

Western University

Geography 3350A: Environmental Change

Course Outline

Fall 2015

Instructor: David Morimoto

Email: dmorimot@uwo.ca

Office Location: SSC 2221 (Social Science Centre)

Instructor Office Hours: Wednesdays 10:30-11:30am (or by appointment)

T.A.: Nolan Pearce (email: npearce7@uwo.ca)

Course Timetable:

Wednesdays 5:30 to 9:30 p.m. SSC 1302 (PGLL*)
(* *Physical Geography Learning Laboratory*)

Course Calendar Description:

The evidence, causes, and chronology of environmental change, with emphasis on the Holocene in North America.

Prerequisite Checking – the student’s responsibility:

One of Geography 2310A/B, 2320A/B or 2330A/B, or at least 3rd year standing in an Environmental Science or Earth Sciences program.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may 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.

Communication Policy:

1. Please contact the professor and the teaching assistant by email with GEO3350 in the subject heading, and use professional communication etiquette. Personal accounts might be intercepted by SPAM filters and be sent to junkmail, and are not to be used for communication between university employees, students, and staff. The teaching assistant and I will therefore not be responding to emails that are not from @uwo.ca addresses.

2. Generally, emails will be responded to within 48 hours during weekdays (not including holidays). Emails will usually be addressed during regular work hours (9-5). We may choose, at our discretion, to respond outside these hours, depending upon availability.
3. Announcements regarding any changes or notifications regarding the course will be made through OWL. (<https://owl.uwo.ca/portal>).

Course Content

The subject matter of this course is very extensive and broad ranging. In order to understand environmental /climate change, it is necessary to have some integrative understanding of:

- (i) the present climate and other natural environmental systems
- (ii) the forcing functions that control those systems
- (iii) the chronology of past environmental changes
- (iv) the techniques used to reconstruct paleoenvironments and their limitations (including dating techniques)
- (v) anthropogenic influences on local and global environments.

Learning Outcomes

After successfully completing Geography 3350A, students will be able to:

- Explain tools/techniques scientists use for studying paleoenvironments.
- Explain types of climate models and the importance of climate projections.
- Articulate natural and anthropogenic climate forcing mechanisms
- Communicate/present environmental change research to class audiences
- Evaluate relevant published research materials

Course Materials:

Textbook (Strongly recommended):

Ruddiman, W.F. (2014). *Earth's Climate, Past and Future*, 3rd Edition. Freeman, New York.

(2nd Edition is also fine)

Additional materials may be incorporated into the course.

(e.g. *IPCC – Fifth Assessment Report*, available for free from www.ipcc.ch; various academic journal articles).

Course Requirements / Marking Breakdown:

| Assessment | Weight | Date |
|---|--------|---|
| Techniques of Environmental Change Science Presentation (10%) and Fact Sheet (5%) <i>Presentation (in pairs) and fact sheet</i> | 15% | Oct. 21, 2015 |
| Lab Assignment #1 <i>Records of Recent Climate Changes</i> | 10% | Oct. 7, 2015 |
| Lab Assignment #2 <i>Dendrochronology</i> | 10% | Nov. 11, 2015 |
| Research Presentation (15%), Abstract (5%), and Annotated Bibliography (5%) <i>Presentation.</i> | 25% | Annotated bibliography and topic statement due Oct. 28, 2015. Abstracts due Nov. 11, 2015. Presentations in class on Nov. 25, 2015. |
| Participation <i>Includes attendance, in-class participation/ activities/discussions, and conference responsibilities.</i> | 10% | Throughout |
| Final Exam | 30% | TBD |

Assignment Summaries:

Lab Assignment #1 – Records of Recent Climate Changes (10%)

Students will be required to complete a lab assignment which focuses on analyses of climate data. The assignment will require written answers, as well as graphing and calculations in a suitable program (e.g. Excel).

Lab Assignment #2 – Dendrochronology (10%)

Students will develop a basic understanding of the science of dendrochronology, including skeleton plotting and chronology building. Relationships between tree-rings and climate will be examined. Lab assignment will require written answers as well as graphing and calculations.

Techniques of Environmental Change Science Presentation (15%)

Students are required to prepare an 8-10 minute presentation (in pairs) describing the methods and use of a technique used in the study of Environmental Change or Climate Science. Students will choose from a list of topics or an alternate topic upon consultation and approval of the instructor.

In-class Conference Presentations (25%)

The in-class conference presentations consists of 3 individually graded components: an annotated bibliography, an abstract, and the presentation. Students contribute to the success of the conference by organizing sessions and introducing the speakers. The research topics are open-ended giving students the opportunity to further explore a topic of interest. The topic must be specific and at least 8 academic references must be used. A topic statement and **annotated bibliography** are due before the presentation and

feedback will be given from the TA and/ or the instructor. Before the presentation, an **abstract** describing the main findings of your research is due (maximum 1 page). The presentations should be 10 minutes – you may reserve 1 – 2 minutes for questions at the end (e.g. 8 minutes presentation, 2 minutes questions).

Participation (10%)

Students will be graded on participation in a variety of ways. Attendance in class is required for effective participation and contributes to the participation grade (students may receive a perfect attendance grade unless more than two classes are missed without reasonable explanations given). Consideration in the participation grade will also be given to involvement including in-class discussions, providing links/commentary to related news or research items to the class and instructor, and participating in the preparation for the in-class conference (above).

Grade Breakdown and Explanation

- 90-100 Excellent. You have surpassed my expectations
- 80-89 Very good. You have fulfilled my expectations
- 70-79 Good. Expectations are mostly fulfilled with weak areas.
- 60-69 Satisfactory. There are problems such as confusing writing or expectations are not fulfilled.
- 50-59 Less than satisfactory. There are major problems.
- < 50 Unsatisfactory. Task not fulfilled.

Course Schedule

The attached schedule is *tentative* and subject to change depending on student enrolments, and other factors, including field camp breaks and possible guest speaker(s). It may be updated – all updates will be communicated with the class.

| Date | Topics | Readings (Ruddiman Ed. 2) | Readings (Ruddiman Ed. 3) | Action items |
|----------------|---|---|--|---------------------------|
| Sept 16 | Course organization <i>Introductions; Assignment handout and discussion</i> Geologic time | | | Lab Assignment #1 handout |
| | Introduction to the Climate System I: Internal interactions - Feedbacks: vegetation, ice, land surface, atmosphere, ocean - The Carbon Cycle | Ch. 1: Section 1-1 to 1-9 Optional review– Ruddiman 2001 Ch 2 (online). | Ch. 1: Section 1-1 to 1-9 Optional review – Ch. 2 | |
| Sept 23 | Introduction to Climate System II: Forcing mechanisms - Milankovitch cycles | Sections 1-5, 1-6 (p. 10-12); Ch. 7. | Sections 1-5 to 1-6; Ch. 8. | |
| | Environmental Change | p. 7-8, Section 2-1 | p. 7-8; section 3-1 | |

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|----------------|---|-----------------------------|-----------------------------|---|
| | Methods I: Instrumental records and dating techniques | to 2-4; Section 2-6 to 2-7. | to 3-4; section 3-6 to 3-7. | |
| Sept 30 | Lab Assignment work period Please read and attempt questions ahead of time so you can use class and instructor time wisely. | | | <i>Work Period No participation grades for attendance today</i> |
| | Lab Assignment work period Please read and attempt questions ahead of time so you can use class and instructor time wisely. | | | <i>Work Period No participation grades for attendance today</i> |
| Oct 7 | Environmental Change Methods II | Section 2-3 to 2-4. | Section 3-3 to 3-4. | <i>Lab Assignment #1 Due</i> |
| | Earth's history & climate I: the whole shebang Earth's history & climate II: the last 550 myr - magnetic susceptibility - Pangaea to present | Ch. 3; Ch. 4. | Ch. 4; Ch. 5. | |
| Oct 14 | Earth's history and climate III: the last 100 myr | Ch. 5; Ch 9. | Ch. 6; Ch. 10. | |
| | Last Glacial Maximum | Ch 12. | Ch. 13. | |
| Oct 21 | Environmental Change Methods: Presentation Day | Section 16-4 | Section 17-4 | <i>Presentation Day + Fact Sheets.</i> |
| Oct 28 | Climate Since the LGM | Ch. 13. | Ch. 14. | <i>Lab Assignment #2 handout</i> |
| | | TBD | TBD | <i>Annotated Bibliography & Topic Statement due</i> |
| Nov 4 | Environmental Change Methods III: | Section 16-2 to 16-3. | Section 17-2 to 17-3 | |
| | Environmental Change | p. 26-31. | p. 64-66. | |

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| | Methods IV: | | | |
| Nov 11 | Early Humans I: Evolution, settlement, and climate hypotheses | Ch. 15. | Ch. 16. | <i>Lab Assignment # 2 due</i> <i>Abstract Due</i> |
| Nov 18 | Early Humans II: Impact of Climate on Early Civilizations Early Humans III: Influence of early civilizations on the environment | Ch. 15 | Ch. 16 | |
| | Short Term Climate Patterns: ENSO, Effective moisture, etc. | Ch. 16; Ch. 17. | Ch. 17; Ch. 18. | |
| Nov 25 | In-Class Conference | | | <i>Presentation Day</i> |
| Dec 2 | Recent Climate Warming: Scientific basis & historical context | Ch. 18. | Ch. 19. | |
| | IPCC – The Physical Science basis | IPCC 4 th AR – specific readings TBA | | |
| Dec 9 | Mitigation/ Adaptation | TBD | | |
| | Policy, education, technology, and the future | Ch. 19. | Ch. 20. | |
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Policy on Late Written Assignments:

For UWO Policy on Accommodation for Medical Illness and a downloadable SMC see:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

Students seeking academic accommodation on medical grounds for any missed tests, exams, participation components and/or assignments worth 10% or more of their final grade must apply to the Academic Counselling office of their home Faculty and provide documentation. Academic accommodation cannot be granted by the instructor or department.

For non-documented medical absences, late assignments will be given a penalty of five percent per day from the final grade for the assignment for a maximum of 5 days. After 5 days the assignment will not be assessed resulting in a grade of 0.

For assignments worth less than 10%, the student must submit a request for accommodation to the instructor.

Statement on Use of Electronic Devices

No electronic devices will be allowed during tests and examinations.

Statement on 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, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

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.

Mental Health

If you or someone you know is experiencing distress, there are several resources here at Western to assist you. Please visit the site below for more information on mental health resources: <http://www.uwo.ca/uwocom/mentalhealth/>.

Western's commitment to accessibility

The University of Western Ontario is committed to achieving barrier free accessibility for persons studying, visiting and working at Western.

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 661-2111 x 82147 for any specific question regarding an accommodation.

Support Services

Registrarial Services: <http://www.registrar.uwo.ca/>

Student Development Services: <http://www.sdc.uwo.ca/>