on this paper early. I would suggest that 12-15 double-spaced pages using a 12-point font of text (~2,500 words, excluding figures/tables and references) would be an appropriate length.

The general format of the final paper is up to you. Normally you would have an *Introduction*, which introduces what you will be talking about, and then go on with your review in a logical manner. I would also recommend that you also have a *Conclusions* section, where you briefly try and sum things up, and perhaps suggest future research directions. Some of the things I expect include: a one-page abstract summarizing your paper; complete captions and sources of all of your figures and tables; all references in a consistent format.

The final paper should be submitted to me as a hard copy, as well as a word document via e-mail. Note: the penalty for late papers is a deduction of 2%/day.

## GRADING SCHEME -

Component	Weight (%)
Seminar 1(25 min. + 5 min. questions/discussion)	15
Proposal for second seminar and paper	10
Seminar 2 (40 min + 5-10 min. questions/discussion)	25
Participation	10

Paper	40
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The seminars will be marked by the instructor as well as by peer evaluation. The week following your seminar, written feedback on aspects of your presentation will be given to you including details on: organization and timing, audio-visual aids, delivery, content and handling of questions. The major paper will be marked by the course instructor.

**Details of Grading Method**

In this course, some components will be graded using numerical percentage marks. Other components will receive letter grades, which for purposes of calculating your course average will be translated into numerical equivalents using the Faculty of Arts and Science Letter Grade Input Scheme.

When letter grades are employed, the following scale will be employed for purposes of calculating your course average:

***Arts & Science Letter Grade Input Scheme***

Assignment mark	Numerical value for calculation of final mark
A+	93
A	87
A-	82
B+	78
B	75
B-	72
C+	68
C	65
C-	62
D+	58
D	55
D-	52
F48 (F+)	48
F24 (F)	24
F0 (0)	0

Your course average will then be converted to a final 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

## **ACADEMIC REGULATIONS, ACCOMMODATION AND CONSIDERATION**

### Academic Integrity and Queen's Code of Conduct

Academic integrity is constituted by the five core fundamental values of honesty, trust, fairness, respect and responsibility. 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.

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments and conduct conform to the principles of academic integrity. Information is available in the Arts and Science Calendar (see Academic Regulation 1 -

<http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations>, on the Arts and Science website (see <http://www.queensu.ca/artsci/academics/undergraduate/academic-integrity>), and at Biology's website (<http://biology.queensu.ca/academics/undergraduate/prepare-yourself>)

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 regulations 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.

### Accommodation of Disabilities

Queen's University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact the Disability Services Office (DSO) and register as early as possible. For more information, including important deadlines, please visit the DSO website at: <http://www.queensu.ca/accessibility/students/supports-and-services-students-disabilities>.

Academic Accommodations are term-long accommodations that are managed by Queen's Student Accessibility Services. Typical accommodations may include extra time on assessments and/or special room requirements. At the beginning of the term, the student should send me a copy of your Letter of Accommodation, and any specific requests you have for this course.

Academic Consideration is mitigation for a short-term issue related to an extenuating circumstance. All academic considerations must go through the student portal available on the Faculty of Arts and Science website (<https://www.queensu.ca/artsci/accommodations>). Following your request, I will be notified. There are 2 types of academic considerations. The first is called a 'brief absence' (up to 48hrs) and is essentially a self-declaration of an extenuating circumstance. The second is a short-term extenuating circumstance that can be from 2 days-3 months. The latter requires documentation.

The aim of centralizing academic considerations is to log extenuating circumstances to provide better support for students who need it, and to watch for patterns where students are abusing the system.