

Environmental Biology Syllabus

ECOL 206, spring 2004, University of Arizona

Kevin Bonine, Ph.D., Jessie Cable, TA, Chuck Price, TA

Introduction

Welcome to Environmental Biology. Our focus will be on the basic principles of environmental biology, ecology, and the relationship between humans and the natural world. This is a course in biology for non-majors, therefore, our discussion will begin broadly, but by the end of the course we hope you will understand and appreciate the natural forces that generate and maintain the diversity of life we see on our planet, as well as the myriad interactions among both biotic and abiotic components of ecosystems. We also hope you will be able to objectively assess the role that humans have played in changing the natural environment, especially during the last few centuries.

Meeting Times

Lecture: MWF 0900–0950h in Haury 216 (aka Anthropology Building)

Lab/Discussion: Lab 1. Tuesday 1400-1700h in CBS/KOFFL 410 (Chuck)
Lab 2. Wednesday 1400-1700h in CBS/KOFFL 410 (Jessie)
Lab 3. Thursday 1400-1700h in CBS/KOFFL 410 (Chuck)
Lab 4. Friday 1100-1400h in CBS/KOFFL 410 (Jessie)
Please attend the lab/discussion section in which you are enrolled.

Instructors

Kevin E. Bonine, Ph.D.

Office Hours: Mon. 1300-1400h and Wed. 1030-1130h in BSE 1D (in the basement)
and by appointment (626-0092, kebonine@email.arizona.edu)

T.A.: **Jessie Cable** (cableje@email.arizona.edu, 621-8220, BSW 431 Huxman Lab in EEB)

Office Hours: TBA

T.A.: **Chuck Price** (cprice@email.arizona.edu, 626-3336, BSW 221 Enquist Lab in EEB)

Office Hours: TBA

Course Materials

Miller, G. Tyler, Jr. 2003. *Sustaining the Earth* 6th edition. Brooks/Cole-Thomson Learning, Pacific Grove, California. (The Miller text is available at the UofA Bookstore.)

Quinn, Daniel. 1993. *Ishmael*. Bantam Paper. Purchase optional; 17 copies on reserve in UA library.

Additional readings will be provided by the instructors (placed on the course **website**, placed on electronic reserve in the library, or made available for photocopy).

You should also purchase a smallish field notebook and a three ring binder for lab (details below).

Course Work

Lecture Exams (three midterms @ 100 pts each, cumulative final 175 pts)	475
Participation Grade (attendance, contribution to discussions, lecture quizzes, etc.)	50
Current Events Journal (fifteen @ 10 pts each, not accepted late)	150
Peer Reviewed, Primary Literature - Article Review/Summary (2 pages)	25
Group Problem Solving Semester Project (students will rate each other on relative contribution)	125
Group Oral Presentation (and short handout for peers)	50
Lab/Discussion (lab assignments, lab quizzes, lab attendance)	200
Lab Notebook (collected twice at 35 pts and 65 pts respectively)	100

Total Points: 1175

Grading

Assignments are due *no later than the beginning of class* on the due date. Late assignments will be penalized 10% for each day they are late. We realize that you have lives (cars do break down, people die, stuff happens). In exceptional documented cases, and if arrangements are made in advance, we will consider your unique situation.

Grades will generally be distributed as follows:

≥ 90%	A
80-89%	B
70-79%	C
60-69%	D
≤ 59%	F

Any student with a documented disability who needs academic adjustments or accommodation is requested to speak with the instructor by the **2nd** week of class. All related discussions will remain confidential.

The University of Arizona has policies in place regarding cheating, grade appeals, and the like. The Dean of Students' office provides a link to a comprehensive index of important policies and procedures:

<http://w3.arizona.edu/%7Estudpubs/policies/ppmainpg.html>

Please be sure you are aware of the policies related to the student code of conduct and academic integrity.

Attendance

You are expected to attend each lecture, each discussion/laboratory session, and each of the two Saturday field trips. Quizzes (often unannounced) may be occasionally given to motivate you to attend class and keep up with the material. Please plan to arrive on time and stay until class is over. Please turn off your cell phone, etc.

Class meeting discussion suggestions:

Please consider employing these suggestions (borrowed from Guy McPherson) during class discussions:

1. Listen carefully to others before speaking
2. Challenge and refute ideas, not people
3. Focus on the best ideas, not on being the best, or "winning"
4. Before adding your own contribution, practice listening by trying to formulate in your own words the point that the previous speaker made
5. Speak whenever you wish (without interrupting!) even though your ideas may seem incomplete
6. Avoid disrupting the flow of thought by waiting until the present topic reaches its natural end before introducing a new issue
7. If you wish to introduce a new topic, warn the group that what you are about to say will address a new topic and that you are willing to wait to introduce it until people are finished commenting on the current topic
8. Give encouragement and approval to others

Course Work Details

Lecture Exams

There will be three midterm examinations and a fourth, final examination. The final will be cumulative. Topics covered in the formal lecture period, in lab/discussion, by guest speakers, on field trips, and in the text and supplemental readings will be fair game. Format will be mixed and may include: matching, fill-in, multiple choice, short answer, and essay. Be prepared to synthesize ideas, rather than just regurgitate information. Portions of exams may rarely be given as 'take-home' assignments. There will be no make-up exams.

Current Environmental Events Journal (150 pts.)

Each week throughout the semester (15 weeks total beginning 21 January) you will be expected to turn in a two paragraph summary of a relevant current event (related to scientific aspects of environmental biology – ask us if you aren't clear what is appropriate) reported in a reputable print-media periodical (Arizona Daily Star, New York

Times, Newsweek, are but a few examples). Online versions of periodicals are acceptable. By the end of the semester you will need to have covered 5 different articles for each of the following three categories:

1. Local (Southern Arizona or Tucson)
2. National/North America (Canada, Mexico, or the U.S.)
3. International (not Canada, Mexico, or the U.S.)

These 15 assignments are due each Wednesday at the beginning of lecture, beginning on **21 January**. These assignments should be typed. Include your name, the date, your TA, the article category (local, national, or international), the appropriate complete citation of the article, a paragraph summarizing the article, and a second paragraph explaining the relevance of the article to this class along with your brief personal opinions. After the assignments are handed back to you, keep them to turn in as a packet at the end of the course so we can be sure you covered each of the three categories 5 times each. Attending an appropriate seminar on campus can be used as a substitute for reading an article. We will try to make you aware of relevant seminars and talks.

Article Review/Summary (25 pts.)

We will ask you to write up a two-page summary and review of a peer reviewed, primary literature article. This assignment will be due on **28 March**. After our lab visit to the library you should have no problem identifying an appropriate article (scientific and relevant to environmental biology) and then writing an intelligent and thoughtful review of the article. We will discuss this assignment further in lab. Please choose a topic quite different from that covered with your group (see below).

Group Problem Solving Semester Project (125 pts.)

This assignment is designed to effect change. In small groups of 3-4 students from your lab you will identify a situation in the community or on campus or at your workplace that is perhaps environmentally unfriendly. As a group, you will summarize why the situation poses a problem (using facts from cited references), you will propose a solution or way to ameliorate the problem and argue why it will work (drawing on success stories elsewhere would be helpful here), and you will work to implement your solution (make contacts, talk to people, write up proposals to submit to decision-makers). You will document your group's progress in the form of approximately tri-weekly short submissions in lab. In the end, you will be graded on the written portion of the project (identifying and verifying the problem and placing it in context), the viability and rationale for your proposed solution, and the amount of effort you expend to actually effect change. More details will be presented in lab as your projects evolve.

Examples:

- 1) A new building on our campus has large south-facing glass walls and an all-black west wall. How might this be less than environmentally friendly?
- 2) Students at Stanford university are paid NOT to purchase parking permits, or are given discounts if more than 1 or 2 students share a parking permit. How might this improve the Stanford, as well as the global environment?
- 3) Styrofoam is recyclable in the Tucson curbside recycling program but is not recycled at the Student Union at the U of A.
- 4) Students at Cornell university were trying to get recycling bins on campus, but the administration would not provide them. In protest, the students stacked recyclables next to trash bins rather than throwing them away until recycling bins became a more reasonable solution for the administration than picking up all the cans and bottles next to the trash cans.
- 5) On several campuses nationwide, students have argued to the administration that energy-saving lights would be more environmentally friendly and less costly than standard incandescent bulbs. The students presented economic analyses that persuaded the building managers to change the lights and bulbs they used.
- 6) The city of San Francisco has adopted a policy for all of its business and projects called the Precautionary Principle - defined in your text.
- 7) Curitiba, Brazil has evolved as a model environmentally-friendly city. Check out some of the things they have done. Would those ideas work here?

Looking at international examples might be an excellent source of ideas and solutions. Alana Levine of the UA Recycling program has agreed to field questions about the feasibility of various ideas related to recycling.

To make the group project fair to each individual, you will each privately estimate the amount contributed by each member of your group (including you) and thus your relative contribution, as determined by your group, will be used to weight your group's grade when assigning points for each individual. The goal here is to get you all to work together effectively.

Group Oral Presentation (50 pts.)

At the end of the semester you will have the opportunity to present to your peers and instructors a summary of the above semester group project. This presentation will consist of a ten minute oral presentation using PowerPoint accompanied by a useful 1-page handout that will allow your peers to recall the important points from your presentation. More details will be forthcoming.

Field Trips and Lab

Attendance and Participation are required for all laboratory/discussion sessions and field trips. These have been designed with specific objectives, so there are no suitable "make-ups" for missed labs or trips. UA vehicles must leave on field trips promptly, for we often have host experts waiting for us. Most labs will be during your 3 hour lab time. There are two mandatory all-day (Saturday) field trips: A) Cienega Creek/San Pedro and B) Mt. Lemmon/Santa Catalina Mountains.

REQUIRED in the field: sufficient water, hat, lunch/snacks, sun & rain gear, field notebook, etc.

RECOMMENDED in the field: camera, binoculars.

Please DO NOT BRING: CD player, head phones etc.

We are going to ask that you dedicate both a small (e.g., 4" x 6") **field notebook** and a **3-ring binder** to your 206 lab experience. Lab notes, handouts, and assignments will be put in order in your 3-ring binder. Always include the date, your name, and the assignment on each page. In the field, you will use your smaller notebook to record observations, data, thoughts, sketches, maps, etc. Always include name, date, time, and location. Then, you will transfer this information to full-size paper and place in your 3-ring binder. Tearing out 4x6 pages from your small notebook and attaching them to an 8.5 x 11 sheet of paper is acceptable and will allow you to add additional notes in the margin without recopying information. Be as neat and tidy (and artistic) as you can. Twice during the course of the semester we will collect these binders to assess their quality and thoroughness. Please turn in your 206 lab binder in lecture first on **05 March** (35 pts.) and finally on **03 May** (65 pts.).

Tentative Lecture Schedule

*chapter assignments refer to Miller's *Sustaining the Earth*, 6th edition, 2003

other reading assignments will be available on the course website unless otherwise noted

	DATE	LECTURE TOPIC	READINGS*	GUEST?
	WEEK 1			
1	14 Jan	Introductions and Syllabus	CH1, <i>Ishmael</i> (on reserve)	
2	16 Jan	What is Environmental Science?	CH1, begin CH2	
	WEEK 2			
	19 Jan	HOLIDAY (no class)	continue reading <i>Ishmael</i>	
3	21 Jan	Natural Resources and Sustainability	CH1, Kates 2000	
4	23 Jan	Ecology's Base (Matter, Energy, Hierarchy) Biogeochemical Cycles	CH2	
	WEEK 3			
5	26 Jan	Ecology and Ecosystems	CH2, CH4, Leopold 1949	
6	28 Jan	Biological Invasions	CH4	McPherson
7	30 Jan	Ecosystems and Species	CH4, CH3	
	WEEK 4			
8	02 Feb	Biomes and Habitats (Water vs. Land)	CH3	
9	04 Feb	Population Dynamics, Succession	CH3, CH4, Dillard 1974	
10	06 Feb	Extinction and Biodiversity	CH3	C. Price
	WEEK 5			
11	09 Feb	Urbanization and wildlife	CH5	T. Edwards
12	11 Feb	Evolution, Natural Selection, and Adaptation	CH3, Quammen 1985	
13	13 Feb	Evolution, Natural Selection, and Adaptation	CH3	
	WEEK 6			
14	16 Feb	EXAM I (Ch1-4)		
15	18 Feb	Human Population and Urbanization	CH5, Stoel 1999	
16	20 Feb	Energy and Consumption	CH6, Ecological Footprint	
	WEEK 7			
17	23 Feb	Energy Sources	CH6	
18	25 Feb	Conservation Biology (Ecosystems)	CH7	D. Backer +
19	27 Feb	Habitat Loss, Deforestation	CH7	
	WEEK 8			
20	01 Mar	Biosphere Reserves	CH7, Batisse 1997	
21	03 Mar	Conservation Biology (Species approach)	CH8	
22	05 Mar	Conservation (Treaties, Laws)	CH8	B. Steidl
	WEEK 9			
23	08 Mar	Soils and Food	CH9, Levidow 1999	
24	10 Mar	Soils and Food, NGOs, sustainable agriculture	CH9, Rifkin 1992	
25	12 Mar	EXAM II (Ch5-9)		
	13-21 Mar	SPRING BREAK		
	WEEK 10			
26	22 Mar	Pesticides and pseudoestrogens	CH9, CH10	J. Cable
27	24 Mar	Silent Spring, Our Stolen Future, Risks, Toxicology, Human Health	CH10, Gore 1994, Colborn 1997	A. Wheelock
28	26 Mar	National Parks and Conservation Issues		D. Swann
	WEEK 11			
29	29 Mar	Fire Ecology	CH11	T. Swetnam
30	31 Mar	Global Warming and Ozone, Climate Change	CH11, Revkin 2003, van der Leun 1995	J. Cable
31	02 Apr	Air Pollution	CH11	
	WEEK 12			
32	05 Apr	Water	CH12	
33	07 Apr	Water	CH12	

34	09 Apr	Marine Biology and Conservation	Rajasuriya 1995	Mangin
	WEEK 13			
35	12 Apr	Water	CH12	Matter
36	14 Apr	Hawaiian Conservation		Robichaux
37	16 Apr	Reduce, Reuse, Recycle	CH13	Levine
	WEEK 14			
38	19 Apr	Economics, Politics, Action	CH14, Abbey 1968	
39	21 Apr	Environmental Justice	Mohai 1992	
40	23 Apr	EXAM III		
	WEEK 15			
41	26 Apr	The Four Spikes		McPherson
42	28 Apr	Student Oral Presentations		
43	30 Apr	Student Oral Presentations		
	WEEK16+			
44	03 May	Student Oral Presentations		
45	05 May	Wrap Up (Last Day of Class)	Hartwell 2002, Revkin 2002	
	12 May (Wed)	FINAL EXAM in same lecture room (8-10am; cumulative)		

Tentative Lab/Discussion and Field Trip Schedule

Additional short readings to be added...

Date	Topic	Readings etc.	Meeting Location
Week 1 (12-18 Jan)	No Lab	<i>Ishmael</i>	(Library Reserves)
Week 2 (19-25 Jan)	Campus Plant Walk	http://arboretum.arizona.edu/plantwalks.html	Meet in Lab, then depart
Week 3 (26 Jan – 01 Feb)	<i>Ishmael</i> Biodiversity CD (Wilson)	<i>Ishmael</i>	Meet in Lab
Week 4 (02-08 Feb)	Aerial View of Tucson	see web link	Meet in Lab, then depart
Week 5 (09-15 Feb)	Data Analysis, Graphing		Meet in Lab
Week 6 (16-22 Feb)	Plant IDs, dichotomous key, Library		Meet in Lab, then depart
Week 7 (23 Feb – 29 Feb)	Tumamoc Hill		Meet S side BSE
Week 8 (01-07 Mar)	NEPA and fire		Meet in Lab
Week 9 (08-14 Mar)	Population Modelling		Meet in Lab, then depart
Week 10 (22-28 Mar)	Tucson Mtn. Park		Meet S side BSE
Saturday 27 March	Cienega Creek, San Pedro Labs 1 + 2 , w/ B.Powell		Meet S side BSE, 7am return ~ 5pm
Week 11 (29 Mar – 04 Apr)	Los Reales Landfill? (with Wilson)	Lomborg 2001	Meet S side BSE
Saturday 03 Apr	Cienega Creek, San Pedro Labs 3 + 4 , w/ T.Edwards		Meet S side BSE, 7am return ~ 5pm
Week 12 (05-11 Apr)	Sweetwater Waste Treatment (w/ Delgado)		Meet S side BSE
Week 13 (12-18 Apr)	Recycling Center (Levine, then Recycle America?)		Meet in Lab, then depart
Saturday 17 Apr	Mt. Lemmon Labs 3 + 4 , Rex Adams		Meet S side BSE, 7am return ~ 6pm
Week 14 (19-25 Apr)	At Home (w/ D. Backer), Cane Toads?		Meet in Lab
Saturday 24 April	Mt. Lemmon Labs 1 + 2 , Rex Adams		Meet S side BSE, 7am return ~ 6pm
Week 15 (26 Apr- 02 May)	Data analysis and summary Mt. Lemmon		Meet in Lab
Week 16 (03-09 May)	No Lab	Prepare for Final	

		Exam!	
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Supplemental Course Readings. Readings will be available on course website or on electronic reserve in the library. Other readings will likely be added or substituted as the course progresses.

1. **Abbey, Edward.** 1968. Polemic: industrial tourism and the national parks. p. 45-67 In: *Desert Solitaire: A Season in the Wilderness*, Edward Abbey. Ballantine Books, NY.
2. **Batisse, Michel.** 1997. Biosphere reserves: a challenge for biodiversity conservation & regional development. *Environment*. 39(5):7-15, 31-33.
3. **Colborn, Theo, Dianne Dumanski, and John Peterson Myers.** 1997. Flying blind. CH. 14 In: *Our Stolen Future*, Colborn, Dumanski, and Myers. Plume, Penguin Books, NY.
4. **Dillard, Annie.** 1974. Fecundity. Ch. 10 In: *Pilgrim at Tinker Creek*, Annie Dillard. HarperCollins, NY.
5. **Gore, Al.** 1994. Introduction In: *Silent Spring*, Rachel Carson. 1962. Houghton Mifflin, Boston.
6. **Hartwell, Meredith and Lainie Levick.** 2002. An opportunity to restore a desert wetland. *Rincon Group Newsletter*, Sierra Club, Grand Canyon Chapter. Nov. 2002-Mar. 2003: 4.
7. **Kates, Robert.** 2000. Population and consumption: what we know, what we need to know. *Environment* 42(3):10-19.
8. **Leopold, Aldo.** 1949. Thinking like a mountain, Aldo Leopold. p. 137-141 In: *A Sand County Almanac*. Oxford University Press, Ballantine Books, NY.
9. **Levidow, Les.** 1999. Regulating Bt maize in the United States and Europe. *Environment* 41(10):10-22.
10. **Lomborg, Bjorn.** 2001. Waste: running out of space? Ch. 20 In: *The Skeptical Environmentalist: Measuring the Real State of the World*, Bjorn Lomborg. Cambridge University Press, Cambridge. (for LAB week 11)
11. **Mohai, Paul and Bunyan Bryant.** 1992. Demographic studies reveal a pattern of environmental injustice. p. 10-23 In: *Race and the Incidence of Environmental Hazards*, Bunyan Bryant and Paul Mohai, eds., Westview Press, Boulder, CO.
12. **Quammen, David.** 1985. Is sex necessary? p. 169-174 In: *Natural Acts*, David Quammen. Nick Lyons Books, NY.
13. **Rajasuriya, Arjan, Ranjith De Silva, and Marcus Ohman.** 1995. Coral reefs of Sri Lanka: human disturbance and management issues. *Ambio* 24(7-8):428-437.
14. **Revkin, Andrew.** 2002. Can global warming be studied too much? *New York Times*. 03 Dec: D1,4.
15. **Revkin, Andrew.** 2003. Warming is found to disrupt species. *New York Times*. 02 Jan: A1,15.
16. **Rifkin, Jeremy.** 1992. Ecological colonialism Ch. 27 In: *Beyond Beef: The Rise and Fall of the Cattle Culture*, Jeremy Rifkin. Plume, Penguin Books, NY.
17. **Stoel, Thomas Jr.** 1999. Reining in urban sprawl. *Environment* 41(4):6-11,29-33.
18. **van der Leun, Jan, Xiaoyan Tang, and Manfred Tevini.** 1995. Environmental effects of ozone depletion: 1994 assessment, executive summary. *Ambio* 24(3):138-142.