

GEOG 5001 MODELLING ENVIRONMENTAL SYSTEMS FALL TERM 2017

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Office Hours: Tuesday, Thursday 13:00-14:00 A330 LA

Lectures: Tuesday, Thursday 16:05-17:25 A220 LA

Textbooks: There is no single textbook for the course as is common in undergraduate classes, but Chalmers (1999) is as close as one might come. You need to purchase:

- Winchester, S. 2001. *The map that changed the world*. (Paperback)
- Chalmers, A.F. 1999. *What is this thing called science?* 3rd ed. or 4th ed. (2013).
- Darwin, C. 1859. *On the origin of species*. (Many editions)
- Hulme, M. 2014. *Can science fix climate change?* (Paperback)

We will read *The map that changed the world* in September, *On the origin of species* in October, and *Can science fix climate change?* in November. Throughout the course you will also be asked to read papers from the refereed literature that are associated with the week's theme. The thought of Michael Church will be prominent in these articles.

Objectives: The course aims to provide students beginning their graduate program with a structured overview of the nature of current research in the environmental earth sciences. It is an epistemological course – studying how we construct knowledge. We consider spatial and temporal variability of environmental data and the scales at which environmental processes occur. We discuss model building and validation of theoretical structures. Towards the end of the semester we discuss science and scientists in the public realm and their role with respect to societal issues. The course is geared to increasing students' ability to evaluate the quality of research they encounter and conduct, and to identify suitable research methods for specific problems.

Course topics: Identifying an environmental system
Spatial variability of environmental data
Temporal variability of environmental data
Models of environmental systems
Experimental method
Deterministic and stochastic systems
Extreme events
Social role of science

Program: Lectures as per schedule
 Reading as assigned
 Three book reviews
 One term paper
 Final examination

Evaluation:	Book reviews	3 x 10% = 30%
	Term paper	30%
	Examination	<u>40%</u>
		100%

Assignments

1)Book reviews. Each month we will read and discuss one of three books listed on p. 1. Students will prepare a review of each book. Each review will be about 1200 words in length. The review will summarize the contents of the book (300 words) and then comment on the book in the context of the course material (900 words). The purpose of the review is to illustrate themes in the development of science that represent how we use and consider evidence, to comment on the nature of the arguments that are constructed in the books, and to discuss the limits of the scientific method. The dates for submission of reviews are: October 5th; November 2nd; and November 23rd. The reviews should be submitted before 11:59 pm. The reviews should be in pdf format, 12 pt Times New Roman font, and double spaced.

2)Literature criticism. Students are required to present a critical assessment of a key paper in their field that is to be chosen in consultation with their supervisor. The paper is due before 5:00 pm on December 8th. The paper will involve a review and critique of the methods, results, and overall presentation of the paper. The review needs to be positioned in the context of the course material we will cover this term. The paper must be presented on paper, and should be approximately 2,500 words long. A copy of the paper that has been examined must also be handed in.

3) A **3-hour examination** will be held in the final exam period. The exam will comprise questions on topics covered in the course, and will require knowledge of material covered in lectures and in assigned readings. You should read Chalmers (1999) during the term in preparation for the examination. The examination is scheduled by central services, not the instructor. The examination schedule will be released on October 6th.

4) **Readings** will be assigned on the topics to be covered in the course. Class periods will generally alternate between lecture material and a seminar discussion, led by students, on readings assigned beforehand. All members of the class are required to read the material assigned in preparation for the seminar, and the leadership will rotate through the group.

Plagiarism

The University Senate defines plagiarism as “*presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.*” This may include:

- reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source;
- submitting a take-home examination, essay, laboratory report or other assignment written, in whole or in part, by someone else;
- using ideas or direct, verbatim quotations, or paraphrased material, concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another’s data or research findings;
- failing to acknowledge sources through the use of proper citations when using another’s works and/or failing to use quotation marks;
- handing in "substantially the same piece of work for academic credit more than once without prior written permission of the course instructor in which the submission occurs."

Plagiarism is a serious offence which cannot be resolved directly with the course’s instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They may include a final grade of "F" for the course.

Academic Accommodation

You may need special arrangements to meet your academic obligations during the term because of disability, pregnancy or religious obligations. Please review the course outline promptly and forward any requests for academic accommodation to the Instructors during the first two weeks of class, or as soon as possible after the need for accommodation arises.

Students with disabilities requiring academic accommodations in this course must register with the Paul Menton Centre for Students with Disabilities (PMC) for a formal evaluation of disability-related needs. Documented disabilities could include but are not limited to mobility/physical impairments, specific Learning Disabilities (LD), psychiatric/psychological disabilities, sensory disabilities, Attention Deficit Hyperactivity Disorder (ADHD), and chronic medical conditions. Registered PMC students are required to contact the PMC, 613-520-6608, every term to ensure that your Instructor receives your Letter of Accommodation, no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you only require accommodations for your formally scheduled exam in this course, you must submit your request for accommodations to PMC by Nov. 10, 2017.

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at <http://carleton.ca/equity/accommodation>.

Cell phones and social media: Students must turn off their cell phones before each class. These devices must be removed from the classroom furniture so that they do not provide distractions. Interruption of classes by users of cell phones is disruptive for instructors and students alike.

Consultation of social media during classes is similarly inappropriate. If students decide that consulting social media is preferred over participation in class activities, the instructor will oblige them by leaving the room.

Uploading of course materials: Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copy protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s).

Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s).

Timetable: we shall adhere to this schedule as much as possible. Note that a week is not a calendar week, but coupling of two class periods.

Week 1	S07	Instructor at NRTH 5008. No class.
	S12	Instructor at NRTH 5008. No class.
Week 2	S14	Introduction to the course; Environmental systems
	S19	Environmental systems – discussion
Week 3	S21	Spatial and temporal variability - lecture
	S26	Spatial and temporal variability – seminar
Week 4	S28	Hypotheses and research proposals – lecture
	O03	<i>The map that changed the world</i> – discussion
Week 5	O05	Models of environmental systems - lecture
	O10	Models of environmental systems – seminar
Week 6	O12	Experimental methods – lecture
	O17	Experimental methods – seminar
Week 7	O19	Deep time and modern processes: Guest lecture
	O24	Fall study break
Week 8	O26	Fall study break
	O31	<i>On the origin of species</i> - discussion
Week 9	N02	Stochastic systems - lecture
	N07	Stochastic systems - seminar
Week 10	N09	Curiosity in science: Guest lecture.
	N14	Science and society - lecture
Week 11	N16	Instructor away.
	N21	<i>Can science fix climate change?</i> – discussion
Week 12	N23	Extreme events and Earth history - lecture
	N28	Extreme events and Earth history - seminar
Week 13	N30	Chaos - lecture
	D05	Chaos - seminar
Week 14	D07	Science and Society - seminar