

GLY 2038: Sustainability and the Changing Earth Spring 2012 Location: TBA

Instructor: Dr Andrew Zimmerman

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Office Hours: M 4-5 pm or by appointment

COURSE DESCRIPTION

This course introduces planet Earth as a dynamic and complex global system which has changed due to human interaction. Course materials will demonstrate physical and chemical linkages between the geosphere, hydrosphere, biosphere and atmosphere, which directly impact the sustainability of human lifestyles at a variety of timescales.

REQUIRED TEXTBOOK

Pipikin et al., *Geology and the Environment* 6e, 2011 Brooks/Cole Pub.

GRADING

- 30% 10 quizzes/exercises (attendance/participation)
- 50% Two exams (mid-term and final) worth 25% each (multiple choice)
- 20% Final project/presentation (done in pairs of students)

GRADING SCALE

A = $\geq 93\%$, A- = 90-92.99, B+ = 87-89.99, B = 83-86.99, B- = 80-82.99, C+ = 77-79.99, C = 73-76.99, C- = 70-72.99, D+ = 67-69.99, D = 63-66.99, D- = 60-62.99, E < 60

***Note:** A C- grade is not a qualifying grade for major, minor, Gen Ed, or College Basic distribution credit.

For further information on UF's Grading Policy, consult the following:

<http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>

<http://www.isis.ufl.edu/minusgrades.html>

EXAMS

Everything associated with the class, including lecture material, textbook readings and exercises, is fair game on exams. However, the focus will be on material presented in lecture. Exam material is cumulative but focuses on most recent material. I will offer pre-exam Q&A sessions. Make-ups for exams will only be given by pre-arrangement (before the exam) or under extraordinary circumstances.

Exam grades will be curved using a linear method described here:

<http://www.ats.amherst.edu/software/excel/excel-grading/excel-grades/#CurvingGrades>. Grades will be curved to a median of 80%. So half the class will get A's or B's on exams. Your participation and eagerness to learn will be used to aid final grade determination in borderline situations.

PROJECT

Students in groups of 3-4 will write a summary and present to the class their analysis of a pressing environmental issue. Each student is responsible for presenting one aspect of the topic such as: 1) Background, 2) The science behind the issue, and 3) The sustainable solution. During the semester there will be due dates such as: a) report topic and team member assignments, b) list of sources, c) presentation, d) paper. Each student will be assessed individually on the basis of the quality of their

written work (50%) and their presentation (45%), integration with the whole theme of the presentation (5%).

COURSE WEBSITE

Go to the e-learning Support Services homepage [<https://lss.at.ufl.edu/services/els/>] and click on the Sakai System Entry link. The course site provides access to announcements, downloadable lecture notes/outlines and readings. You are responsible for checking this site for announcements and to see that your grades are being correctly recorded. Do not send me e-mail through this site. I don't check it there (use azimmer@ufl.edu).

READINGS/EXERCISES

In addition to textbook chapters, reading will be assigned periodically and must be read prior to class discussion. These will be available in pdf format.

ATTENDANCE AND ABSENCE POLICY

Attendance and participation will be gauged by the level of completion of 10 unannounced in-class quizzes or exercises during the semester.

Students are expected to complete all requirements (quizzes, exams, etc.) on the specified dates and will not be granted an alternate date unless they have an acceptable reason for their absence as specified in the undergraduate catalog (e.g., absences due to medical illness, observance of religious holidays, military obligation, twelve-day rule), fulfill the conditions described therein, and provide the instructor with timely notification (see <http://www.registrar.ufl.edu/catalog/policies/regulationattendance.html>).

CLASSROOM POLICY

Use of mobile phones and computers (for purposes other than note-taking) are prohibited during lectures. Refusal to comply will result in immediate dismissal from the classroom.

ACADEMIC POLICY

Students are required to be honest in their coursework, may not use notes during quizzes and/or exams, and must properly cite all sources that they have consulted for their papers. Any act of academic dishonesty will be reported to the Dean of Students, and may result in failure of the assignment in question and/or the course. For University of Florida's honor code, see <http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php>.

DISABILITY RESOURCE CENTER

Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

For information about resources that are available to students with disabilities, contact the Disability Resources Center: <http://www.dso.ufl.edu/drc/>

ADDITIONAL RESOURCES

Students facing difficulties completing the course or who are in need of counseling or urgent help may call the on-campus counseling center (352-392-1575) or the student mental health center (352-392-1171).

GLY 2XXX: Sustainability and the Changing Earth: Spring 2012**Prof. Andrew Zimmerman - Tentative Schedule**

Week	Date	Topic	Reading*
1	Jan X	Course Intro/Science and Sustainability	Ch 1
	Jan X	Origins of Everything and Geol. Time	
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Sustainability and the 'Solid' Earth			
2	Jan X	Plate tectonics	Ch 3
	Jan X	Plate tectonics	
	Jan X	Earthquakes	Ch 4
3	Jan X	Volcanoes	Ch 5
	Jan X	Mass Wasting	Ch 7
	Jan X	Case Studies in Sustainable Habitation	*
Sustainability and Climate			
4	Jan X	The Atmosphere	Ch 2
	Jan X	Past climate variability	
	Jan X	Case Studies in Climate & Sustainability	#Topic & team due
5	Feb X	Climate Change Today - Evidence	Ch11
	Feb X	Climate Change Today – C Cycle	
	Feb X	Climate Change Today – Solutions	
Sustainability and Water			
6	Feb X	The Oceans	Ch 6 & 7
	Feb X	The Oceans	(Abel & McConnell)
	Feb X	Marine Resources and Sustainability	
7	Feb X	The Coastal Environment	Ch 10
	Feb X	The Coastal Environment	
	Feb X	Case Studies in Coastal Sustainability	*team sources due
8	Feb X	Freshwater	Ch 8
	Feb X	Freshwater/Desertification	Ch 12
	Feb X	Case Studies in FW Sustainability	
9	Mar X	Mid-Term Exam	
Earth Resources and Sustainability			
9	Mar X	Soils and Fertility	Ch 6
	Mar X	Soil and Erosion of Civilization	
10	Mar X	Case Studies in Soil Sustainability	
	Mar X	Mineral Resources	Ch 13
	Mar X	Mineral Resources	

11	Mar X	Energy Resources	Ch 14
	Mar X	Energy Resources	
	Mar X	Case Studies Min. & Energy Sustain.	
12	Mar X	Pollution/Recycling	Ch 15
	Mar X	Pollution/Recycling	
	Mar X	Case Studies in Waste Management	
Student Presentations of Sustainability Issue Analyses and Discussion			
13	Apl X	Student Presentations	
	Apl X	Student Presentations	
	Apl X	Student Presentations	
14	Apl X	Student Presentations	
	Apl X	Student Presentations	
	Apl X	Student Presentations	
15	Apl X	Student Presentations	
	Apl X	Student Presentations	
Final Exam: Issue Analysis Paper due at the time the final examination is scheduled.			

*Readings on days labeled 'Case studies' will be announced and made available on class website.

#Reading from Pipikin et al. unless otherwise specified.

A partial list of potential topics to be analyzed by the students:

- A case study in Earth-Human interaction and sustainability
- Evaluation of an Earth resource not discussed in detail during class
- A pollution issue not discussed in detail during class (marine, coastal, air pollution, river)
- marine habitat protection/preserves
- marine invasive species
- eutrophication-nutrient runoff
- aquaculture
- irrigation/dams
- overfishing (fishing practices)
- geological C sequestration
- climate change policy
- ocean fertilization
- scientific ethics/media
- alternative energy (solar, wind, tide, wave etc.)
- sea level rise/coastal effects
- ocean acidification/coral bleaching
- food security
- genetically modified organisms
- collapse of ancient civilizations
- biofuels
- soil C sequestration
- climate change paleorecords
- land use change

Other potential readings

Selected Book Chapters:

- When the Rivers Run Dry: Water-The Defining Crisis of the Twenty-first Century (Fred Pearce)
Dirt: The Erosion of Civilizations (David R. Montgomery)
The Control of Nature (John McPhee)
Environmental Oceanography (Abel and McConnel)

Peer-reviewed journal articles:

- Armaroli, N., Balzani, V., 2011. The Legacy of Fossil Fuels. *Chemistry-an Asian Journal* 6, 768-784.
- Arnell, N.W., 1999. Climate change and global water resources. *Global Environmental Change-Human and Policy Dimensions* 9, S31-S49.
- Barnosky, A.D., Matzke, N., Tomiya, S., Wogan, G.O.U., Swartz, B., Quental, T.B., Marshall, C., McGuire, J.L., Lindsey, E.L., Maguire, K.C., Mersey, B., Ferrer, E.A., 2011. Has the Earth's sixth mass extinction already arrived? *Nature* 471, 51-57.
- Biemans, H., Haddeland, I., Kabat, P., Ludwig, F., Hutjes, R.W.A., Heinke, J., von Bloh, W., Gerten, D., 2011. Impact of reservoirs on river discharge and irrigation water supply during the 20th century. *Water Resources Research* 47.
- Chalmers, H., Gibbins, J., 2011. Carbon capture and storage: More energy or less carbon? *Journal of Renewable and Sustainable Energy* 2.
- Cordell, D., Drangert, J.O., White, S., 2009. The story of phosphorus: Global food security and food for thought. *Global Environmental Change-Human and Policy Dimensions* 19, 292-305.
- Cutter, S.L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., Webb, J., 2008. A place-based model for understanding community resilience to natural disasters. *Global Environmental Change-Human and Policy Dimensions* 18, 598-606.
- Gorissen, L., Buytaert, V., Cuypers, D., Dauwe, T., Pelkmans, L., 2010. Why the Debate about Land Use Change Should Not Only Focus on Biofuels. *Environmental Science & Technology* 44, 4046-4049.
- Jacoby, M., Jiang, J., 2010. Securing the Supply of Rare Earths. *Chemical & Engineering News* 88, 9-12.

- Jung, I.W., Chang, H.J., 2011. Assessment of future runoff trends under multiple climate change scenarios in the Willamette River Basin, Oregon, USA. *Hydrological Processes* 25, 258-277.
- Montgomery, D.R., 2007. Soil erosion and agricultural sustainability. *Proceedings of the National Academy of Sciences of the United States of America* 104, 13268-13272.
- Tsouris, C., Aaron, D.S., Williams, K.A., 2011. Is Carbon Capture and Storage Really Needed? *Environmental Science & Technology* 44, 4042-4045.
- Xu, H., Taylor, R.G., Xu, Y., 2011. Quantifying uncertainty in the impacts of climate change on river discharge in sub-catchments of the Yangtze and Yellow River Basins, China. *Hydrology and Earth System Sciences* 15, 333-344.

Some Popular Press Articles:

Time Magazine. Climate: Why It's a Mistake to Ban Research on Geoengineering - November 2, 2010