

This course introduces whole-Earth materials & processes with a focus on the formation of & human interaction with surficial environments. We examine phenomena such as volcanoes, earthquakes, wasting, flooding, desertification, & climate change. Discussions and lectures employ case studies allowing students to place geologic phenomena in human context, including analysis of sustainable development, water supply, mining, agriculture, and waste disposal practices. Laboratory and field trip exercises employ maps, specimens, real-world datasets, and local geological sites and resources. This course is designed for students who want to understand Earth and how it works. (Quantitative Reasoning, Scientific Inquiry – Lab)

**Course Goals**

- 🌐 to contribute an understanding of Earth systems to the student’s scientific literacy,
- 🌐 to provide the student with the tools necessary to interpret change in global environments, and
- 🌐 to encourage critical thinking & effective problem-solving methodologies for sustainability in human-landscape interactions.

**Course meets for:**

lecture  
M W F 9-9:50 in Dennis 314

laboratory  
T 13-15:50 in Dennis 314

**Professor:**

Cynthia Fadem  
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**Teaching Assistant:**

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Office Hours: by appointment

**Texts:**

Pipkin, B., Trent, D.D., Hazlett, R.W., & Bierman, P. (2014). *Geology and the Environment*, 7<sup>th</sup> edition. Brooks/Cole/Cengage Learning, Belmont, CA. (ISBN: 978-1-133-60398-6)

OR

Pipkin, B., Trent, D.D., Hazlett, R.W., & Bierman, P. (2011). *Geology and the Environment*, 6<sup>th</sup> edition. Brooks/Cole/Cengage Learning, Belmont, CA. (ISBN: 0-538-73755-7)

&

McPhee, J. (1990). *The Control of Nature*. Farrar, Straus & Giroux, New York City. (ISBN: 0-374-52259-6)

<b>Assessment</b>	<b>Grades</b>
42% Laboratory assignments (14)	90-92 – A-    ≥93 – A
30% Written examinations (3)	80-82 – B-    83-85 – B    86-89 – B+
8% Essay assignments (4)	70-72 – C-    73-75 – C    76-79 – C+
8% Discussions (8)	60-62 – D-    63-65 – D    66-69 – D+
12% Activities (6)	≤59 – F

## Policies

*Open door:* Students should feel free to write/talk to the instructor at any time regarding course material or life in general.

*Academic integrity:* Students are expected to abide by Earlham's policy on academic integrity (<http://www.earlham.edu/curriculumguide/academics/integrity.html>).

*Accommodation:* For information on disabilities legislation compliance or to discuss academic accommodation, contact the Academic Enrichment Center (<http://www.earlham.edu/~sas/support/>, 765.983.1341). Students with college-accommodated disabilities not facilitated by the AEC are encouraged to meet with the instructor as soon as possible so appropriate arrangements may be made.

*Attendance:* Students are expected to attend all class meetings. Should a student miss a lecture, it is the student's responsibility to obtain notes from a fellow student. Students are never excused from assignments or exams; however, in the following cases a make-up or alternative assignment/exam would be provided:

- In the case of regularly-scheduled laboratories or exams, absence will be accepted for illness with a doctor's note ONLY.
- In the case of a field trip, absence will be accepted for illness with a doctor's note, religious obligations, and college-organized events in which the student is currently scheduled to take part. *If the student will be missing the field trip for any reason other than illness, s/he MUST notify the instructor at least one week prior to the scheduled field trip and complete a make-up assignment for credit.*

*Due dates:* Laboratory and essay assignment due dates are noted in the syllabus schedule. Laboratory assignments are always due at the next lab meeting. Class participation grades are issued the day of the event, highlighted in the syllabus schedule. Students may always turn in assignments early. All late assignments incur a 10% per day penalty.

*Curves:* Exams will be curved by a quantity sufficient either to make the mean 75% or the highest grade 100%, whichever is larger.

## Discussion Readings & Viewings

Alley, W.M. (2006). Tracking U.S. groundwater: Reserves for the future? *Environment* 48:11-25.

Denselow, J. (2009). Iraq's forgotten crisis. *The Guardian* 18 July 2009.

Hill, D.J. (2008). Nuclear energy for the future. *Nature - Materials* 7:680-682.

Intergovernmental Panel on Climate Change (2007). Summary for policymakers. In *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., and Hanson, C.E., Eds. Cambridge University Press, p. 7-22.

Kammen, D.M. (2006). The rise of renewable energy. *Scientific American* 295:85-93.

Klare, M.T. (2007). Global warming battlefields: How climate change threatens security. *Current History* 106:355-361.

Kokmen, L. (2008). Environmental justice for all. *Utne Reader* Mar/Apr:42-46.

Lima, E., Merry, F., Nepstad, D., Amacher, G., Azevedo-Ramos, C., Lefevre, P., Resque, F. Jr. (2006). Searching for Sustainability: Forest policies, smallholders, and the trans-Amazon highway. *Environment* 48:26-36.

Morrison, J. (2005). How much is clean water worth? *National Wildlife* 43:24-28.

Morrisette, J.J., and Borer, D.A. (2005). Where oil and water do mix: Environmental scarcity and future conflict in the Middle East and North Africa. *Parameters: U.S. Army War College Quarterly* 34:86-101.

Pasqualetti, M.J. (2004). Wind power: Obstacles and opportunities. *Environment* 46:23-38.

Perkins, S. (2008). Down with carbon: Scientists work to put the greenhouse gas in its place. *Science News* 173(16):18-23.

United Nations Convention to Combat Desertification (1994). Elaboration of an international convention to combat desertification in countries experiencing serious drought and/or desertification, particularly in Africa. UN General Assembly. 62 p.

United Nations Convention to Combat Desertification (2010). FAO in action: Food crisis in Niger (video). Food & Agriculture Organization of the UN. <http://youtu.be/hhhueYo2AEE>.

United Nations. Turning the tide on desertification in Africa (video). Food & Agriculture Organization of the UN. <http://youtu.be/AfbM-DNMnNg>.

United States Geological Survey (2007). Putting down roots in earthquake country: Your handbook for the San Francisco Bay region. General Information Product No. 15. U.S. Department of the Interior. 32 p.

Webster, D.(2008). Nature's revenge: Inside Chernobyl's Zone of Alienation. *Best Life* November 2008:146-153.

Wright, S.A., Schmidt, J.C., Melis, T.S., Topping, D.J., and Rubin, D.M. (2008). Is there enough sand? Evaluating the fate of Grand Canyon sandbars. *GSA Today* 18:4-10.

Zweibel, K., Mason, J., and Fthenakis, V. (2008). A solar grand plan. *Scientific American* 298:64-73.

## Schedule

Date		Topic	Type	Reading	Assignment	Due Date	
J A N	16	W	Lecture				
	18	F	Lecture	Pipkin Ch. 1 & 2			
	21	M	Lecture				
	22	T	Lab		Lab 1	29 Jan	
	23	W	Lecture	Pipkin Ch. 3			
	25	F	Lecture				
	28	M	Lecture				
	29	T	Lab		Lab 2	5 Feb	
	30	W	Lecture				
F E B	1	F	Discussion	IPCC 07; Klare 07; Kokmen 08	Discussion 1		
	4	M	Lecture	Pipkin Ch. 5	Essay 1	18 Feb	
	5	T	Lab		Lab 3	12 Feb	
	6	W	Lecture				
	8	F	Lecture				
	11	M	Lecture	Pipkin Ch. 4			
	12	T	Lab		Lab 4	19 Feb	
	13	W	Lecture				
	15	F	Discussion	McPhee Ch. 2, USGS 07	Discussion 2		
	18	M	<b>Review</b>				
	19	T	Lab		Lab 5	26 Feb	
	20	W	<b>Exam 1</b>				
	22	F	<b>Early Semester Break – no class</b>				
	25	M	Lifeblood	Lecture	Pipkin Ch. 6	Essay 2	11 Mar
26	T	Lab			Lab 6	5 Mar	
27	W	Lecture		Pipkin Ch. 7			

Date			Topic	Type	Reading	Assignment	Due Date	
M A R	1	F	Lifeblood	Discussion	McPhee Ch. 3; Lima et al. 06	Discussion 3		
	4	M		Lecture				
	5	T		Lab		Lab 7	12 Mar	
	6	W		Lecture	Pipkin Ch. 8			
	8	F		Discussion	Alley 06; Morison 05; Morrisette & Borer 05	Discussion 4		
	11	M		Lecture	Pipkin Ch. 9	Essay 3	25 Mar	
	12	T		Lab		Lab 8	26 Mar	
	13	W		Lecture				
	15	F		Discussion	McPhee Ch. 1; Wright et al. 08	Discussion 5		
	18	M	<b>Spring Break – no class</b>					
	19	T						
	20	W						
	22	F						
	25	M		Lecture				
26	T		Lab		Lab 9	2 Apr		
27	W	<b>Review</b>						
29	F	<b>Exam 2</b>						
A P R	1	M	Seas of Water	Lecture	Pipkin Ch. 10			
	2	T		Lab		Lab 10	9 Apr	
	3	W		Lecture		Essay 4	22 Apr	
	5	F	Seas of Sand	Activity	group articles			
	8	M		Discussion	Denselow 09; UNCCD 1994; <i>FAO videos</i>	Discussion 6		
	9	T		Lab		Lab 11	16 Apr	
	10	W		Lecture	Pipkin Ch. 12			
	12	F	Seas of Ice	Lecture	Pipkin Ch. 11			
	15	M		Discussion	Kammen 06; Pasqualetti 04; Perkins 08	Discussion 7		
	16	T	Sustenance	Lab		Lab 12	23 Apr	
	17	W		Lecture	Pipkin Ch. 14 & 15			
	19	F		Discussion	Webster 08; Hill 08; Zweibel et al. 08	Discussion 8		
	22	M		<i>Climate of Change</i> InTeGrate Module	Activity	Unit 1 - Case study 1.1	Activity 1	
	23	T			Lab	Unit 2 - Case studies 2.1, 2.2 & 3.1	Activity 2, Lab 13	30 Apr
	24	W			Activity	Unit 3 - Case study 3.2	Activity 3	
	26	F			Activity	Unit 4 - Case study 4.1	Activity 4	
	29	M			Activity	Unit 5 - Case study 5.1	Activity 5	
30	T	Lab	Case studies 4.2 & 5.2		Lab 14	3 May		
M	1	W	Activity	Unit 6 - Case study 6.1	Activity 6			
A	3	F	<b>Review</b>					
Y	9	R	<b>Exam 3 @ 8:00 am</b>					