

ENV 275: Principles of Environmental Science - Spring 2009
Tuesday and Thursday 11:00-12:15 215 Shideler Hall

Instructors:

Dr. Melany Fisk, 160 Pearson Hall, office hours Wed. 9-10 am and by appointment.
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This course is a required core course in the Environmental Science Co-Major. The Environmental Science Co-Major provides a multi-disciplinary curriculum in environmental science at Miami University. The term "co-major" indicates that students must complete the degree requirements of both a primary major and the co-major. The Environmental Science Co-Major is open to all students, but is designed to complement majors in the physical and natural sciences such as Botany, Chemistry, Geography, Geology, Microbiology, and Zoology.

Objectives: This course introduces students to the disciplines of environmental science. The course illustrates how information and concepts from the biological, physical, and social sciences need to be considered in describing and solving environmental problems. Class discussion and reading will draw upon current research and events to illustrate environmental problems.

Text: J.H. Withgott & S. Brennan. 2009. *Essential Environment: The Science Behind the Stories*, 3/E. Prentice Hall (ISBN 013604531).

Additional readings will be assigned from relevant books, journal articles, or government publications as necessary. These will be made available through the course Blackboard site. Students are expected to read these materials in advance of the class in which they are discussed.

Assignments and Evaluation: There will be two midterm exams and a final exam. The exams will include a mixture of material from the lecture and readings. In addition, there will be four group projects during the semester. Students will be assigned to groups of approximately four students each. In each project a particular question will be posed, and groups will be responsible for: 1) finding useful information on the internet and sharing this with other group members (to be carried out and evaluated on an individual basis); and 2) analyzing this information and writing a brief summary of conclusions (to be carried out and evaluated on a group basis. These written assignments must be submitted via Turnitin on the course Blackboard site, which allows for automated detection of plagiarism. More information on Turnitin is available at https://ithelp.muohio.edu/attach/tii_plagiarism_student_guide.pdf.

Grades will be calculated according to the following values:

<u>Component</u>	<u>% of Total</u>
Exam 1	20
Exam 2	20
Group assignments (4)	35
Final Exam	25
Total	100

Attendance: Students are expected to attend all classes. All exams, including the final, will be given at the time stated on the syllabus. Make-ups will be allowed only when students have documented medical excuses. Miami University Health Center does not provide such documentation unless the student is hospitalized, sent home, or in event of a death in the family.

Academic honesty: Students are reminded that the work they submit in this course must be original. University policies on academic dishonesty are described in the Student Handbook, 2008-2009, http://www.units.muohio.edu/secretary/policies_guidelines/student_handbook/; students are expected to adhere to these policies.

Schedule: The schedule which follows is provided as a general guide to the lecture topics. There may be departures from the order of presentation and the time allotted for the various topics. Exams are based largely on lecture material with additional material coming from the text and other assigned readings. Some of the material presented in lecture will not be in the book. It is to your benefit to attend class.

Schedule of classes:

Date	Topic	Lecturer	Readings* and Assignments
13-Jan	Human population	Renwick	Ch. 6
15-Jan	Resource use, sustainability	Fisk	Ch. 1; Hardin 1968
20-Jan	Ecosystems and services	Fisk	pp 25-27, 30-33; Vitousek et al 1997
22-Jan	Energy and carbon	Fisk	Ch. 3
27-Jan	Nitrogen and phosphorus	Fisk	Ch. 3; DelGrosso 2008
29-Jan	Water supply	Renwick	pp 254-264; Oki & Kanae 2006; Assignment # 1
3-Feb	Water quality	Renwick	pp 264-269
5-Feb	Efficiency in water systems	Renwick	Pimentel et al 2004; Resource #1 due
10-Feb	Food Supply	Renwick	pp 144-154
12-Feb	Meat & Water	Renwick	pp 154-158; 276-281; Bittman 2008; Essay #1 due
17-Feb	Agriculture pests and biotech	Fisk	Marvier & VanAcker 2006
19-Feb	Exam 1		
24-Feb	Biodiversity and extinction	Fisk	Ch. 8; Assignment # 2
26-Feb	Exotic species	Fisk	pp 92, 93, 100-105; Resource # 2 due
3-Mar	Biodiversity services	Fisk	Diaz et al 2006; Wiens 2007
5-Mar	Mineral resources	Renwick	pp 243-252; Essay # 2 due
10-12 Mar	Spring Break		
17-Mar	Energy overview	Renwick	pp 327-332; Assignment #3
19-Mar	Fossil fuels	Renwick	pp 332-345; Witze 2007; Resource #3 due
24-Mar	Nuclear Energy	Renwick	pp 345-352; Hoffert et al, 2002
26-Mar	Renewable Energy	Renwick	Ch. 16; Essay #3 due
31-Mar	Atmospheric chemistry	Fisk	Ch. 13
2-Apr	Biotic effects of pollution	Fisk	Ch. 13
7-Apr	Exam 2		
9-Apr	Atmospheric dynamics	Renwick	Ramanathan and Feng, 2008
14-Apr	Past climate	Renwick	
16-Apr	Current climate change	Fisk	Ch. 14; IPCC 2007
21-Apr	Climate feedbacks	Fisk	Ch. 14; Assignment #4
23-Apr	Carbon storage	Renwick	pp. 134-144; Lehmann 2007; Resource #4 due
28-Apr	Carbon footprints	Fisk	
30-Apr	Managing the carbon budget	Fisk	Essay #4 due
5-May	Final Exam 7:30 am		

* Ch. = chapter and pp = pages in Withgott and Brennan 2009. Others are supplemental readings.

Supplemental readings:

- Bittman, M., 2008. Rethinking the meat-guzzler. NY Times, Jan. 27, 2008. <http://www.nytimes.com/2008/01/27/weekinreview/27bittman.htm>. See also the graphics that go with it.
- Del Grosso, S.J., T. Wirth, S.M. Ogle, and W.J. Parton, 2008. Estimating agricultural nitrous oxide emissions. *EOS* 89:529-530.
- Diaz, S., J. Fargione, F.S. Chapin, and D. Tilman, 2006. Biodiversity loss threatens human well being. *PLoS Biology* 4: 1300-1305.
- Hardin, G., 1968. The tragedy of the commons. *Science* 162: 1243–1248
- Hoffert, M.I. et al, 2002. Advanced Technology Paths to Global Climate Stability: Energy for a Greenhouse Planet. *Science* 298: 981-987.
- Intergovernmental Panel for Climate Change, 2007. Climate Change 2007: Synthesis Report.
- Lehmann, J., 2007. A handful of carbon. *Nature* 447, 143-144.
- Marvier, M. and R.C. Van Acker, 2005. Can crop transgenes be kept on a leash? *Frontiers in Ecology and the Environment*. 3: 99-106.
- Oki, T., and S. Kanae, 2006. Global hydrological cycles and world water resources. *Science* 313: 1068.
- Pimentel, D., B. Berger, D. Filiberto, M. Newton, B. Wolfe, E. Karabinakis, S. Clark, E. Poon, Abbett, and S. Nandagopal, 2004. Water resources: agricultural and environmental issues. *Bioscience* 54: 909-918.
- Ramanathan, V., and Y. Feng, 2008. On avoiding dangerous anthropogenic interference with the climate system: Formidable challenges ahead. *Proceedings of the National Academy of Science* 105: 14245-14250. See also commentary by HJ Schellnhuber.
- Vitousek, P.M., H.A. Mooney, J. Lubchenco, and J.M. Melillo, 1997. Human domination of Earth's ecosystems. *Science* 277: 494-499.
- Wiens, J., 2007. Diversity: the dangers of black-and-white conservation. *Conservation Biology* 21: 1371-1372.
- Witze, A., 2007. That's oil. *Nature* 445: 14-17.