

## Environmental Biology Syllabus

ECOL 206, spring 2006, University of Arizona

Kevin Bonine, Ph.D., Alice Boyle and Kristen Potter Grad TAs



**William A. Calder III, 1934–2002**

**Bill Calder, Rocky Mountain Biological Station, Gothic, CO.  
Photograph taken in July 1999 by Lorene Calder.**

### ***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 BSW 208

Lab/Discussion: Lab 1. Tuesday 1400-1700h in CBS/KOFFL 410 (Boyle)  
Lab 2. Wednesday 1400-1700h in CBS/KOFFL 410 (Potter)  
Lab 3. Thursday 1400-1700h in CBS/KOFFL 410 (Potter)  
Lab 4. Friday 1100-1400h in CBS/KOFFL 410 (Boyle)  
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.: **Alice Boyle** (alboyle@email.arizona.edu, 621-3534, BSW506)

Office Hours: TBA and by appointment

T.A.: **Kristen Potter** (kap15@u.arizona.edu, BSW211)

Office Hours: TBA and by appointment

### ***Course Materials***

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

**Speth, James Gustave.** 2004. *Red Sky at Morning*. Yale University Press. (The Speth book is also available at Antigone Books, 411 N. 4<sup>th</sup> Ave., 792-3715)

**Quinn, Daniel.** 1993. *Ishmael*. Bantam Paper.

Purchase optional; 16 copies on reserve in UA Science library (password = ecology206).

**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 150 pts)	450
Participation Grade (attendance, contribution to lecture discussions, lecture quizzes, etc.)	50
Current Events Journal (fourteen @ 10 pts each, not accepted late)	140
Group Problem Solving Semester Project	125
Group Oral Presentation	50
Lab/Discussion (lab assignments, lab quizzes, lab attendance)	110
Lab Notebook (collected twice at 25 pts and 50 pts respectively)	<u>75</u>
<b>Total Points:</b>	<b>1000</b>

### **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

Please re-familiarize yourself with policies against plagiarism, etc., within the UA Student Code of Academic Integrity: <http://studpubs.web.arizona.edu/policies/cacaint.htm>

Students caught cheating may be penalized by failing the relevant assignment or exam, failing the course, or being expelled.

### **Students with Disabilities:**

If you anticipate the need for reasonable accommodations to meet the requirements of this course, you must register with the Disability Resource Center (Disability Resource Center, 1224 East Lowell Street Tucson, Arizona 85721, Phone: (520) 621-3268 V/TTY Fax: (520) 621-9423, E-mail: [uadrc@email.arizona.edu](mailto:uadrc@email.arizona.edu)) and request that the DRC send the instructor official notification of your accommodation by the beginning of the 3<sup>rd</sup> week of class. Please plan to meet with us by appointment or during office hours to discuss accommodations and how the course requirements and activities may impact your ability to fully participate. All related discussions will remain confidential.

### **Attendance**

You are expected to attend each lecture, each discussion/laboratory session, and the all-day Saturday or Sunday field trip to Mt. Lemmon. Another Saturday field trip will be optional. Be prepared and ready to contribute. 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. All holidays or special events observed by organized religions will be honored for those students who indicate affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.

***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

Please be aware of the UA policies against threatening behavior by students:

<http://policy.web.arizona.edu/~policy/threaten.shtml>

***Web Site***

We will maintain a course website ([http://eebweb.arizona.edu/eeb\\_course\\_websites.htm](http://eebweb.arizona.edu/eeb_course_websites.htm)) with readings, assignments, schedules, announcements, etc. Appropriate powerpoint lectures will likely be posted to the website the day after they are given.

***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 and the key posted to meet with the instructors about exam grading questions you may have.

**Current Environmental Events Journal (140 pts.)**

Each Friday throughout the semester (14 weeks total beginning 20 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 4 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.)

The remaining two assignments will be more specific and may involve summarizing a scientific article or summarizing a scientific seminar (we will announce relevant seminars on campus throughout the semester). We will give you more details as the semester progresses. These 14 assignments are due each Friday at the beginning of lecture, beginning on **20 January**. The last one will be due on 28 April. 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 (here you may include your 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 4 times each.

### **Group Problem Solving Semester Project (125 pts.)**

This assignment is designed to effect change. In small groups of about 3 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? How could you make changes to this building or improve energy efficiency in future buildings.
- 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) Should the UA or the City of Tucson adopt a fleet of hybrid vehicles?
- 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.

During the semester we will make sure that everyone in the group is contributing. Students consistently shirking their duties will have their grades for the group assignment lowered accordingly. 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 nine minute oral presentation using PowerPoint. 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. An optional Saturday field trip to Cienega Creek Preserve and the San Pedro River will also be offered.

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: ipod, 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. Neatly 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 **10 March** (25 pts.) and finally on **28 April** (50 pts.).

## Tentative Lecture Schedule

- \* Chapter assignments from Miller's *Sustaining the Earth*, 7<sup>th</sup> edition, 2005, are denoted SE followed by a chapter number.
- \* Readings from the Speth book, *Red Sky at Morning*, are denoted RS followed by a chapter number.
- \* Other reading assignments will be available on the course website unless otherwise noted.

	DATE	LECTURE TOPIC	READINGS*	LECTURER
	WEEK 1			
1	11 Jan	Introductions and Syllabus	SE1, <i>Ishmael</i> (on reserve)	Boyle&Potter
2	13 Jan	Ecological Footprint, Intro Environmental Science	SE1, begin SE2	Boyle&Potter
	WEEK 2			
	16 Jan	MLK HOLIDAY (no class)	continue reading <i>Ishmael</i>	
3	18 Jan	Brief History of the Environmental Movement	RS4	Bonine
4	20 Jan	Ecology's Base (Matter, Energy, Hierarchy) Biogeochemical Cycles	SE2	Bonine
	WEEK 3			
5	23 Jan	Ecology and Ecosystems	SE2, SE4, Leopold 1949	Bonine
6	25 Jan	Biological Invasions	SE4	Gerst
7	27 Jan	Ecosystems and Species	SE4, SE3	Bonine
	WEEK 4			
8	30 Jan	Biomes and Habitats (Water vs. Land)	SE3	Bonine
9	01 Feb	Population Dynamics, Succession	SE4, Dillard 1974	Bonine
10	03 Feb	Extinction and Biodiversity	SE3, RS2	Price
	WEEK 5			
11	06 Feb	Evolution, Natural Selection, and Adaptation	SE3, Quammen 1985	Bonine
12	08 Feb	Evolution, Natural Selection, and Adaptation	SE3	Bonine
13	10 Feb	Urbanization and desert tortoises	SE5	Edwards
	WEEK 6			
14	13 Feb	Human Population and Urbanization	SE5, RS1, optional: Stoel 1999	Bonine
15	15 Feb	<b>EXAM I</b> (Ch1-4, and related readings and lectures)		EXAM
16	17 Feb	Energy and Consumption	SE10, optional: Kates 2000	Bonine
	WEEK 7			
17	20 Feb	Energy Sources	SE10	Bonine, ECLIPSE?
18	22 Feb	Ecological Crises	SE6	Bonine
19	24 Feb	Habitat Loss, Deforestation	SE6,7, RS3	Bonine
	WEEK 8			
20	27 Feb	Conservation (Treaties, Laws)	SE7	Bonine
21	01 Mar	Conservation Biology (Species approach)	SE7	Bonine
22	03 Mar	National Parks and Conservation Issues	SE6	D. Swann
	WEEK 9			
23	06 Mar	Biosphere Reserves	SE6, Batisse 1997	Bonine
24	08 Mar	Soils and Food	SE8, Levidow 1999	Bonine
25	10 Mar	<b>EXAM II</b> (SE5-10 [skip 9], and related readings and lectures)		EXAM
	11-19 Mar	SPRING BREAK		
	WEEK 10			
	WEEK 11			
26	20 Mar	Soils and Food, NGOs, sustainable agriculture	SE8, Rifkin 1992	Bonine
27	22 Mar	Silent Spring, Our Stolen Future, Risks, Toxicology, Human Health, Pesticides and pseudoestrogens	SE8&11, Gore 1994, Colborn 1997	Bonine
28	24 Mar	Lessons from Bird Migrations	TBA	Boyle
	WEEK 11			
29	27 Mar	Bugs, Bats, and Biology	TBA	Potter

30	29 Mar	Fire Ecology	SE12	T. Swetnam
31	31 Mar	Global Warming, 4 Spikes	SE12, RS6, Revkin 2002 and 2003, van der Leun 1995	G. McPherson
	WEEK 12			
32	03 Apr	Air Pollution	SE12	Bonine
33	05 Apr	Water	SE9	Bonine
34	07 Apr	Marine Biology and Conservation	SE9, Rajasuriya 1995	K. Mangin
	WEEK 13			
35	10 Apr	Water	SE9	Bonine
36	12 Apr	Hawaiian Conservation		R. Robichaux
37	14 Apr	Reduce, Reuse, Recycle	SE13	Bonine
	WEEK 14			
38	17 Apr	Politics, Action (Earth Day)	SE14, RS5, Abbey 1968	
39	19 Apr	<b>EXAM III</b>		EXAM
40	21 Apr	Environmental Justice	SE14, optional: Mohai 1992	Bonine
	WEEK 15			
41	24 Apr	Economics	SE14, RS7&8	Bonine
42	26 Apr	Student Oral Presentations		Students
43	28 Apr	Student Oral Presentations		Students
	WEEK16+			
44	01 May	Student Oral Presentations		Students
45	03 May	Wrap Up (Last Day of Class)	RS9,10	Bonine
	10 May (Wed)	<b>FINAL EXAM in same lecture room</b> (8-10am; cumulative)		EXAM

## Tentative Lab/Discussion and Field Trip Schedule

Additional short readings to be added (check your course website)...

<b>Date</b>	<b>Topic</b>	<b>Readings etc.</b>	<b>Meeting Location</b>
Week 1 (11-13 Jan)	No Lab	<i>Ishmael</i>	(Library Book Reserves)
Week 2 (16-20 Jan) (KB)	Introduction, Campus Plant Walk	<a href="http://arboretum.arizona.edu/plantwalks.html">http://arboretum.arizona.edu/plantwalks.html</a>	Meet in Lab, then depart
Week 3 (23-27 Jan) (KB)	<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 (30 Jan – 03 Feb) (KP)	Aerial View of Tucson	see web link	Meet in Lab, then depart
Week 5 (06-10 Feb) (KP)	Data Analysis, Graphing	see web link	Meet in Lab
Week 6 (13-17 Feb) (AB)	Plant IDs, dichotomous key, How to use the library	see web link	Meet in Lab, then depart
Week 7 (20-24 Feb) (AB)	Sweetwater Waste Treatment	see web link	Meet S side BSE (van) (J. Delgado?)
<b>Saturday</b> 25 February (KB) Rex Adams?	Mt. Lemmon <b>Labs 1 + 2</b>	see web link	Meet S side BSE, 7am return ~ 6pm (van)
<b>Sunday</b> 26 February (KB) Rex Adams?	Mt. Lemmon <b>Labs 3 + 4</b>	see web link	Meet S side BSE, 7am return ~ 6pm (van)
Week 8 (27 Feb- 03 Mar) (KB)	Data analysis and summary Mt. Lemmon	see web link	Meet in lab
Week 9 (06-10 Mar)	No Lab	work on group project	
Week 10 (20-24 Mar) (KP)	Tumamoc Hill	see web link	Meet S side BSE (van)
Week 11 (27-31 Mar) (KP)	Los Reales Landfill	Lomborg 2001	Meet S side BSE (van) (Wilson Hughes)
Week 12 (03-07 Apr) (AB)	Population Modelling	see web link	Meet in Lab, then depart
Week 13 (10-14 Apr)	No Lab	work on group project	
OPTIONAL, <b>Sat.</b> 15 April (AB)	Cienega Creek Preserve and San Pedro River	see web link	Meet S side BSE, 8am return ~ 4pm (van)
Week 14 (17-21 Apr) (KP)	Greasewood Park	see web link	Meet S side BSE (van)
Week 15 (24-28 Apr) (AB)	Recycling	see web link	Meet in Lab (Levine?)
Week 16 (01-03 May)	No Lab	Prep for Final Exam	