

## ***Geography 361: Global Environmental Change***

**Fall 2017, 8:30 9:50 am, Monday & Wednesday, 111 Lillis, CRN: 16385**

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**Overview:** This course will examine the physical and human geographical aspects of global environmental change, focusing on natural variations of the environment over time, the impact of human action on the Earth and its environmental systems, and the projection of future environmental changes. An alternative title for this course might be *Future Earth*.

**Expanded course description:** The course will introduce some of the major themes in global environmental change, a relatively new interdisciplinary field that focuses on both long-term and recent changes in the Earth system, including brought about by both human and natural causes. The major components of the Earth system will be described, along with the ways they are linked and vary over time. The lectures and readings will cover the basic concepts and records of environmental change (both natural and human-induced), the tools used to develop those records, and the ways in which our understanding of those concepts have developed.

An important reason for studying past environmental change is to learn how to project future environmental changes, and this task is motivating the development of both stand-alone models of individual components of the Earth system as well as integrated models that explicitly examine the linkages between human activities and the environment. The way in which such models are developed, tested, and used will be a key component of the lectures and discussion.

The study of global environmental change also provides the context for understanding how humans have interacted with the environment over time to create the one we are currently living in and rapidly modifying. A full understanding of environmental change therefore requires the synthesis of information from a variety of sources that describe both physical environment and human activity, and in ways that encourage and exploit new techniques for viewing the Earth system.

The online exercises will be focused mainly on "making sense" of the kinds of data and information that arise in studying global environmental change. Although ultimately based on numerical data from satellites or from simulation models, most of the information that is actually analyzed in studying global appears in the form of maps or other graphical summaries, and interpretation of such summary information, is critical for understanding how the physical environment varies over time and space.

**Prerequisites:** GEOG 141 (or equivalent introductory Earth-science course)

**Course Materials:** Reading assignments, lecture images and outlines, exercises, grades, etc. are available on Canvas (<http://canvas.uoregon.edu>).

**Goal of the course:** The course will introduce some of the major themes in global environmental change, a relatively new interdisciplinary field. In particular the major components of the Earth system will be described, along with the ways they are linked and vary over time. In addition to the basic concepts of environmental change, both natural and human-induced, the ways in which our understanding of those concepts have developed will also be discussed, as will the tools that are used for projecting future environmental changes.

**Workload expectations:** Attendance at two lectures per week. There will be 10 exercises that will be completed online using materials from the course web page and other sources; these will take 2-3 hours each week (mostly for reading background material, the actual completion of the exercises will not take that long). In addition, about 6 hours per week will be required to complete the readings. Additional time (1-2 hours) could be profitably spent on browsing on-line resources such as links on the Current Weather & Climate web page <http://geog.uoregon.edu/weather/>, climate and environmental change blogs (e.g. RealClimate <http://realclimate.org>, the NY *Times* Science section, and the news portions of *Science* and *Nature*).

**Grading/assessment:** Two exams (20% each; October 23<sup>rd</sup> and Nov 29<sup>th</sup>); plus 4 short quizzes (5% each), completion of all ten exercises (40%). No make-up exams or quizzes. Do not miss class on the days quizzes are given. With adequate documentation of the medical or other issue that created an unavoidable absence, scores from another exam or quiz may be substituted for a single missed exam or quiz. The exams and quiz questions will consist of multiple-choice, essay and short-answer questions, will emphasize concepts (as opposed to factoids), and will also include questions aimed at your ability to synthesize material presented in the lectures, readings, and related web pages.

**Exercises:** The weekly exercises will be focused on "making sense" of the kinds of data and information that arise in studying global environmental change. Although ultimately based on numerical data from satellites or from simulation models, most of the information that is actually analyzed exists in the form of maps or other graphical summaries. Consequently, the exercises will focus on the interpretation of such summary information. Exercises will be posted on Thursdays and will be due at 5pm on the Friday of the following week (except for the first exercise, due on Friday of the first week). *One point will be deducted for each day an exercise is late. All exercises must be completed in order to receive a passing grade for the course, even if the lateness of submission would result in a score of 0.*

**Readings:** All readings will be available as .pdfs online (in the *Modules* section on Canvas, and will consist mainly of chapters from the following books or report series:

- *Climate Change 2013: The Physical Science Basis* <http://www.ipcc.ch>
- *U.S. National Climate Assessment* <http://www.globalchange.gov>

- *Climate Change Indicators 2016* (US EPA) <https://www.epa.gov/climate-indicators>
- Weart, S.R (2004) *The Discovery of Global Warming*  
<http://www.aip.org/history/climate/>
- *One Planet Many People*, <http://na.unep.net/atlas/onePlanetManyPeople/book.php>

**How to deal with the readings:** All of the readings will be available as Adobe Acrobat .pdf (or links to them). There are two reasons for this, both related to the pace and nature of research in global environmental change: 1) there is no single up-to-date textbook (and if one existed, it would cost a fortune owing to the density of color images in would require), and 2) most of research publications and assessments (e.g. from the IPCC) are available first (or only) as .pdfs. Printing every single page in the .pdfs will not be feasible, and so it will be necessary to develop a personalized routine for reading the material online. The visual inspection and interpretation of the maps and images will be important, but accommodation for alternative methods of course-material access may be possible--please see me as soon as possible. Also, the support provided by the following may be useful: UO Division of student life:

<http://studentlife.uoregon.edu/>, University Counseling and Testing Center:  
<http://counseling.uoregon.edu/dnn/>

**Collaboration:** Working together on exercises is a good thing, but you must submit your own work. Similarly, using somebody else's distillation of notes to use as a study guide may be convenient, but it won't provide the same insight as organizing the material yourself. UO's policy on academic dishonesty will be strictly enforced: Academic Misconduct: The University Student Conduct Code (available at [conduct.uoregon.edu](http://conduct.uoregon.edu)) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only the sources and resources authorized by the instructor. If there is any question about whether an act constitutes academic misconduct, it is the students' obligation to clarify the question with the instructor before committing or attempting to commit the act. Additional information about a common form of academic misconduct, plagiarism, is available at <http://researchguides.uoregon.edu/citing-plagiarism>.

**Classroom etiquette:** It would be fine (and might be a good idea) to bring notebook computers, tablets and smartphones to class, but using them for purposes other than note-taking or browsing global change-related web pages during class would be unprofessional.

**Learning objectives:** In addition to providing some intermediate-level material on Earth-System Science and global environmental change, the material in the lectures, reading and exercises addresses some cross-cutting concepts in Geography and Earth Science, as well as some practical skills that are useful in both academic and casual contexts. The general concepts include:

- understanding the way in which different components of the Earth system interact with one another
- the application of both conceptual and mechanistic models in explaining how environmental systems work
- understanding the drivers of global environmental change

Practical skills include:

- the use of Internet information sources to understand global environmental change

**The Internet and Global Change:** Anybody can set up a web site now, make it look like it's an authoritative source of information on global change (and in particular, climate change), and make that site appear as though it were relatively "green" as opposed to, say, skeptical about human-induced climate change. It would be a good thing learn how to deconstruct web pages by figuring out who the "owners" are, and whether they have a particular orientation that may be based on a political perspective as opposed to a scientific one.

**Schedule (see Canvas for details, including outlines and readings)**

Week	Topic	Exam	Quiz	Exercise (due 5 pm on Friday)
1	Introduction, the Earth System			1, IGPB and IPCC
2	Tools for studying global change		1, Oct 2	2, LULC change
3	Drivers of global change			3, Population
4	Atmospheric change		2, Oct 16	4, IPCC AR5
5	Observed climate change	1, Oct 23		5, Climate trends
6	Future climates			6, Climate analogues
7	Air-quality change		3, Nov 6	7, The ozone hole
8	Land-cover change		4, Nov 15	8, Forest changes
9	Water			9, Water
10	The far future/geoengineering			10, The Internet and global change
	<b>Final Exam</b>	2, Dec 7 @ 10:15		