

Course Syllabus for STIA 227 Environmental Geoscience Fall 2015

Course Description

In this course, we will study the Earth as an evolving, dynamic planet and how humans have come to affect it. We'll survey the underlying scientific principles—based on chemistry, physics, and biology—that govern the natural world. We'll study the Earth's physical structure, including how the properties of fluids on our rotating planet shape wind patterns and ocean currents. We'll consider the interrelationships among the biosphere, atmosphere, hydrosphere, and geosphere, investigating long and short-term climate variability and biogeochemical cycles. And we'll learn to analyze the scientific underpinnings of environmental problems with an eye toward real-world situations, from mineral resource use and implications for environmental justice to agricultural productivity and our ability to feed Earth's population. Through hands-on active learning, we'll evaluate the risks associated with biodiversity loss, air and water pollution, and natural hazards; think critically about potential solutions; and apply the fundamental concepts we've learned to begin solving problems of practical importance to society.

Professor

Dr. Sarah Stewart Johnson, STIA/SFS
Office: ICC 530, Lab: Regents 511
Phone: 202-687-3893
Email: Sarah.Johnson@georgetown.edu (email is usually the fastest way to get in touch).

Course Location

We will meet for lecture (STIA 227) on Tuesday and Thursdays from 11am-12:15pm in White-Gravenor 409. For those of you co-enrolled in the lab (STIA 228), we will meet Mondays 2-4:30pm in Regents 361.

Office Hours

Office hours will be held in ICC 530 on Mondays from 4:30-5:30pm, Tuesdays 2:30-3:30, and by appointment.

Student Learning Goals

Successfully completing this course requires regular and active engagement in all aspects of the course: reading, completing exercises, contributing to discussions, and writing papers. These course elements will allow successful students to understand and explain:

- 1) major environmental challenges and their scientific underpinnings;
- 2) the processes that govern the biosphere, atmosphere, hydrosphere, and geosphere; and
- 3) how environmental science impacts real-world situations.

Text

The text for this course is Botkin & Keller. 2011. *Environmental Science: Earth as a Living Planet*, 9th Ed. Wiley. It's available at the bookstore and online. If purchasing the text presents a financial hardship, please let me know. Additional readings will be assigned on Blackboard.

Additional Resources

For some assignments, you'll want to consult the scientific literature as well as the websites of government agencies and research centers. Some potential resources are listed below.

General Science Journals: Accessible via George online or at the library:
Science, Nature, PNAS, PLOS, Nature Geoscience, Nature Climate Change, Global Change Biology, Frontiers in Ecology and Environment, Environmental Health, Environmental Research, Environment: Where Science and Policy Meet

Web Addresses of Government Agencies and Research Centers:

NOAA: <http://www.noaa.gov/>

National Climate Data Center: <http://www.ncdc.noaa.gov/ol/ncdc.html>

NWS Regional Weather Map: <http://iwin.nws.noaa.gov/iwin/iwdspg1.html>

Climate Variability: <http://www.cdc.noaa.gov/>

National Academy of Science: <http://www.nasonline.org/site/PageServer>

National Center for Atmospheric Research: <http://www.ncar.ucar.edu/>

National Geophysical Data Center: <http://www.ngdc.noaa.gov/>

Links to Weather Forecasts: <http://www.atmos.umd.edu/weather.php>

Convention on Climate Change: <http://unfccc.int/>

Center for Climate and Energy Solutions: <http://www.c2es.org/>

UNEP: <http://www.unep.org/>

National Ocean Data Center: <http://www.nodc.noaa.gov/>

Hurricanes: <http://www.nhc.noaa.gov/>

GOES: <http://www.goes.noaa.gov/>

USGS Water Data: <http://waterdata.usgs.gov/nwis>

USGS Earthquake Hazards: <http://earthquake.usgs.gov/>

Population Reference Bureau: <http://www.prb.org/>

UN Population Division: <http://www.un.org/esa/population/unpop.htm>

World Population Data Sheet:

<http://www.prb.org/Publications/Datasheets/2014/2014-world-population-data-sheet.aspx>

National Council for Science and the Environment (NCSE):

<http://www.NCSEonline.org>

IPCC: <http://www.ipcc.ch/>

Encyclopedia of Earth: <http://www.eoearth.org/>

Physical Geography E-Textbook (free, a good review of basic science principles):

<http://www.physicalgeography.net/fundamentals/contents.html>

Expectations

Please make sure to arrive on time for class. Attendance is extremely important and participation will form a large part of your final grade! If you have a documented family or medical emergency and are unable to attend class, or need to submit an assignment late, please email me as soon as possible. To facilitate your active

engagement in class and minimize distractions, the use of cell phones, mobile devices, iPads, and laptops are not permitted in class, unless specifically noted in advance as part of an activity or exercise. Accommodation to this policy can be made, however, if required in a particular case, in consultation with the Office of Disability Support Services. All course materials will be posted on Blackboard, along with this syllabus, which is subject to change and may be updated during the semester.

i>clickers

We will use i>clickers as part of this course, which are available at the bookstore. Please purchase a physical i>clicker, as cell phones and other mobile devices are not allowed in class. To set up your i>clicker, you need to bring it to class; if I'm unable to register it for you, you can register your clicker online after it has connected to the class base station at <http://www.iclicker.com/registration>. You'll need to input your first name, last name, student ID (your 9-digit GO Card number), and remote ID (on the back of your i>clicker remote). If you buy a used i>clicker, just make sure to replace the three AAA at the beginning of the semester. If purchasing an i>clicker presents a financial hardship, please let me know.

Grading

Course grades will be determined as follows:

- 10% from attendance and regular participation in lecture, case studies, and activities.
- 15% from homework assignments and exercises, including a five to ten minute presentation on a topic of special focus in our textbook that relates to the reading. The schedule lists these below! In your presentation, please incorporate findings from two recent scientific articles related to your assigned topic.
- 5% short quizzes using the i>clicker. You may occasionally forget to bring your remote, get sick, or need to interview for a job, so please know that I'll drop your lowest three i>clicker scores. In general, you will need to arrive on time and be prepared for class to do well on these quizzes.
- 5% from speaker reviews. You will be assigned to write reviews (approximately 300 words in length) of two separate talks on environmental science topics that you attend during the semester. You should take notes and then write a short review. Please ask if you have questions about what counts as environmental science! Reviews are due before the last day of class and within ten days of the date of the talk.
- 15% from a final paper (~3000 words) and presentation on a major topic in environmental science. You must incorporate at least five sources, including peer-reviewed journals, books, and government documents.
- 50% from two examinations.

The Grading Rubric is as follows: A: 93-100, A-: 92-90, B+: 89-87, B: 86-83, B-: 82-80, C+: 79-77, C: 76-73, C-: 72-70, D+: 69-67, D: 66-60, F: <60.

Tentative Course Schedule

(STIA 228 lab topics are included in italics for the benefit of those co-enrolled.)

Dates	Topics	Readings/Presentations
Week 1 9/2 9/3	Overview <i>LAB: Biogeochemical Cycles Part 1</i> Introductions, Key Themes	Natural History Museum Assignment, due 9/15
Week 2 9/7 9/8 9/10	Geosphere 1 <i>NO LAB: Labor Day</i> A Planetary Perspective Geology and Mineral Resources	Chp 23
Week 3 9/14 9/15 9/17	Geosphere 2 <i>LAB: Water Quality Part</i> More Minerals, Rare Earth Elements Case Study Environmental Justice Case Study	Treasures of the Cell Phone
Week 4 9/21 9/22 9/24	Hydrosphere 1 <i>LAB: Sampling at Fletcher's Cove</i> Hydrologic Cycle and Water Pollution Ogallala Aquifer Case Study w/USGS data	Chp 18-19, Singapore America's First River
Week 5 9/28 9/29 10/1	Hydrosphere 2 <i>LAB: Sediment DNA Extraction</i> Biogeochemical Cycles Guest Speaker: Senior Advisor to NOAA's Chief Scientist, Peter Colohan	Chp 7, Oysters
Week 6 10/5 10/6 10/8	Hydrosphere 3 <i>LAB: Ocean Acidification,</i> <i>Biogeochemical Cycles Part 2</i> Ocean Circulation Midterm 1	Bring a sample environmental science abstract to class Gulf of Mexico, Rivers/Seacoasts
Week 7 10/12 10/13 10/15	Atmosphere 1 <i>NO LAB: Columbus Day</i> Tropical Pacific Case Study Part 1 Tropical Pacific Case Study Part 2	History/Climate
Week 8 10/19 10/20 10/22 10/25	Atmosphere 2 <i>LAB: Coriolis Effect</i> Insolation and Greenhouse Warming Greenland Ice Sheet Case Study Anacostia Boat Trip (Sunday 9am-12pm)	Ocean Acidification Lab Due. Chp 4 & 20, Japan Chp 21, Acid Rain
Week 9 10/26 10/27 10/29	Atmosphere 3 <i>LAB: Anacostia Sample Processing</i> Air Pollution Biodiversity Loss, Class Evaluation	Coriolis Lab Due. Beijing "The Sixth Extinction"

Week 10	Biosphere 1	
11/2	<i>LAB: Wet Scrubbers</i>	Biogeochemical Lab Due.
11/3	Population Growth (Remember to Vote!)	Chp 1, 5 & 8, Food Chain
11/5	Ecosystems and Restoration	Chp 6, 9 & 10, Amboseli, Fox
Week 11	Biosphere 2	
11/9	<i>LAB: Soil Formation and Soil Productivity Part 1</i>	Wet Scrubbers Lab Due, Water Quality Lab Report Due.
11/10	Agriculture, Forests and Fisheries	Chp 11-13, Dust Bowl, Jamaica Bay
11/12	Sustaining Soils Case Study	Everglades
Week 12	Energy 1	
11/16	<i>LAB: Soil Productivity Part 2</i>	
11/17	Fossil Fuels	Chp 14-15, Oil Boom
11/19	Alternative Energy	Chp 16-17, Southwest
Week 13	Energy 2	
11/23	<i>LAB: Biofuels</i>	Soil Formation Lab Due. Soil Productivity Lab Due.
11/24	Midterm 2	
11/26	No Class: Thanksgiving	
Week 14	Environmental Justice	
11/30	<i>LAB: Genomic Data Analysis & MATLAB for the Environment</i>	Biofuels Lab Due.
12/1	Environmental Policy Case Study	Chp 2 & 24, Ecotopia
12/3	Final Project Presentations 1	
Week 15	Final Projects	
12/7	<i>LAB: Comprehensive Laboratory Exam</i>	Sediment DNA Lab Due. Lab Notebooks Due
12/8	Final Project Presentations 2	

Your final paper is due in my office (ICC 530) by noon on December 11th.

Instructional Continuity

If campus is closed for any reason, please make sure to check your email. I will be in touch with instructions on where to find materials for continuing class instruction. This may include additional readings, video or audio files, and/or writing assignments.

Georgetown Honor Code

The Georgetown Honor Code can be found online at <http://gervaseprograms.georgetown.edu/honor/>. It is essential that you read this fully and abide by it your entire time at Georgetown. You must, for instance, cite all sources in presentations and when writing papers and you may not turn in the same paper for more than one class without the explicit permission of both instructors. Unless specifically noted, the exercises I assign must be completed individually.

University Policy on Sexual Misconduct

Please know that as a faculty member I am committed to supporting survivors of sexual misconduct, including relationship violence, sexual harassment and sexual assault. However, university policy also requires me to report any disclosures about sexual misconduct to the Title IX Coordinator, whose role is to coordinate the University's response to sexual misconduct. More information about campus resources and reporting sexual misconduct can be found at <http://sexualassault.georgetown.edu>. Georgetown has a number of fully confidential professional resources who can provide support and assistance to survivors of sexual assault and other forms of sexual misconduct. These resources include:

Jen Schweer, MA, LPC
Associate Director of Health Education Services for Sexual Assault Response and Prevention
(202) 687-0323
jls242@georgetown.edu

Erica Shirley, Trauma Specialist
Counseling and Psychiatric Services (CAPS)
(202) 687-6985
els54@georgetown.edu

Final Note

If you find yourself in a situation where you are having difficulty accessing or understanding the information presented because of a learning or physical disability, please do not hesitate to get in touch. I will do whatever I can to help come up with a solution.