

Global Change (iCourse)

GPH 314

Summer 2013

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Course Overview

The topic of global change is one of the most contentious issues of the 21st century, and debates about the causes and implications are prominent in the media and politics. This course will explore the science and theory that shapes our understanding of this contentious topic.

While humanity has always transformed the Earth to meet the needs of society, the extent and intensity of these changes have accelerated over the past century. What is driving current changes in the environment, such as climate change and biodiversity loss? What evidence do we have that humans are causing these changes? What are the implications of these changes for human society? This course will address these and other questions regarding global trends in both social and environmental processes.

The topic of global changes is inherently interdisciplinary and spans scientific and ethical considerations. As such, GPH 314 is designed to fulfill three breadth requirements, Humanities, Society and Environment, and Global Perspectives. Each of these will be satisfied as described below:

GS Requirement	Description	Related Activities
Humanities (HU)	The study of the humanities and the disciplines of art and design deepen awareness of the complexities of the human condition and its diverse histories and cultures. Courses in the humanities are devoted to the productions of human thought and imagination, particularly in philosophical, historical, religious, and artistic traditions.	Deconstructing and analyzing representations of environmental change in media, films and art. Study of historical changes in human society. Emphasis on influential streams of philosophy.
Global Awareness (G)	The objective of the global awareness requirement is to help students recognize the need for an understanding of the values, elements, and social processes of cultures other than those of the U.S.	Discussion, readings, and written assignments regarding the social implications and drivers of global change. Focus on global distribution of impacts and vulnerabilities to change.
Science and Society (College of Liberal Arts and Sciences)	Upon completing the Science and Society requirement, students will understand the reciprocal relationship between science and societies (local, regional, national and/or global); develop a critical understanding of the principles underlying some of the major topical scientific issues in the public domain; and demonstrate the ability to formulate, communicate, and defend well-informed views of their own concerning the issues studied.	Exploration of cross-scalar dynamics of change in human-environment systems. Discussion questions throughout the semester will focus on constructing arguments about societal responses to global change.

Course Outcomes

GPH 314 will provide you with an understanding of the causes and consequences of global change. Upon completion of the course, you will be familiar with the following concepts:

- Earth system science
- Historical trends of environmental change
- Human drivers of environmental change
- Scientific methods to characterize change
- Explanations and evidence of climate change
- Global demographic trends
- Adaptation and Adaptive Capacity
- Sustainability science

Course Format

Learning Modules

Every week, you will have access to a new set of learning modules, generally *two per week*. Each module will focus on a different element of global change and will include four components:

1. **Lectures** – Each module will contain one or two 20-30 minute lectures available as movies online. You are expected to watch entire lecture and will be *accountable for all of the material that is covered in the lectures*.
2. **Readings** – There will be two to three reading assignments associated with each module. These materials span literature from scientific journals and popular media.
3. **Learning Activities** – Most modules will contain an additional learning activity. These assignments will vary in their format, but may include online exercises, movies, or other at home exercises.
4. **Discussion Questions** – Discussion is an important part of the learning experience. To facilitate online discussion, discussion questions related to the lectures, reading material and learning activities will be posted with each module. Your responses are to be posted through Blackboard per the instructions provided in the discussion boards. Your responses should be respectful and reflective of the module material.

Review Quizzes

At the end of each week, you must complete a review quiz that covers the content of the week's module. The quizzes will be multiple-choice and administered in Blackboard. A portion of the questions on the exams will be drawn directly from the review quizzes and all exam questions will cover similar content to the review quizzes.

Exams

In addition to these learning modules, you will have two comprehensive exams. Exams will be composed of multiple choice and short answer questions.

Final Paper

Your final paper will require you to interpret a selection of short films depicting issues of global change. Your final paper is intended to develop critical discussions of the course's content. The final paper supports the objectives of all three general studies guidelines described above.

Grading

Your final grade is based on grades from discussion posts, your final paper, exams, and weekly quizzes. Grading for written assignments and discussion are described in detail on Blackboard. Your grade will break down as follows:

Discussion: 15%
Review Quizzes: 15%
Midterm Exam: 20%
Final Exam: 20%
Final Paper: 30%

A+	97-100	C+	77-79
A	93-96	C	73-76
A-	90-92	C-	70-73
B+	87-89	D	60-69
B	83-86	E	<60
B-	80-82		

Course Expectations

Online Learning

All students are responsible for their own time management, including unexpected Blackboard outages. Modules for a given week will be available for seven days, starting from Monday at 12:01 a.m. to Sunday at 11:59 p.m. You are responsible for completing all module materials within this time frame. If you have technical problems, please follow the instructions posted under the Technical Support button. Please review these instructions and contact ASU technical support with any issues.

The entire course will use the Blackboard interface. Familiarize yourself with this interface during the first two days of the course. Lack of familiarity with Blackboard is not an acceptable excuse for late work. See help.asu.edu (http://help.asu.edu/sims/selfhelp/SelfhelpKbView.seam?parature_id=8373-8193-5953) for more information and to check system requirements. If you need help learning more about Blackboard, visit the Blackboard section on help.asu.edu. If you have difficulty accessing any of the learning materials (videos, readings, etc.) outside of blackboard, please contact me immediately.

Exams will be administered online and must be taken on the date for which they are scheduled on the syllabus. *If you are unable to take an exam on the specified date, contact me at least one week prior to the exam in order to discuss alternative arrangements.*

Workload

This is an intensive six-week course and we will move quickly through the course material. The total workload will be equivalent to that of a normal full semester. For this iCourse, in class type work will include lectures, quizzes, movies, and forum discussions. The remainder of the course will be comprised of written assignments and readings. Given the pace of this class, if you are encountering challenges

please contact me early in the course to get the necessary assistance. If you anticipate conflicts or have questions regarding the workload I am happy to discuss them with you.

Academic Integrity

Plagiarism and cheating are both academic crimes. Never (1) turn in an assignment that you did not write yourself, (2) turn in an assignment for this class that you previously turned in for another class, or (3) cheat on test/exam, *this includes copying and pasting materials that are not your own words*. If you do so, it will result in a failing grade for the class, and possibly even suspension from the college. All ASU students are required to uphold the strict standard of academic integrity as stipulated by the university. The instructor will levy penalties for academic dishonesty in accordance with published university policy. In order to avoid any conflicts regarding intentional or accidental plagiarism, your final paper will be submitted using SafeAssign on Blackboard. Safe Assign automatically scans your document to identify possible cases of plagiarism and provides a report on the results.

Accommodations

Those who would benefit from alternative sites and/or dates for exams and who are registered with Disability Resources for Students (DRS) should notify me within the first three days of class. I will gladly work with you to accommodate your needs.

Course Materials

Technical Requirements

All resources for this course will be accessed via the Internet. As such, you will need high-speed Internet access and an up-to-date web browser. You may use any functioning browser, but ASU technical support recommends that you use Mozilla Firefox, available here: <http://www.mozilla.com/en-US/firefox/new/>.

Text Books

This course requires one print book:

Seitz, J.L. and K. A. Hite. *Global Issues: An Introduction*, 4th Edition. Wiley-Blackwell, 2011. ISBN: 047065564X

All other the materials needed for this course will be provided on Blackboard in the form of PDFs and links. The class will draw heavily from two online texts:

Global Change and the Earth System: A Planet Under Pressure

Will Steffen, Angelina Sanderson, Peter Tyson, Jill Jäger, Pamela Matson, Berrien Moore, Frank Oldfield, Katherine Richardson, H. John Schellnhuber and B. L. Turner, et al.

<http://www.springerlink.com.ezproxy1.lib.asu.edu/content/978-3-540-26594-8/contents/>

Changing Climates, Earth Systems, and Society

John Dodson

<http://www.springerlink.com.ezproxy1.lib.asu.edu/content/978-90-481-8715-7/contents/>

Schedule (specific readings and videos are subject to change)

Week 1

Module 1: Natural Processes and Earth System Science

Readings:

- Steffen et al. Chapter 1
- Steffen et al. Chapter 2

Optional Readings:

- Lovejoy on the Planet Under Pressure Conference: http://www.nytimes.com/2012/04/06/opinion/the-greatest-challenge-of-our-species.html?_r=1
- Carpenter et al. 2011
- Scale in Geography

Videos:

- Secrets Beneath the Ice: <http://video.pbs.org/video/1700738538>
- Lovelock on the Gaia Hypothesis: <http://digital.films.com.ezproxy1.lib.asu.edu/PortalViewVideo.aspx?xtid=8129>
- Geocycles: <http://digital.films.com.ezproxy1.lib.asu.edu/PortalViewVideo.aspx?xtid=34725>
- Introduction to complex systems: <https://www.youtube.com/watch?v=eO9uiMk19As>
- Simon Levin on Complex Adaptive Systems: <http://www.bu.edu/pardee/lecture-levin-2/>

Websites:

- Milankovitch Cycles: <http://cimss.ssec.wisc.edu/wxfest/Milankovitch/earthorbit.html>
- Palaeoclimatology: <http://www.ncdc.noaa.gov/paleo/primer.html>

Discussion Question:

- Steffen et al. and Lovelock demonstrate evidence that the Earth has the characteristics of an integrated system. What are the implications of systems thinking for environmental management and policy? Why is the concept of thresholds and non-linearities important for understanding the effects of human activities?

Week 2

Module 2: Planetary Boundaries and the Anthropocene

Readings:

- Rockstrom et al. 2009
- Steffen et al. 2007
- Raskin 2007

Optional Readings:

- Crutzen et al. 2002
- Turner and McCandless 2004
- Steffen et al. Chapter 3
- MA Overview: <http://www.maweb.org/en/About.aspx>
- Welcome to the Anthropocene: <http://www.economist.com/node/18744401>
- Costanza et al. 1997
- Jones and Schmitz 2009

Videos:

- Johan Rockstrom: <http://www.ted.com/talks/view/lang/en/id/945>
- Peter Kareiva: <http://dotearth.blogs.nytimes.com/2012/04/03/peter-kareiva-an-inconvenient-environmentalist/?src=tp>

- Global Tipping Points:
http://www.youtube.com/watch?feature=player_embedded&v=QkkKZgKmdP4
- Response to above: <http://dotearth.blogs.nytimes.com/2012/04/11/another-round-conservation-on-a-human-shaped-planet/?src=tp>
- Optional: Diana Liverman and Will Steffen: <http://view6.workcast.net/?pak=2103510620841073&cpak=5876441157257134#> (Begin at 50:00)

Websites:

- Footprint Calculator: <http://www.footprintnetwork.org/en/index.php/GFN/page/calculators/>

Discussion Question:

- Consider the points made by Peter Kareiva and Johan Rockstrom about a shifting paradigm to understand the relationship between humans and the environment. Kareiva, in particular, points out that the narrative about conservation must change. Discuss whether you think the narrative about conservation needs to change. For example, what are the pros and cons of changing the way we view the fragility of nature? How does conservation balance an interest in protecting biodiversity and protecting the rights of indigenous people?

Module 3: Population Transitions and Globalization

Readings:

- Seitz and Hite Chapter 1
- Seitz and Hite Chapter 2
- Hall and Day 2009

Optional Readings:

- J.E. Cohen. 1995
- Heinberg 2011

Videos:

- Han Rosling: http://www.ted.com/talks/hans_rosling_on_global_population_growth.html

Websites:

- Peak Everything: <http://www.scientificamerican.com/article.cfm?id=interactive-how-much-is-left>

Discussion Question:

- Humanity is approaching a critical junction, as population is expected to peak at 9 billion and then to stabilize. Are there limits to our growth? What economic and environmental factors may limit the opportunities to improve the standard of living for the entire human population (i.e. lifting most out of poverty)?

Week 3

Module 4: Climate Change

Readings:

- Seitz and Hite Chapter 4

Optional Readings:

- Dodson in Dodson
- Bertler and Barrett in Dodson
- C. Rosenzweig et al., 2008

Videos:

- North Atlantic Oscillation:

<http://digital.films.com.ezproxy1.lib.asu.edu/PortalViewVideo.aspx?xtid=47549&psid=0&sid=0&State=&title=NAO:%20Driving%20Climate%20Across%20the%20North%20Atlantic&IsSearch=Y&parentSeriesID=>

- David Keith on Geo-engineered solutions:
http://www.ted.com/talks/lang/en/david_keith_s_surprising_ideas_on_climate_change.html
- James Hansen:
http://www.ted.com/talks/lang/en/james_hansen_why_i_must_speak_out_about_climate_change.html
- Ocean Acidification: <https://www.youtube.com/watch?v=5cqCvcX7buo>

Websites:

- <http://www.southwestclimatechange.org/climate/southwest>
- Heartland Institute: <http://news.heartland.org/nipcc-update>
- NASA Climate Time Machine: http://climate.nasa.gov/interactives/climate_time_machine

Discussion Question:

- Review the Heartland Institute's web site and consider their claims about the political motivations of climate science. To what extent do you think that political interests can shape science and the interpretation of scientific results? The Heartland Institute points out the biases of scientists, but what are some potential biases or motivations behind the Heartland Institute's interpretations of scientific evidence?

Module 5: Vulnerability and Adaptive Capacity

Readings

- Reid et al. in Dodson
- Easterbrook, G. 2007

Optional Readings

- Steffen et al. Chapter 5
- Ford and Smit 2004

Videos:

- Arctic Rush: Staking a Claim on the Earth's Uncertain Future: <http://digital.films.com.ezproxy1.lib.asu.edu/PortalViewVideo.aspx?xtid=40074>
- Shrinking Ice:
<http://www.nytimes.com/video/2007/07/16/science/earth/1194817121366/shrinking-ice.html?scp=1&>

Websites:

- Adaptation and Mitigation Knowledge Network: <http://amkn.org/>

Discussion Question:

- Climate change is a global phenomenon, which will have differential impacts around the world. What role should more developed nations play in supporting adaptation and mitigation in less developed nations? Can economic development in less developed nations occur without a major increase in greenhouse gases?

Midterm Exam – Friday, June 7

Week 4

Module 6: Food and Agriculture

Readings:

- Seitz and Hite Chapter 3
- Godfray 2010

Optional Readings:

- Simelton in Dodson
- Vorosmarty et al. 2000. Global Water Resources: Vulnerability from Climate Change and Population Growth
- Foley et al. 2012
- Diamond, J. 2002. Evolution, consequences and future of plant and animal domestication
- Pollan, M. 2008. <http://michaelpollan.com/articles-archive/farmer-in-chief/>

Videos:

- Jonathan Foley: http://www.ted.com/talks/jonathan_foley_the_other_inconvenient_truth.html
- Panel Discussion on Food in a World without Oil:
<http://www.youtube.com/watch?v=cNjNqwARobo&feature=related>
- Altieri on agroecology: <http://www.youtube.com/watch?v=2yFvD8wuLmU>

Websites:

- Gates Foundation Agricultural Development: <http://www.gatesfoundation.org/agriculturaldevelopment/Pages/default.aspx>
- Feed the Future: <http://www.feedthefuture.gov/>

Discussion Question:

- David Tilman and others have argued that food production will need to double by 2050. Intensified agriculture promises to meet this growing demand, but also presents an array of environmental challenges. What role should agricultural intensification play in supporting food security? What other actions are needed to improve global food security besides increased production?

Module 7: Land Use and Land Cover Change

Readings:

- Seitz and Hite 2012 Chapter 5
- Foley et al. 2005

Optional Readings:

- DeFries et al. 2004
- Turner et al. 2007
- Ellis and Ramankutty 2008
- Rudel et al. 2009

Videos:

- http://www.youtube.com/watch?feature=player_embedded&v=QRn73BhIDJY

Websites:

- Land Cover Change Hotspots: <http://lcluc.umd.edu/hotspots/index.php>
- NASA, State of Flux: <http://climate.nasa.gov/stateOfFlux/index.cfm>
- Google Earth Engine: <http://earthengine.google.org/#intro>

Discussion Question:

- Consider one example of anthropogenic change from the state of flux web site. What proximate and underlying drivers may have contributed to this change? What are some feedbacks or cascading effects that may be likely to be associated with this change?

Final Paper Proposals Due – Wednesday, June 12

Week 5

Module 8: Urbanization

Readings:

- DeFries et al. 2010
- Rudel et al. 2005
- Seto et al. 2010

Optional Readings:

- Angel et al. 2005
- Baker, L.A., T. Brazel, and P. Westerhoff. 2004. Environmental Consequences of Rapid Urbanization in Warm, Arid Lands: Case Study of Phoenix, Arizona (USA)
- Martin P. Brockerhoff, 2000. An Urbanizing World

Videos:

- Karen Seto at UGEC: <http://vimeo.com/17384591>
- Michael Crow at UGEC: <http://vimeo.com/17385418>

Websites:

- UGEC: <http://www.ihdp.unu.edu/article/read/ugec>
- BBC Interactive
Map: <http://news.bbc.co.uk/2/shared/spl/hi/world/06/urbanisation/html/urbanisation.stm>

Discussion Question:

- As Karen Seto points out, the geographies of urbanization are transforming physical and social landscapes. They are also distinctly altering the relationship between human and the environment. Considering Seto and Rudel et al's arguments, what are the greatest challenges in supporting sustainable urbanization? What are some specific example of innovations that may improve the sustainability of cities?

Module 9: Global Change and Sustainability Science

Readings:

- Seitz and Hite Chapter 6
- Clark and Dickson 2003

Optional Readings:

- Steffen et al. Chapter 6
- J.M. Meyer, 2008
- Turner et al. 2003
- Parris and Kates 2003

Videos:

- Brian Walker: http://www.youtube.com/watch?feature=player_embedded&v=tXLMeL5nVQk
- Elinor Ostrom: http://www.youtube.com/watch?feature=player_embedded&v=ByXM47Ri1Kc
- Optional: Making Stuff Cleaner: <http://www.pbs.org/wgbh/nova/tech/making-stuff.html#making-stuff-cleaner>

Websites:

- School of Sustainability: <http://sustainability.asu.edu/index.php>
- Wal-mart Sustainability: <http://www.walmartstores.com/sustainability/>
- Dow Jones Sustainability Index: <http://www.sustainability-index.com/>

Discussion Question:

- Robert Costanza, a leading environmental economist said, "I do not believe that more progress will be made by appealing to people's hearts rather than to their wallets." What role should economic incentives play in reducing anthropogenic environmental change? What are the challenges and limitations of economic driven environmental policies?

Week 6

Module 10: Global Governance and Environmental Institutions

Readings:

- Seitz and Hite Chapter 7

Optional Readings:

- Raustiala 1997
- Ostrom 2010

Videos:

- Elinor Ostrom: <http://www.cornell.edu/video/embed.js?videoID=571>

Websites:

- Kyoto Protocol: <http://www.kyotoprotocol.com/>
- Convention on Biological Diversity: <http://www.cbd.int/>
- Arizona's Sustainability Bill: http://usnews.msnbc.msn.com/_news/2012/04/26/11415282-agenda-21-arizona-close-to-passing-anti-un-sustainability-bill?lite
- UN Rio Declaration: <http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm>

Discussion Question:

- An Arizona Senator recently proposed a bill that would ban government support of the Rio Declaration of Environment Principles, arguing that international institutions were encroaching not the rights of states. Are these valid concerns? What is the role of global governance in addressing global change? To what extent are global institutions needed to regulate processes of global environmental change?

Final Papers Due – Wednesday, June 26

Final Exam – Friday, June 28