

Environmental Biology Syllabus

ECOL 206, spring 2005, University of Arizona

Kevin Bonine, Ph.D., Alona Bachi and Matthew Herron GradTAs

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 (Bachi)
Lab 2. Wednesday 1400-1700h in CBS/KOFFL 410 (Herron)
Lab 3. Thursday 1400-1700h in CBS/KOFFL 410 (Bachi)
Lab 4. Friday 1100-1400h in CBS/KOFFL 410 (Herron)
Please attend the lab/discussion section in which you are enrolled.

Instructors

Kevin E. Bonine, Ph.D. (626-0092, kebonine@email.arizona.edu)

Office Hours: TBA in BSE 1D (in the basement) and by appointment

T.A.: **Alona Bachi** (alona@u.arizona.edu, 621-5202, BSW 321, Rosenzweig Lab in EEB)

Office Hours: TBA and by appointment

T.A.: **Matthew Herron** (mherron@u.arizona.edu, 621-1844, BSW 413, Michod Lab in EEB)

Office Hours: TBA and by appointment

Course Materials

Miller, G. Tyler, Jr. 2005. *Sustaining the Earth* 7th edition. Brooks/Cole-Thomson Learning, Pacific Grove, California. (The Miller text is available at Antigone Books, 411 N. 4th Ave., 792-3715)

McPherson, G.R. 2005. *Killing the Natives: Has the American Dream Become a Nightmare?* Whitmore Publishing Company, Pittsburgh, Pennsylvania. (also available at Antigone Books)

Quinn, Daniel. 1993. *Ishmael*. Bantam Paper. Purchase optional; 19 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 obtain 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
Group Problem Solving Semester Project	150
Group Oral Presentation (and short handout for peers)	50
Lab/Discussion (lab assignments, lab quizzes, lab attendance)	100
Lab Notebook (collected twice at 35 pts and 65 pts respectively)	100

Total Points: 1075

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. (Current event assignments will not be accepted 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://dos.web.arizona.edu/uapolicies/>

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 the all-day weekend field trip. 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, in the text, and supplemental readings will be fair game. The exam 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. You will have a week from the time a graded exam is returned to you to meet with the instructors about exam grading questions you may have.

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 short 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 Friday 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. At least three times during the semester these assignments will be scrutinized more closely than usual for content and appropriate use of the English language. 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.

Group Problem Solving Semester Project (150 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?
- 8) Should the UA or the City of Tucson adopt a fleet of hybrid vehicles?

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. The UA van will leave for field trips promptly; we often have host experts waiting for us. Most labs will be during your 3 hour lab time. There is one mandatory all-day (Saturday or Sunday) field trip to 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 **11 March** (35 pts.) and finally on **04 May** (65 pts.).

Tentative Lecture Schedule

- * Chapter assignments from Miller's *Sustaining the Earth*, 7th edition, 2005, are denoted SE followed by a chapter number.
- * Readings from McPherson's *Killing the Natives* are denoted KN followed by a chapter number.
- * Other reading assignments will be available on the course website unless otherwise noted.

	DATE	LECTURE TOPIC	READINGS*	GUEST
	WEEK 1			
1	12 Jan	Introductions and Syllabus	SE1, <i>Ishmael</i> (on reserve)	
2	14 Jan	What is Environmental Science?	SE1, begin SE2, KN preface	
	WEEK 2			
	17 Jan	MLK HOLIDAY (no class)	continue reading <i>Ishmael</i>	
3	19 Jan	Natural Resources and Sustainability	SE1, KN1	
4	21 Jan	Ecology's Base (Matter, Energy, Hierarchy) Biogeochemical Cycles	SE2	
	WEEK 3			
5	24 Jan	Ecology and Ecosystems	SE2, SE4, Leopold 1949	
6	26 Jan	Biological Invasions	SE4	
7	28 Jan	Ecosystems and Species	SE4, SE3	
	WEEK 4			
8	31 Jan	Biomes and Habitats (Water vs. Land)	SE3	
9	02 Feb	Population Dynamics, Succession	SE4, Dillard 1974	
10	04 Feb	Extinction and Biodiversity	SE3	C. Price
	WEEK 5			
11	07 Feb	Evolution, Natural Selection, and Adaptation	SE3, Quammen 1985	
12	09 Feb	Urbanization and desert tortoises	SE5	T. Edwards
13	11 Feb	Evolution, Natural Selection, and Adaptation	SE3	M. Herron
	WEEK 6			
14	14 Feb	Human Population and Urbanization	SE5, KN2 optional: Stoel 1999	
15	16 Feb	EXAM I (Ch1-4, and other readings and lectures)		
16	18 Feb	Energy and Consumption	Ecological Footprint SE10, KN3 optional: KN4, Kates 2000	
	WEEK 7			
17	21 Feb	Energy Sources	SE10	
18	23 Feb	Ecological Crises	SE6, KN5	A. Bachi
19	25 Feb	Habitat Loss, Deforestation	SE6,7	
	WEEK 8			
20	28 Feb	Conservation (Treaties, Laws)	SE7	B. Steidl?
21	02 Mar	Conservation Biology (Species approach)	SE7	A. Bachi
22	04 Mar	Biosphere Reserves	SE6, Batisse 1997	
	WEEK 9			
23	07 Mar	Soils and Food	SE8, Levidow 1999	
24	09 Mar	Soils and Food, NGOs, sustainable agriculture	SE8, Rifkin 1992	
25	11 Mar	EXAM II (SE5-10 [skip 9], and related readings and lectures)		
	12-20 Mar	SPRING BREAK		
	WEEK 10			
26	21 Mar	Silent Spring, Our Stolen Future, Risks, Toxicology, Human Health	SE11, Gore 1994, Colborn 1997	
27	23 Mar	National Parks and Conservation Issues	SE6	D. Swann
28	25 Mar	Pesticides and pseudoestrogens	SE8,11	
	WEEK 11			
29	28 Mar	Global Warming and Ozone, Climate Change	SE12, Revkin 2002 and 2003, van der Leun 1995	
30	30 Mar	Fire Ecology	SE12	T. Swetnam?
31	01 Apr	Air Pollution	SE12	

	WEEK 12			
32	04 Apr	Water	SE9	
33	06 Apr	Water	SE9	
34	08 Apr	Marine Biology and Conservation	SE9, Rajasuriya 1995	K. Mangin
	WEEK 13			
35	11 Apr	Water	SE9	W. Matter
36	13 Apr	Reduce, Reuse, Recycle	SE13, KN6	
37	15 Apr	Hawaiian Conservation		R. Robichaux
	WEEK 14			
38	18 Apr	Environmental Justice	SE14, KN9 optional: Mohai 1992	
39	20 Apr	EXAM III		
40	22 Apr	Economics, Politics, Action (Earth Day)	SE14, Abbey 1968	
	WEEK 15			
41	25 Apr	The Four Spikes	KN6,7	G. McPherson
42	27 Apr	Student Oral Presentations		
43	29 Apr	Student Oral Presentations		
	WEEK16+			
44	02 May	Student Oral Presentations		
45	04 May	Wrap Up (Last Day of Class)		
	13 May (Fri)	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 (10-14 Jan)	No Lab	<i>Ishmael</i>	(Library Book Reserves)
Week 2 (17-21 Jan)	Introduction, Campus Plant Walk	http://arboretum.arizona.edu/plantwalks.html	Meet in Lab, then depart
Week 3 (24-28 Jan)	<i>Ishmael</i> (we are discussing the whole book; it is a quick read) Biodiversity CD (Wilson)	<i>Ishmael</i>	Meet in Lab
Week 4 (31 Jan – 04 Feb)	Aerial View of Tucson	see web link	Meet in Lab, then depart
Week 5 (07-11 Feb)	Data Analysis, Graphing		Meet in Lab
Week 6 (14-18 Feb)	Plant IDs, dichotomous key, Library (Paula Wolfe and Jeanne Pfander)		Meet in Lab, then depart
Week 7 (21-25 Feb)	Tumamoc Hill	see web link	Meet S side BSE (van)
Week 8 (28 Feb- 04 Mar)	Population Modelling	see web link	Meet in Lab, then depart
Week 9 (07-11 Mar)	No Lab	work on group project	
Week 10 (21-25 Mar)	Tucson Mtn. Park	see web link	Meet S side BSE (van)
Week 11 (28 Mar- 01 Apr)	Los Reales Landfill (Wilson Hughes)	Lomborg 2001	Meet S side BSE (van)
Week 12 (04-08 Apr)	Sweetwater Waste Treatment (w/ J. Delgado?)	see web link	Meet S side BSE (van)
Week 13 (11-15 Apr)	No Lab	work on group project	
Saturday 16 Apr	Mt. Lemmon Labs 3 + 4 , Rex Adams?	see web link	Meet S side BSE, 7am return ~ 6pm
Sunday 17 April	Mt. Lemmon Labs 1 + 2 , Rex Adams?	see web link	Meet S side BSE, 7am return ~ 6pm
Week 14 (18-22 Apr)	Data analysis and summary Mt. Lemmon		Meet in lab
Week 15 (25-29 Apr)	Recycling (Levine)		Meet in Lab
Week 16 (02-06 May)	No Lab	Prep for Final Exam	

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. **Kates, Robert.** 2000. Population and consumption: what we know, what we need to know. *Environment* 42(3):10-19.
7. **Leopold, Aldo.** 1949. Thinking like a mountain, Aldo Leopold. p. 137-141 In: *A Sand County Almanac*. Oxford University Press, Ballantine Books, NY.
8. **Levidow, Les.** 1999. Regulating Bt maize in the United States and Europe. *Environment* 41(10):10-22.
9. **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)
10. **Quammen, David.** 1985. Is sex necessary? p. 169-174 In: *Natural Acts*, David Quammen. Nick Lyons Books, NY.
11. **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.
12. **Revkin, Andrew.** 2002. Can global warming be studied too much? *New York Times*. 03 Dec: D1,4.
13. **Revkin, Andrew.** 2003. Warming is found to disrupt species. *New York Times*. 02 Jan: A1,15.
14. **Rifkin, Jeremy.** 1992. Ecological colonialism Ch. 27 In: *Beyond Beef: The Rise and Fall of the Cattle Culture*, Jeremy Rifkin. Plume, Penguin Books, NY.
15. **Stoel, Thomas Jr.** 1999. Reining in urban sprawl. *Environment* 41(4):6-11,29-33.
16. **van der Leun, Jan, Xiaoyan Tang, and Manfred Tevini.** 1995. Environmental effects of ozone depletion: 1994 assessment, executive summary. *Ambio* 24(3):138-142.