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SANTA BARBARA • SANTA CRUZ

January 7, 2015

DEPARTMENT OF ECOLOGY AND EVOLUTIONARY BIOLOGY
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To: Joseph Nagy, Chair
General Education Governance Committee

From: Paul Barber, Vice Chair for Undergraduate Studies
Department of Ecology and Evolutionary Biology

Re: Change of GE Category for Ecology and Evolutionary Biology 18 – Why Ecology Matters: The Science Behind Environmental Issues

The Department of Ecology and Evolutionary Biology (EE BIOL) proposes to change the general education category for Ecology and Evolutionary Biology 18 – Why Ecology Matters: The Science Behind Environmental Issues, effective Spring 2015. Presently, EE BIOL 18 fulfills one of the requirements for the Foundations of Scientific Inquiry: Life Sciences. The Department would like EE BIOL 18 to be included under the Life Sciences – Laboratory/Demonstration category.

The Department submitted a proposal in January, 2014, but the proposal was not approved. Since that time, the instructor for EE BIOL 18 has made significant changes to the course to align more closely with the guidelines for the Life Sciences – Laboratory/Demonstration category.

The instructor added significant hands-on scientific research experience to the lab component of the class. Labs now include two field trips that involve data collection: one investigates on-campus bird communities, and one investigates the environmental impacts of consumer food choices. A laboratory session has been added, in which students will test drinking water samples for a variety of water quality variables. These labs will give students experience implementing the scientific method. Students will be required to test hypotheses, quantitatively analyze the data they collect, and report their results (in written lab reports), according to the standards of scientific reporting (introduction, methods, results, discussion, references). All lab reports will need to include references to peer-reviewed articles. Finally, the existing Lifestyle Change Project has been reformatted so that students will test hypotheses and report according to scientific guidelines. Additionally, students will now present the results of their Lifestyle Change Projects in a more formal manner, in the style of a scientific conference, as 10 minute PowerPoints on the last day of class. Guidelines for the added/revised labs are added to the end of this proposal.

Included in this packet you will find a course syllabus, lecture schedule, course reading list, and the GE Course Information Sheet. A course action form has already been submitted to the Faculty Executive Committee.

Thank you in advance for your consideration of this proposal. If you have any further questions, please contact me at x45349 (paulbarber@ucla.edu), or Jessica Angus at x51680 (jangus@lifesci.ucla.edu).

Sincerely,

Paul H. Barber
Vice Chair Undergraduate Studies

General Education Course Information Sheet
Please submit this sheet for each proposed course

Department & Course Number Ecology and Evolutionary Biology 18

Course Title Why Ecology Matters: Science Behind Environmental Issues

Indicate if Seminar and/or Writing II course

1. Check the recommended GE foundation area(s) and subgroups(s) for this course

Foundations of the Arts and Humanities

- Literary and Cultural Analysis
- Philosophic and Linguistic Analysis
- Visual and Performance Arts Analysis and Practice

Foundations of Society and Culture

- Historical Analysis
- Social Analysis

Foundations of Scientific Inquiry

- Physical Science

With Laboratory or Demonstration Component must be 5 units (or more)

- Life Science X

With Laboratory or Demonstration Component must be 5 units (or more) X

2. Briefly describe the rationale for assignment to foundation area(s) and subgroup(s) chosen.
This course will study the physical and chemical characteristics of the biological environment with a major focus on discussing current issues facing our planet including, but not limited, to issues of climate change, off-shore oil drilling, plastic and chemical pollution, overfishing, and fresh water shortages. Students will be required to attend at two field trips where they will have the opportunity for hands-on experience with ecological science.

3. List faculty member(s) who will serve as instructor (give academic rank):
Alison Lipman (Lecturer)
Do you intend to use graduate student instructors (TAs) in this course? Yes X No
If yes, please indicate the number of TAs 2

4. Indicate when do you anticipate teaching this course over the next three years:

2012-2013	Fall	X	Winter		Spring	
	Enrollment	80	Enrollment		Enrollment	
2013-2014	Fall	X	Winter		Spring	
	Enrollment	80	Enrollment		Enrollment	
2014-2015	Fall	X	Winter		Spring	X
	Enrollment	80	Enrollment		Enrollment	80

5. GE Course Units
Is this an ***existing*** course that has been modified for inclusion in the new GE? Yes X No
If yes, provide a brief explanation of what has changed. The department is requesting that the GE classification be changed from Life Sciences to Life Sciences + Lab/Demo. After reviewing lab activities of other courses within the Life Sciences + Lab/Demo category, the department determined that the nature of the activities in EE BIOL 18 justifies this change.

Present Number of Units: 5 Proposed Number of Units: 5 (no change)

6. Please present concise arguments for the GE principles applicable to this course.

❑ General Knowledge	This course will teach environmental literacy to students who would not otherwise have the opportunity to learn about environmental issues, especially through an ecological basis. Environmental literacy will equip students to become leaders in the growing "green economy" and to help forge solutions to the current and future environmental crises that threaten our natural resource base. This course would align UCLA with the efforts of states, including Maryland and Minnesota, as well as with universities in Georgia, Maine, Arizona and Kentucky, that are officially recognizing and mandating the need for all students to be taught environmental literacy.
❑ Integrative Learning	There will be four projects assigned during the quarter that will require students to collect and analyze scientific data (three research projects): (1) a field research project in which they analyze and compare on-campus bird communities in three different habitat types, (2) a consumer issues lab, in which students will visit a local supermarket to calculate the environmental impact of three hypothetical diets: (a) low cost diet, (b) convenience diet, and (c) environmentally low impact diet; and (3) a water quality lab, in which students test and compare contaminants in a number of drinking water samples. Students will also be required to change and quantitatively assess an aspect of their lives they would like to change to be more environmentally responsible (Lifestyle Change Project).
❑ Ethical Implications	This course will enable students to see how their life choices have either a direct or indirect impact on the environment. They will also have a more informed and critical perspective on current and future environmental issues as well as how they listen and react to media concerning these issues.
❑ Cultural Diversity	The course will not focus solely on environmental issues in the United States. Rather, the course will integrate a global perspective on factors affecting the changing environmental issues that this course will address. For instance, different regions of the world (e.g., Bolivia, the Middle East and Los Angeles) will be compared with one another on such issues as water resources, usage and loss.
❑ Critical Thinking	Students will be required to engage in discussions on assigned topics. Students will be asked to present their perspectives at times, in a multidisciplinary manner, such as the social and moral implications that must be addressed in order to achieve true environmental literacy.
❑ Rhetorical Effectiveness	Solutions to environmental problems will need to be interdisciplinary and collaborative in nature. This course will instill all students (from all majors) a strong understanding of environmental issues that they will be able to take back to their respective disciplines and apply to their future careers.
❑ Problem-solving	In the Lifestyle Change Project, students will be required to document and keep detailed logs, which will include both quantitative and qualitative data, of what lifestyle change was made to be more environmentally responsible. At the end of the quarter, students will submit a final, written research report and present their findings in the final week of the discussion section. In the Book Report, students will be asked to evaluate one book whose purpose is to inform the public of environmental issues. Their final written report will discuss various themes related to their chosen piece, including the main issue and how it relates to larger environmental issues; author's stance and arguments on the issue; effectiveness of the media, among others. In the Consumer Issues Project, students will create three hypothetical diets (low cost, convenience, and environmentally low impact diet) consisting of the foods they would normally consume. Student will submit written reports that will compare the health, environmental impact, cost, convenience, and general accessibility of the three diets. Additionally, course exams will test the students' ability to come up with well thought out solutions to the environmental problems discussed in class.
❑ Library & Information Literacy	Within the discussion sections, students will be required to discuss and/or debate an

assigned topic, many of which will require the students to seek other primary and secondary resources to support their viewpoints. One discussion section will be conducted at the Biomedical Research Library, where librarians will present information on how to conduct and correctly cite scientific research. In all four written research reports that the students submit, they will need to include peer-reviewed articles as references.

(A) STUDENT CONTACT PER WEEK (if not applicable write N/A)		
1. Lecture:	**3**	(hours)
2. Discussion Section:		(hours)
3. Labs (include Discussion):	**2**	(hours)
4. Experiential (service learning, internships, other):		(hours)
5. Field Trips:		(hours)
(A) TOTAL Student Contact Per Week	**5**	**(HOURS)**

(B) OUT-OF-CLASS HOURS PER WEEK (if not applicable write N/A)		
1. General Review & Preparation:	**1**	(hours)
2. Reading	**2**	(hours)
3. Group Projects:	**2**	(hours)
4. Preparation for Quizzes & Exams:	**1**	(hours)
5. Information Literacy Exercises:	**1**	(hours)
6. Written Assignments:	**2**	(hours)
7. Research Activity:	**2**	(hours)
(B) TOTAL Out-of-class time per week	**11**	**(HOURS)**
GRAND TOTAL (A) + (B) must equal at least 15 hours/week	**16**	**(HOURS)**

Ecology and Evolutionary Biology 18:
Why Ecology Matters: the science behind environmental issues

Instructor: Alison Lipman, Ph.D.

Lecture, three hours. Discussion, two hours.

COURSE DESCRIPTION
The purpose of this course is to promote both science and environmental literacy in UCLA students. A broad curriculum will teach basic ecological concepts, the scientific method, and the ecological basis for local and global environmental issues. The course will address the major challenges to be faced in this century, including the need to find interdisciplinary and collaborative solutions to the world's worsening environmental problems (e.g., global climate change, biodiversity loss, deforestation, pollution, declining water resources, declining fisheries). Environmental literacy will equip students to become leaders in the growing 'green economy' and to help forge solutions to the current and future environmental crises that threaten our natural resource base.

JUSTIFICATION FOR COURSE
This general education course, EEB 18, was designed to teach environmental literacy to non-major UCLA students who would not otherwise have the opportunity to learn about environmental issues. International scientific consensus tells us that the global problems of tomorrow will be largely environmental in nature. Relevant education will thus teach today's students a solid understanding of ecological issues and the science that describes them. This course would align UCLA with the efforts of states and universities across the country that are officially recognizing and mandating the need for all students to be taught environmental literacy.

Surprisingly, with its strong history of environmental protection, California and its educational institutions lag behind other states in requiring environmental education. For example, the states of Maryland and Minnesota, along with universities in Georgia, Maine, Arizona, and Kentucky, require environmental literacy of their students. The California state legislated Education and the Environment Initiative (EEI), which mandated creation of a K-12 curriculum (formally approved by the State Board of Education) for use in classrooms statewide, was an important step to bring California to the forefront of this movement. Although California does not yet require environmental literacy of its students, the state is actively promoting the teaching of environmental themes in its schools. Universities in the state should be leading, or at least joining, this effort.

By offering this course, UCLA will join national and statewide efforts to teach environmental literacy to all students. Although there are a variety of environmental courses and majors offered at UCLA, there is a current need for environmental education that is specifically designed for all students. Common sense tells us that the solutions to environmental problems will need to be interdisciplinary and collaborative in nature. This course will instill in UCLA students (from all majors) a strong understanding of environmental issues, and the science behind them, that they will be able to take back to their respective disciplines and apply to their future careers.

CLASS CONCEPT
This GE course was developed to promote environmental literacy in UCLA students. This goal will be achieved through a broad curriculum that teaches basic ecological concepts and the ecological basis for local and global environmental issues. The course is specifically designed to reach students (especially non-majors) who would not otherwise have the opportunity to learn about environmental issues. The idea for this class was inspired by a similar class that is offered as a GE course at the Odum School of Ecology at the University of Georgia (UGA).

UGA is one of the first universities (since 1993) in the United States to require that every undergraduate student complete an environmental literacy (EL) requirement. Studies tracking the EL program's success have revealed the course to consistently be one of the university's most popular, because today's students feel it is important to learn about environmental issues.

Given California's strong environmental record, California surprisingly lags behind states like Georgia in requiring environmental literacy of its students. However, a recent California statewide mandate (the Education and the Environment Initiative (EEI)) requires that environmental curriculum be taught to K-12 students. Our goal in developing this UCLA course is to align the university with statewide efforts to promote EL education in California. This effort is based on the knowledge that the major challenges we face this century will include finding interdisciplinary and collaborative solutions to the world's worsening environmental problems (e.g., global climate change, biodiversity loss, deforestation, pollution, declining water resources, declining fisheries). The main objective of this course will thus be to instill in UCLA students a strong understanding of environmental issues, which they will be able to take back to their respective disciplines. Environmental literacy will equip UCLA graduates to help forge solutions to today's environmental crises and to lead the necessary movement to a more sustainable and "green" economy.

COURSE OBJECTIVES

This course was designed to give students from all disciplines a science-based understanding of environmental issues, which will allow them to make better-informed decisions in their careers and personal lives, and to help build a more sustainable future for our society. After taking this course, you should understand:

1) The scientific method and scientific peer review and reporting processes.
2) The difference between science and "pseudoscience."
3) Key ecological terms and concepts (e.g., ecology, environment, ecological function, sustainability).
4) The ecological basis of current and future environmental issues/crises.
5) The linkages between living things and their environment.
6) The ecological principles behind the planet's capacity to sustain life.
7) The environmental consequences of human activities.
8) The impacts of environmental change on human health and welfare.
9) The economic, political, and cultural forces that drive human activities and reshape our environment.
10) The precautionary principle, lag times, and how they should be applied to current policies and planning.
11) The moral and social issues related to environmental decision making.
12) The choices we can make as individuals and societies to mitigate and reverse current environmental destruction.

After taking this course you should be able to:

13) Think and debate critically, across disciplines, "outside the box," and with a strong foundation in science.
14) Analyze and balance the costs/risks/benefits, to human health and the environment, of personal and societal decisions.
15) Make choices and changes that help build more sustainable human societies.

REQUIRED COURSE TEXTS & FILMS

Textbooks

Daniel B. Botkin & Edward A. Keller. 2014. *Environmental Science: Earth as a Living Planet*, 9th Edition. John Wiley & Sons, Inc.
Purchase at a discounted price at:
http://www.wiley.com/WileyCDA/Section/id-823472.html

or rent online at:
http://www.coursesmart.com/9781118427323

Paul R. Ehrlich & Navjot S. Sodhi. 2010. *Conservation Biology for All*. Oxford University Press. (Free Online Textbook)
Download from:
http://www.mongabay.com/conservation-biology-for-all.html

Films

Links for streaming movies available at UCLA will be provided on the course website. Otherwise, movies must be obtained (rented/purchased/streamed) by students.

The Garbage Warrior
The Economics of Happiness
Chasing Ice
A Crude Awakening
Flow: For the Love of Water
End of the Line
Frontline: Poisoned Waters
Damnation
Trashed (2012)

EEB 18 COURSE SYLLABUS

Week	Lecture	Lecture Topic	Key Concepts	Reading & Films	Assignment Due
0	1	Introduction: Course organization, goals, & key concepts	• What is environment? • Environmental issues • Key terms: ecology, sustainability, natural resource, conservation • Ecosystem services	• ES Ch.1 • CB Ch.3 • Film: *The Garbage Warrior*	None
1	2	Science: What, How, & Why?	• Scientific method • Disprovability • Data & Models • Precautionary principle & lag times	• ES Ch.2	• Bring environment related current event to discussion
	3	Ecosystems: Species, communities, energy, & cycles	• Species/communities • Food chains • Primary production • Energy flow / 10% rule • Ecological cycles • Watersheds	• ES Ch.6-7	
	Discussion	Intro & Discuss: Current Events	• Course guidelines & projects • Introductions • Current events		
2	4	Biodiversity: Evolution, adaptation, & extinction	• Biodiversity • Evolution • Ecological niches/ competition • Life histories • Extinction/extirpation • Endangered species • Non-native species	• ES Ch.9, 13.4-13.8 • CB Box 3.1, Box 3.2, 7.1, 10.2, 10.5, Box 12.1, p.228, 12.5	• Lifestyle Change Project proposal due on discussion date
	5	Human Population	• Birth & death rates • Age Structure • Growth curves • Carrying capacity • Limiting factors	• ES Ch.5	
	Discussion (meet in Regional Medical Library – 12th floor of Biomed)	Discuss & Debate: Population issues	• Country discussions • U.S. Census population data research • Population solutions		
3	6	Urbanization: Humans as urbanites	• Global trends • Urban effects/sprawl • Urban pollution • Cities as ecosystems • Urban wilds, farming • Eco-cities	• ES Ch.22	• Begin tracking lifestyle change • Submit book you plan to review
	7	Overconsumption & Overexploitation	• History of human impact • Western consumerism • Renewable/nonrenewable • Hunter/gather, agricultural & industrial societies	• CB 13.1 • Film: *Trashed*	
	Discussion (meet in Biomedical Library Classroom)	Present & Discuss: Scientific research vs. pseudoscience	• Library research • Peer review • Fact vs. bias • Scientific citations		
4	8	The Ecology of Economics & Politics	• Tragedy of the commons • Capitalism	• ES Ch.3 • CB 14.4.3	

			• Globalization • Infinite growth vs. steady state • Full cost accounting • Externalities & subsidies • Legislation	• Film: *The Economics of Happiness*	
	9	Indigenous Peoples: Rights, ethics, and culture	• Alternative world views • Development & technologies • Resource rights & justice • Poverty creation • Assimilation • Environmental ethics	• CB 14.3, 14.4.1, 14.6, Box 14.5, 15.3	
	Discussion	Watch & Discuss: Indigenous peoples & Alternative Economics Midterm Review	• Midterm review • Economic solutions		
5	10	Global Climate Change & Ocean Acidification	• Global warming • Sea level rise • Ocean acidification • Habitat/Agric. effects • Mitigation/ Legislation	• ES Ch.20 • Film: *Chasing Ice*	None
	11 – Nov 6	Midterm	• All materials to date		
	Discussion (Ralphs Supermarket)	Consumer Issues Lab	• Consumer choices & solutions research		
6	Nov 11 Veterans Day NO CLASS				Consumer Issues Lab Report due
	12	Energy Basics: Fossil fuels & alternatives	• Thermodynamics • Fossil fuel dependency • Peak oil & energy policy • Mining, transportation, & wastes • Alternative systems	• ES Ch.14-17 • Film: *A Crude Awakening*	
	NO DISCUSSION				
7	13	Agriculture: Environmental & human effects	• Global trade / subsidies • Green Revolution • Pesticides/herbicides • Fertilizers/dead zones • Till & soil erosion • Habitat & diversity • GMOs • Sustainable systems	• ES Ch.11	• Book Reviews due
	14	Freshwater Resources	• Demand & sources • Transport, waste, & scarcity • Domestic, agricultural & industrial use • Reclamation	• ES 18.1-18.5, 18.8 • Film: *Flow: For the Love of Water* • Film: *Tapped*	
		Bird Communities Lab	• Effects of land use planning on bird communities		
8	15	Freshwater Resources: Habitats & Wildlife	• Habitat effects • Wetlands, waterways & coastal zones • Dams / diversions • Restoration	• ES 18.6-18.7 • Film: *Damnation*	• Final week for tracking lifestyle changes • Bird Communities Lab Report due
	Thanksgiving NO CLASS				

	NO DISCUSSION				
9	16	Terrestrial Habitats & Wildlife	• Global trends • Deforestation • Desertification • Fragmentation • Hunting pressures • Parks & reserves • Restoration	• ES Ch.12, 13.1-13.2, 13.9-13.10 • CB Ch.4, 13.9, Box 14.2, Box 14.3, Box 15.5	• Lifestyle Change Reports due
	17	Marine Habitats & Wildlife	• Marine systems • Overfishing • Aquaculture • Sustainable seafood • Coral reefs • Dead zones • MPAs / legislation	• ES 11.8, 13.3 • CB Box 4.3 • Film: *End of the Line*	
		Water Quality Lab	• Tap vs. bottled water • Freshwater solutions		
10	18	Pollution	• Point vs. nonpoint • Synergism & thresholds • Biomagnification • Acute/chronic effects • Water pollution • Air pollution • Urban pollution • Plastics • Toxins • Waste management • 3 R's	• ES Ch.8, Ch.19, Ch.21 • CB Box 13.1 • Film: *Frontline: Poisoned Waters*	• Water Quality Lab due • Lifestyle Change presentations in discussion • Fill out course evaluation online!
	19	Conclusion: Review & solutions	• What we can do • Alternative societies • Science & education • Localization • Restoration • Sustainability	• CB 14.5	
	Discussion	Present & Discuss: Lifestyle Change Projects Final Review	• Lifestyle change presentations • Course evaluations • Final review		

*CB – Conservation Biology textbook
ES – Environmental Science textbook

Clips: In an effort to enhance and diversify student learning, we will be including various forms of media in the lectures. These will include short films, news clips, interviews, photos, etc. We have listed an example of clips that will be shown in lectures; however, this is not an all-inclusive list. Additional clips will be added as the course develops. Titles and sources of all clips will be available on the class website.

Additional Readings: Some additional readings (articles, book chapters) will be posted on the course website.

COURSE REQUIREMENTS & GRADING

EEB 18 is a 5-credit hour life science course that satisfies UCLA's requirement for a Foundations of Scientific Inquiry – Life Science (lab/demo) general education course. Grading for EEB 18 includes two exams, a book review, a "lifestyle change" report, three lab reports, and participation in discussion sections. We will use a letter grading system, with permission required from the instructors in special cases when students request pass/fail.

*Attendance of lab sections is mandatory and reflected in the grading breakdown below. Lab sections consist of a variety of activities, including field research, lab research, group projects, class discussions, debates, presentations, and watching additional media clips. Active engagement in research, discussions, debates, and presentations will help students test, practice, and develop their skills in scientific methodology, critical thinking and rhetoric, which are crucial to environmental problem solving in the real world.

Grading Breakdown

We will assign grades based on performance on the following assignments:

Item	Points	% Grade
Midterm Exam	50	20%
Book Review	20	8%
Lab Work	130	52%
Final Exam	50	20%
Total	250	100%

Lab Work	POINTS
Lifestyle Change Project	50
Consumer Issues Lab	20
Bird Lab	20
Water Quality Lab	20
Discussion Attendance	10
Discussion Participation	10
TOTAL	130

Grades will be based on a percentage of total points, as follows:

93-100% = A	80-82% = B-	68-69% = D+
90-92% = A-	78-79% = C+	63-67% = D
88-89% = B+	73-77% = C	60-62% = D-
83-87% = B	70-72% = C-	<60% = F

ASSIGNMENT DESCRIPTIONS

Lifestyle Change Project

(Adapted from Porter, 2003)

This group research project will be conducted throughout the quarter. Students, individually or in groups of 3-4, will choose an aspect of their lives they would like to change to be more environmentally responsible (e.g., use public transportation, conserve water at home). The change must be a significant lifestyle change; it must be something new that you are NOT already doing. Be sure that your change is an attainable goal.

Throughout the quarter, students will document and keep detailed logs, including both qualitative and quantitative data, of exactly what they do to implement this change. In addition to documenting their work, students must research, calculate, and report the subjective and objective impacts their change made to their lives and the larger environment. You must include at least FOUR peer-reviewed journal references in your report, cited according to APA guidelines. The more references cited the better! Students will submit a final, written research report, and they will present their findings the final week of discussion sections. The total impact of all students' lifestyle changes will be presented on the course website.

Short Proposal

The second week of the quarter you are to turn in a short proposal (1-2 paragraphs) describing what you plan to do and how you are going to do it. Over the course of the quarter, you must keep track of exactly what you do, in some kind of log or journal. For example, if you decide to ride a bike instead of drive, you must log every time you ride instead of drive, and you must include the date and how many miles you rode. You should also include comments in your journal (e.g., how you feel conducting this change, the effort involved)

Your proposal should include the following information:

1. What your lifestyle change will be.
2. Which other students will be making this change with you.
3. What data you will record to track this change (e.g., miles ridden, water saved). Include a blank data log sheet with your proposal.
4. The impacts you will calculate that result from your change (e.g., gallons of water saved, energy and other materials required to treat water, wastewater not created)

Final Report (40 points)

The final report is due at the end of the quarter (see syllabus). It must be 3-5 pages long, not including the record of activities, which you must include in your final report. In addressing the following questions, it is important that you relate the change you have made to the broader environmental context. Be sure to demonstrate that you understand the link between your actions and the specific environmental issues that it is related to. For example: if you refrain from driving, your impacts will be related to global climate change, fossil fuel issues, local air pollution, urban crowding, etc. You should describe the environmental problems related to your lifestyle change and how your change can help effect positive change related to these problems.

The final report must address the following questions:

1. Did you find this change difficult? What were the positive and negative aspects of this change? Do you think this lifestyle change made a positive impact on your life and/or the environment? Will you continue this change after the class ends?
2. What reactions did you receive from your peers, parents, or family members when you talked about what you were doing?
3. What was the environmental impact of your action? This should be a quantitative measurement (e.g., If you rode your bike, how much gas and production energy did you save, and how much environmental destruction did you avoid?)
4. What would be the environmental impact of your action if you were to continue this change for a year (change was conducted over 7 weeks, so multiply by 52/7)?
5. What would be the environmental impact if all students at UCLA were to do this for a year (assume 30,000 students)? If all the US (assume 314 million people) were to do this for a year?

Specific components of the report:

1. Title of the Project (1 point): This should be unique and not just "Lifestyle Change Project."
2. Introduction (10 points): This section includes background information about the problem and its significance. A clear statement regarding your specific problem should be included here. Citations related to the environmental problem should be included in this section. You should

also include hypotheses related to your lifestyle change. Be sure to pose these before you begin data collection!
3. Methods (5 points): This section should describe exactly how you calculated your environmental impacts. The more methods you include, the better. Any citations related to methods should be included here.
4. Results (5 points): This should include the quantitative results of the calculations you performed from the Methods section.
5. Discussion/Conclusion (10 points): Critical discussions and arguments related to the problem: pros and cons, difficulties, and possible solutions (your own opinion must be expressed in here). Be sure to include whether the results supported your hypotheses.
6. Reference lists (5 points): All the reference listed here should be cited in the text.
7. Grammar/style (4 points)

Presentation (10 points)

Presentations will be made in discussion sections, the last week of class. Each group must prepare for a presentation of no more than 10 minutes. You must use software such as PowerPoint, and try to limit your presentation to less than 10 slides. Your presentation should include background information on the environmental problem you address, a summary of your project, and the positive impacts you made. All students need to participate in the group presentation in order to receive points. There is no makeup for missed presentations.

Critical Book Review

This project will require you to read and evaluate one popular science book (from the list below), whose purpose is to inform the public of environmental issues. If you prefer to review another book, you MUST have this book approved by Dr. Lipman beforehand. The objective behind this assignment is to give you the opportunity to delve more deeply into an environmental theme of your choice. At the end of the quarter, (see syllabus) you will have to submit a critical review of the piece that addresses the following questions. Your essay should be two to three pages and should have an original title (not the book's title). It should be written as a book review that you might find online or in a newspaper (not as a list of questions/answers).

1) What was the main theme and how does it relate to environmental issues?
2) Why did you choose to read this book?
3) Do you feel the issues covered in the book are important? Why/why not?
4) What was the author's stance?
5) Did the author report the science accurately (e.g., were scientific statements referenced?)
6) Were the author's arguments convincing? Why/why not?
7) What solutions did the author offer, and which solutions do you believe could work?
8) What was the quality of the book? Was it interesting, effective, important, well written?
9) How was this book received by the public? (You can find this information online.)
10) Were there any images/lessons that made a lasting or emotional impact? Why?
11) Would you recommend this book to others? Why/why not?

Consumer Issues Lab

(Adapted from Porter, 2003)

This project will be conducted in groups of up to four students, but lab reports will be submitted individually. Students will visit a supermarket during their lab section and collect data related to four hypothetical diets that they will create, consisting of foods they would normally consume: 1) low cost diet, 2) convenience diet, and 3) normal diet, and 4) environmentally low impact diet. All diets must meet the minimum US RDA nutritional recommendations. Students will calculate an Environmental Impact Index for each diet, according to the following scale (low score is better):

Students will pose hypotheses related to the health, cost, and environmental impacts of each diet type. They will then compare the following between diets: 1) indices of health (calories, fat, saturated fat, protein, carbohydrates, sugar, dietary fiber, sodium), 2) cost, and 3) Environmental Impact Index.

Students will submit written reports that analyze and compare the quantifiable and qualitative health, environmental impact, cost, convenience and general accessibility of the three diets. They will assess whether their hypotheses were correct and discuss the results they found, including relevance to course themes. Students will submit their findings as a scientific report including abstract, introduction, hypotheses, methods, results, discussion, and references. They will need to include a minimum of two scientific articles as references.

Bird Lab

(Adapted from Porter, 2003)

This project will be conducted in groups of up to four students, but lab reports will be submitted individually. This field research project will be conducted at three sites on the UCLA campus: Sage Hill, the Sculpture Garden, and the native plant landscaped site in the Court of Sciences. Students will run transects to collect and compare species abundance and diversity between sites. Data collected will include the diversity and abundance of bird and plant species. The goal of the project will be for students to compare flora and fauna between three different landscapes: a native island remnant (coastal sage and oak woodland), an urban garden landscape with non-native vegetation, and an urban landscape with native plant vegetation. Before collecting data, students will be required to pose hypotheses related to species diversity and abundance in the different landscapes. They will analyze and compare species diversity (including native vs. non-native) and abundance, and they will be required to discuss why species composition might be different between the sites. They will need to address the inter-relations between the species they find and their corresponding habitats. Students will submit their findings as a scientific report including abstract, introduction, hypotheses, methods, results, discussion, and references. They will need to include a minimum of two scientific articles as references.

Water Quality Lab

This lab will be conducted in groups of up to four students, but lab reports will be submitted individually. This research project will be conducted in the classroom. Students will test water quality variables, using water quality test kits, between potable water from the tap and bottle: UCLA tap water, bottled water (2 different brands), and distilled water (control). Students will test each sample for the following water quality variables: lead, bacteria (total coliform), pesticides, nitrates, nitrites, chlorine, total hardness, pH. Before conducting tests, students will be required to pose hypotheses regarding whether tap water or bottled water has higher water quality variables. Students will include results from different lab sections so as to have multiple repetitions of the experiment. They will analyze and compare results between water samples, and they will submit their findings as a scientific report including abstract, introduction, hypotheses, methods, results, discussion, and references. This lab tests the notion that bottled water is of higher quality than municipal tap water. In addition to in-lab testing, students will need to conduct a brief review of the scientific literature regarding the quality of Los Angeles tap water quality in comparison to bottled water.

CLASS POLICIES

Academic honesty: Students are expected to read and abide by the University's Student Code of Conduct, which can be found at http://www.deanofstudents.ucla.edu/studentconductcode.pdf. Students who violate this policy will be subject to disciplinary action, and may receive a failing grade in the course for a single violation.

Reading & film schedule: Reading and film assignments will include reading from both textbooks, Environmental Science (ES) and Conservation Biology for All (CB), and popular movies. Reading and watching of materials should be completed BEFORE the lecture date listed in the syllabus, as we will be discussing issues relevant to the material on that date. Course tests will include information from all required materials.

Assignments: Assignments for this class promote integrative learning that translates to the real world, as well as student participation in course creation and evaluation. Assignments will require critical thinking, real world action, self-evaluation, use of multi-media, and critical evaluation of course materials. An extra credit assignment will be offered that could be worth 5% of your total class grade. No additional extra credit points will be offered. All assignments are due during discussion section, according to the schedule. Late assignments will only be accepted with prior WRITTEN CONSENT signed by the instructor.

Participation: Students learn best when they are actively engaged in lectures and discussion, thus you will be awarded points for attending and actively participating in discussion. Attendance at discussion is required. If an extraordinary circumstance requires you to miss discussion section, you must coordinate with your TA BEFOREHAND, to make-up the section at another time the same week.

Exams: The midterm and final exam consist of definitions, short answers, and short essays. It is very important for you to attend all aspects of this course, as both exams will reflect the material covered in the lectures, discussion, and assigned texts and films. Exams will test students on: 1) definitions and understanding of the most important course concepts, 2) understanding of general course themes, and 3) ability of students to think critically, across disciplines, and to draw conclusions based on science (as opposed to "pseudo-science"). Exams will not test trivial knowledge such as dates, names, titles, and scientific jargon. All exams must be taken on the date and time of the exam unless there is prior WRITTEN CONSENT signed by the instructor. Students missing an exam without prior consent receive a zero for that exam.

BOOKS FOR REVIEW (Students must choose one)

Economics/Capitalism/Alternative World Views

***This Changes Everything: Capitalism vs. the Climate (2014)*- Naomi Kleim**
A brilliant explanation of why the climate crisis challenges us to abandon the core "free market" ideology of our time, restructure the global economy, and remake our political systems. (Amazon.com review)

***The Capitalism Papers: Fatal Flaws of an Obsolete System* (2012)- Jerry Mander** Mander argues that capitalism is no longer a viable system: "What may have worked in 1900 is calamitous in 2010." Capitalism, utterly dependent on never-ending economic growth, is an impossible absurdity on a finite planet with limited resources. (Amazon.com review)

***In the Absence of the Sacred: The Failure of Technology & the Survival of the Indian Nations* (1991)- Jerry Mander**
This provocative work challenges the promise of technological society and tracks its devastating impact on native cultures worldwide. The Western world's loss of a sense of the sacred in the natural world has led us toward global environmental disaster and social disorder. Yet models for restoring our relationship with the Earth exist in the cultures of native peoples. (Amazon.com review)

***Alternatives to Economic Globalization: A Better World Is Possible* (2004)- John Cavanagh (Editor) , Jerry Mander (Editor)**
The culmination of a five-year project by the International Forum on Globalization (IFG), this book presents an inspiring plan for moving toward more sustainable, humanistic models of economic prosperity with an emphasis on citizen democracies, local self-sufficiency, and ecological health. (Amazon.com review)

***The Wayfinders: Why Ancient Wisdom Matters in the Modern World* (2009)- Wade Davis**
A fascinating tour through a handful of indigenous cultures, describing the worldviews they represent and reminding us of the encroaching danger to humankind's survival should they vanish." (Book cover)

Population

***The Population Explosion* (1991)- Paul and Anne Ehrlich**
The Population Explosion vividly describes how the Earth's population, growing by 95 million people a year, is rapidly depleting the planet's resources, resulting in famine, global warming, acid rain, and other major problems. (Amazon.com review)

History of Human Civilizations & Environmental Crises

***A New Green History of the World: The Environment and the Collapse of Great Civilizations* (2007)- Clive Ponting**
Will modern society survive the current environment crisis it faces or will our civilization dwindle and fade in the face of global warming, worldwide pollution and mass poverty and starvation? This book provides an interpretation of human history on a global scale- revealing just how old many of our contemporary environmental problems really are. (Amazon.com review)

***Collapse: How Societies Choose to Fail or Succeed* (2005) - Jared Diamond** Environmental damage, climate change, globalization, rapid population growth, and unwise political choices were all factors in the demise of societies around the world, but some found solutions and persisted. Collapse raises the urgent question: How can our world best avoid committing ecological suicide? (Amazon.com review)

Biodiversity

***The Diversity of Life* (1992) - E. O. Wilson** Wilson, internationally regarded as the dean of biodiversity studies, conducts us on a tour through time, traces the processes that create new species in bursts of adaptive radiation. He describes how the sixth great spasm of extinction on earth--caused this time entirely by humans--may be the one that breaks the crucible of life. (Amazon.com review)

***The Future of Life* (2002)- E. O. Wilson** This eloquently written book on the biodiversity crisis is by a Pulitzer Prize-winning ecologist. The author makes a solid business and economic case for the preservation of life on earth. (Jim Porter review)

Marine Ecology

***The World is Blue: How our fate and the ocean's are one* (2009)- Sylvia Earle** This book tie-in to National Geographic's ambitious 5-year ocean initiative—focusing on overfishing—is written in Sylvia Earle's accessible yet hard-hitting voice. Through compelling personal stories she puts the current and future peril of the ocean and the life it supports in perspective for a wide public audience. (Amazon.com review)

***Sea Change: A Message of the Oceans* (1996)– Sylvia Earle**
The gripping adventure story of Earle's three decades of undersea exploration, an insider's introduction to the dynamic field of marine biology, and an urgent plea for the preservation of the world's fragile and rapidly deteriorating ocean ecosystems. (Amazon.com review)

Water Resources

***Cadillac Desert: The American west and its disappearing water* (1993)- Marc Reisner**
The story of the American West is the story of a relentless quest for a precious resource: water. It is a tale of rivers diverted and dammed, of political corruption and intrigue, of billion-dollar battles over water rights, of ecologic and economic disaster. Based on more than a decade of research, Cadillac Desert is a stunning expose. (Book cover)

Food Agriculture

***The Omnivore's Dilemma* (2006)- Michael Pollan**
A national bestseller, this revolutionary book by award winner Michael Pollan asks the seemingly simple question: What should we have for dinner? Pollan discusses the profound implications our food choices have for the health of our species and the future of our planet. (Amazon.com review)

Climate Change

***The Last Hours of Ancient Sunlight: The fate of the world and what we can do before it's too late* (revised in 2004) - T. Hartmann**
While everything appears to be collapsing around us -- ecodamage, genetic engineering, virulent diseases, the end of cheap oil, water shortages, global famine, wars -- we can still do something about it and create a world that will work for us and for our children's children. The inspiration for Leonardo DiCaprio's web movie *Global Warning, The Last Hours of Ancient Sunlight.* (Goodreads.com review)

***An Inconvenient Truth: The planetary emergency of global warming and what we can do about it* (2006) – Al Gore**
Former Vice President Al Gore's *New York Times* #1 bestselling book is a daring call to action, exposing the shocking reality of how humankind has aided in the destruction of our planet and the future we face if we do not take action to stop global warming. Now, Viking has adapted this book for the most important audience of all: today's youth, who have no choice but to confront this climate crisis head-on. (Amazon.com review)

Pollution

***Our Stolen Future* (1997) - Colborn, T., D. Dumanoski, and J.P. Meyers**
An impressive and chilling accumulation of evidence of the effects of environmental pollutants on present and future human health. (Jim Porter review)

References Cited

Porter, J.W. 2003. Laboratory Manual for Environmental Science. John Wiley John Wiley & Sons, Inc., New York, NY. xxvii + 700 pp. ISBN 0-471-47027-9.

Ecological Issues for Consumers
Hidden Impacts of Marketing and Production of Food
(Adapted from Porter, 2003)

Introduction:
Do you eat to live or live to eat? Everyone must eat to meet his or her daily nutritional requirements, but people also derive pleasure from eating - just ask the producers of fine quality chocolates or premium ice creams. When you shop at the grocery store or make choices at a restaurant, you not only serve your own needs and desires but also make an environmental impact. During this exercise, you will begin assessing some of the environmental impacts of your dietary choices. You will not be able to make a complete environmental assessment taking into account the full life cycle of the product. For example, you will not be able to compare the energy costs of buying a pound of protein in the form of beans versus filet mignon. Likewise, you might find it difficult to compare the energy required to produce, package, and transport a quart of fresh squeezed orange juice versus frozen juice concentrate. However, by tabulating prices and information from nutrition labels, you can make a reasonable estimate of the ecological consequences of the dietary choices you make.

Objectives:
1. To examine the amount of resources allocated to the marketing and production of food
2. To examine differences in resource distribution between the United States and other countries
3. To gain a better understanding of the nature of free market economics
4. To determine the impacts of our dietary habits on the surrounding ecosystem
5. To examine the social and economic constraints inherent in resource consumption and environmental impact

Methods:
For this exercise, you will work in groups of three people. You will go to a grocery store and collect data on the food that you would normally consume. You will compare these data for three hypothetical diets: low cost diet, convenience diet, and low environmental impact diet. For the low cost diet, you are to determine how to best meet the US RDA nutritional recommendations for three meals, while spending no more than three dollars a day. For the convenience diet, you are to determine how to best meet the US RDA nutritional recommendations, and at the same time reduce the amount of time you spend cooking and cleaning. For the low environmental impact diet, you are to determine how to best meet the US RDA nutritional recommendations and at the same time reduce the environmental impact of the food you eat. Your analysis will concentrate on three areas: the nutritional content of each type of diet, the cost of each diet, and the environmental impact of each diet.

Before collecting your data, be sure to form hypotheses related to your three diets. Example hypotheses:

1. It is impossible to form a low cost diet that has a low environmental impact.
2. Convenience diets are inherently expensive, high cost, and high environmental impact.
3. Low cost diets are low in nutrition and high in environmental impact.

When collecting your data, you should pay attention to the following guidelines:

1. Be realistic. You do not eat the same thing every day, so include variety in your diet. You will also need to estimate the service size that you consume in order to calculate the nutritional information. For example, if you drink a large glass of orange juice for breakfast, this is probably twice the size of the serving size listed on the package.
2. Do not forget to include condiments (mustard, mayonnaise, ketchup), soft drinks, or between-meal snacks.
3. For the low cost diet, remember that you are trying to maximize the amount of total nutrition, not just calories or vitamins and minerals. For example, you would not want to just eat Total cereal. Although it supposedly meets all your vitamin and mineral requirements, it has very few calories. If you were to live off this cereal for several weeks, you might become ill.
4. Use the following US RDA recommendations to evaluate the nutritional aspects of each of your diets.

Calories:	**2000/day**	**2500/day**
Fat	65 grams or less	80 grams or less
Saturated Fat	20 grams or less	25 grams or less
Protein	44 grams	56 grams
Carbohydrates	300 grams	375 grams
Dietary Fiber	25 grams	30 grams
Cholesterol	300 milligrams or less	300 milligrams or less
Sodium	2400 milligrams or less	2400 milligrams or less

Recommendations for the 2000 calorie diet are for an average person weighing approximately 120 lbs. (Typical adult female). Recommendations for the 2500 calorie diet are for an average person weighing approximately 150 lbs. (Typical adult male). Remember that individual needs may be higher or lower depending on age, level of physical activity; and other factors. For this exercise, it might be easiest to collect data on the assumption that your dietary needs match this hypothetical average person: If you have reasons (or rationalizations) for believing that your dietary needs are higher or lower than average, explain in your write-up.

Turn in the following data sheets with your lab report.

Diet	Typical	Low Cost	Minimal Environmental Impact	Convenience
NUTRITION				
Calories				
Fat				
Saturated fat				
Protein				
Carbohydrate				
Dietary fiber				
Cholesterol				

Sodium				
COST				
Environmental Index				

Diet Summary: Daily Totals

Diet Type: Meal: Breakfast

Food Item	Calories	Fat	Saturated Fat	Protein	Carbo-hydrates	Dietary Fiber	Cholesterol	Sodium	Cost	Environmental Index
Total										

Diet Type: Meal: Lunch

Food Item	Calories	Fat	Saturated Fat	Protein	Carbo-hydrates	Dietary Fiber	Cholesterol	Sodium	Cost	Environmental Index
TOTAL										

Diet Type: Meal: Dinner

Food Item	Calories	Fat	Saturated Fat	Protein	Carbo-hydrates	Dietary Fiber	Cholesterol	Sodium	Cost	Environmental Index
TOTAL										

Comments on total packaging for entire daily diet:

Notes on the Consumer Issues Lab

Ecologists who have studied food webs have measured the flow of energy (in the form of light energy from the sun and then in the form of carbohydrate, protein, and fat calories in plants and animals) through food chains and food webs. It has been found that, on average, approximately only 10% of the energy flows from one level to the next level in a food chain. That means 90% of the energy is lost from the food web at each level. This is because plants and animals have to spend a lot of energy on maintenance of tissues, looking for food, reproducing, and normal "basal" or "resting" metabolism.

For example, say that the sun sends 100,000 units of energy that hit the leaf surface area of one plant. The plant is not completely efficient so it will only absorb about 10% of that sun energy, so 10,000 units move up the food chain during photosynthesis. The plant uses up a lot of energy for maintaining itself and for metabolism (plants actually burn calories too). Then an herbivore comes along and eats the plant. Since the plant "spent" a lot of energy it got from the sun for its own growth and reproduction, and only a fraction was actually incorporated into plant tissue that can be eaten, the herbivore runs around doing its thing and its metabolism will burn up some of the sun's energy it got from the plant, so only 10%, or 100 unit of energy, will end up being incorporated into its tissue (meat). Then when a carnivore comes along and eats the herbivore, it only gets 100 of the 100,000 units of the sun's energy that initially entered the food chain.

What does this mean for humans? Plenty. Basically, it is much more efficient to eat "lower on the food chain." It takes a lot more energy, water, and money to produce meat than it does to produce grain. For instance, it takes 25 gallons of water to produce 1 pound of grain, but it takes 1,500 gallons to produce one pound of beef. Therefore, the environment of our planet can support a lot more vegetarians than meat eaters, which is important to consider in the face of growing populations. In fact, by necessity, most of the world's populations are primarily vegetarian.

Environmental Impact Index
Low scores win

Packaging Points:
+0 = no packaging (loose fruits/vegetables, bulk foods transported in reusable container)
+1 = 1 layer of non-plastic packaging
+2 = 1 layer of plastic packaging
+3 = 2 layers of packaging, at least one is not plastic
+4 = 2 layers of plastic packaging
+5 = 3 or more layers of packaging
-1 = Subtract 1 point if you would actually recycle the recyclable packaging
-1 = Subtract 1 point if the packaging is made from recycled materials
+1 = Add 1 point if the product contains fewer than 4 servings

Shipping Points:
+0 = The product was shipped from somewhere in California
+1 = The product was shipped from out-of-state
+2 = The product was shipped from out-of-country

Food Chain Efficiency Points:
+0 = The product contains no dairy, eggs, or meat
+1 = The product contains dairy products or eggs
+2 = The product contains meat
+3 = The product contains beef

Agricultural Practice Points
-1 = The product was grown organically

References Cited

Porter, J.W. 2003. Laboratory Manual for Environmental Science. John Wiley John Wiley & Sons, Inc., New York, NY. xxvii + 700 pp. ISBN 0-471-47027-9.

Requirements for the consumer issues paper:

Type a 4-6 page scientific paper. Be sure to refer to the general guidelines for writing a scientific paper. These guidelines are posted on the course website.

Write the report individually using your observations and the data collected by your group at the supermarket. Include the tables and figures. The best reports are objective, informative, accurate, and use correct grammar. Do not be overly wordy. Below is a list of topics to address in your paper.

Title: Must be descriptive of what you studied and where you studied it. Be original. Do not simply use the title of the lab.

Introduction: Include background information on the subject, the objectives of the study, and the important concepts that an uninformed reader needs to know. End with your hypotheses. Cite sources that you use; the format is outlined in the lab handouts.

Methods: Describe the methods that you used to conduct the study. Do this in a way that would allow the reader to go out and repeat the experiment exactly. Do not simply re-write the lab handout, but be sure to cite it.

Results: Summarize the important findings shown in your tables and figures. Be sure to refer to the tables and figures (e.g. Figure 2). Focus on the trends of your data and include summary statistics (e.g. averages). These questions are provided to help you START thinking about the content of your results.

1. Give an overall estimate of the environmental impact of each diet (high, intermediate, low, minimal). Use the impact index on your lab handout to calculate this for each diet.
2. How does environmental impact differ between diets?
3. How did nutritional content differ between diets?
4. How did cost differ between diets?

Discussion: Explanations for the results are provided in this section. Why do we see the results that we see? Be sure to relate the results that you found to the background information (from the introduction) and to the bigger picture. Cite any sources that you use. These questions are provided to help you START thinking about the content of your discussion.

1. Did your results and observations support your hypotheses?
2. What do you normally buy or consume?
3. How do the costs, environmental impact, and nutritional content of your diets compare?
4. Do your diets meet the US RDA?
5. What would you buy to meet your nutritional needs if you were poor and lived in the U.S.?
6. What if you lived in a less developed country?
7. Was it difficult to meet your nutritional needs on only three dollars a day?
8. What would you buy if you were trying to decrease the environmental impact of the foods you consume?
9. What would you buy if you had to minimize the time you spent eating, cooking, or cleaning?
10. Did any of your diets meet the US RDA as well as your own desires and have minimal environmental impact?
11. Discuss the environmental impacts of the diet with a high index. Be specific. Think about imports and exports to / from the ecosystem.
12. Explain what you might do to make your diet more healthful and less expensive.
13. Place your patterns of food consumption into a global context.
14. How much of the food you usually consume comes from high on the food chain?

15. What impact might this have on the food availability for a growing global population?
16. Is your study conclusive?

17. Are there any other variables that may have influenced your findings?
18. How can the information that you collected be used to inform human and environmental health?

References: List full citations of the information that you cited in the text.

Effects of Land Use Planning on Bird Communities
(Adapted from Porter, 2003)

Introduction:

Birds provide an array of beneficial services to humans including the control of rodents that would otherwise consume stored grain crops, pollination of flowers, consumption of insect pests, and the aesthetics of our surroundings. Birds are also used as indicators of environmental health. In addition to living everywhere (several hundred species throughout Georgia), they are relatively easy to detect and census by sound and sight in a relatively short amount of time. The decline of the Peregrine Falcon, for example, was a signal to both environmentalists and scientists that DDT was harmful to both human and environmental health.

Bird population declines already have been detected by recreational birders, and scientists have implicated land use change as a cause of the declines. For example, 85% of forest habitats in the United States have been logged or destroyed, and 2/3 of all woodland species have declined in abundance over the past 30 years in the central U.S. (U.S. FWS, 1999). Urban development also affects bird diversity by displacing birds from natural habitats. Urban development results in **biotic homogenization**, a process of natural habitat fragmentation and an increasingly uniform landscape that favors similar species. These species, called **habitat generalists** (e.g. the Mourning Dove), are widespread because they can adapt to a wide variety of natural and altered environments. **Habitat specialists**, such as the California gnatcatcher, prefer open sage scrub. 90% of coastal sage scrub habitat in the southwestern U.S. has been destroyed, resulting in the gnatcatcher being listed as Threatened by the U.S. Fish and Wildlife Service in 1993.

Urban areas also have a larger proportion of **non-native**, or introduced, bird species. Non-native species such as the European Starling and the House Sparrow were brought to the United States from Europe in the mid-late 1800's. They are now the most common urban bird species. Both are aggressive and inhabit tree cavities. As a consequence, they can out-compete and drive out **native** bird species.

With 2/3 of the human population expected to live in urban areas by 2030 (United Nations, 2004), there is growing concern that bird populations will continue to decline. Conservationists want to know how to minimize impacts to native bird species. As scientists, we are tasked with not only examining which and how many birds disappear from urban areas, but also understanding the reasons for bird community changes. Building this understanding may provide developers the necessary information to construct an environment that is inclusive of both people and wildlife.

The Problem

Urban landscapes in the LA area were/are often built on habitat that has been completely demolished. All native plants are bulldozed out; development is built; and garden landscapes are recreated, most often with non-native plants. Vegetation is often replanted, but with non-native plant species and with a lower plant diversity than existed previously. In some areas development has built around native vegetation, so we see fragmented remnants of natural habitat within the urban landscape. In some newer developments, ecological conscious design has called for the plantings of California natives, as they are drought tolerant and provide wildlife benefit for native species. Hence, we might expect there to be differences in bird and plant diversity and abundance between these development types. However, scientific data is lacking and it is your scientific task to find out if differences truly exist between habitat fragments and developments that use native and non-native plantings!

Objectives:

1. To build an awareness of the influence of urban development on natural habitats and fauna.
2. To compare habitat, bird abundance, and bird diversity in urban areas of contrasting development methods.
3. To become familiar with a scientific approach of estimating abundance and species diversity.
4. To become familiar with birds and plants.

Research Methods:

Locations. The habitat fragment oak woodland and chaparral is at Sage Hill, at north campus. The non-native garden is the Sculpture Garden, also at north campus. The native garden is at the Bombshelter, on south campus.

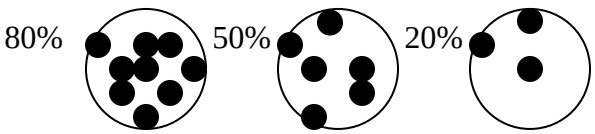
Bird data collection. A **point count** is a method that is widely used to collect habitat-specific diversity and abundance data for birds. Point counts are ideal because they allow a person to collect a large amount of data at multiple locations (i.e. a large sample size) in a relatively short amount of time. Point counts require the identification of birds by both sight and sound at multiple observation points. In this lab, we will use point counts to compare residential development types.

Work in groups of 3. At each point, you will record the bird type and bird abundance in an area starting from the ground and up to the tree canopy. Using the bird identification cards provided by the instructor, try to identify each bird that you see. Although it will not be possible to identify every bird to the species level, you should still be able distinguish between bird types (e.g. a big red bird, a small brown bird, a black bird, etc). Quietly take 2 minutes for your group to become acquainted with your surrounding. Use a watch and conduct each point count for 4 minutes. Record this information on your data sheets.

One method frequently used to attract birds is "pishing." Use this method to attract birds. **Pishing** refers to a noise that is made with the tongue and sounds like a series of "s" or "sh" syllables (e.g. PSH-PSH-PSH or SSS-SSS-SSS). Nobody is exactly sure why some birds are attracted to this sound, but it is speculated that the sound mimics the sound of a bird in distress and other birds are lured to the scene of excitement. The concept is similar to rubber-necking on the Atlanta bypass.

Vegetation survey. At each point where bird observations are made, estimate the number of large trees or shrubs within a 50 meter radius around you and estimate the number of species present. In the same area, note the percent of understory vegetation (less than 20 feet tall). Record this information on the table.

Example: Black dots indicate understory vegetation within a plot.



Hypotheses:

Choose a hypothesis from each section below and be prepared to explain your choice.

Section 1. Bird Diversity (number of species observed).

A. The bird diversity will be the same in all three habitat types.
B. The bird diversity will be greatest in the habitat fragment.

C. The bird diversity will be greatest in the native plant landscape.

Section 2. Bird Abundance (total number of birds observed).

A. The bird abundance will be the same in all three habitat types.
B. The bird abundance will be greatest in the habitat fragment.
C. The bird abundance will be greatest in the native plant landscape.

Section 3. Vegetation.

A. The amount of vegetation will be the same in all three habitat types.
B. The amount of vegetation will be greatest in the habitat fragment.
C. The amount of vegetation will be greatest in the native plant landscape.

Discussion Questions:

Why are there differences in bird abundance/ diversity between the three habitat types?

How do differences in plant abundance/diversity affect the bird populations?

A developer wants to convert an oak woodland into a residential area. She comes to you for advice on how to do so in bird friendly manner. What do you recommend?

Based on your observations, describe the types of habitat required by birds. Do all birds require the same type of habitat? Why?

Hypothetical headline: "Developers Claim that Rights are Threatened by Environmentalists." Some people argue that development and environmental protection are incompatible. Do you agree or disagree with this statement? Support your choice.

Table _____. General site observations.

Development Type	% understory	# Tall Trees/ Shrubs	# Tree/ Shrub species	Time of Day	Other wildlife	Temperature and cloud cover
Habitat Fragment						
Non-native Garden						
Native Garden						

Table_____. Tallies of birds at Sage Hill.

Bird Type or species	Site A	Site B	Site C	Average abundance
Example: Yellow bird	𝍸 | =6	| | = 2	0	2.7
Rock Pigeon				
Mourning Dove				
Anna's Hummingbird				
Allen's Hummingbird				
Black Phoebe				
American Crow				
Western Scrub Jay				
Common Raven				
Bushtit				
Ruby-Crowned Kinglet				
Northern Mockingbird				
European Starling				
Yellow-rumped Warbler				
Brewer's Blackbird				
House Finch				
Lesser Goldfinch				
House Sparrow				
European Starling				
Total Abundance				

Table_____. Tallies of birds at the Sculpture Garden.

Bird Type or species	Site A	Site B	Site C	Average abundance
Example: Yellow bird	𝍸 | =6	| | = 2	**0**	**2.7**
Rock Pigeon				
Mourning Dove				
Anna's Hummingbird				
Allen's Hummingbird				
Black Phoebe				
American Crow				
Western Scrub Jay				
Common Raven				
Bushtit				
Ruby-Crowned Kinglet				
Northern Mockingbird				
European Starling				
Yellow-rumped Warbler				
Brewer's Blackbird				
House Finch				
Lesser Goldfinch				
House Sparrow				
European Starling				
Total Abundance				

Table_____. Tallies of birds at the Bomb Shelter.

Bird Type or species	Site A	Site B	Site C	Average abundance
Example: Yellow bird	𝍸 | =6	| | = 2	**0**	**2.7**
Rock Pigeon				
Mourning Dove				
Anna's Hummingbird				
Allen's Hummingbird				
Black Phoebe				
American Crow				
Western Scrub Jay				
Common Raven				
Bushtit				
Ruby-Crowned Kinglet				
Northern Mockingbird				
European Starling				
Yellow-rumped Warbler				
Brewer's Blackbird				
House Finch				
Lesser Goldfinch				
House Sparrow				
European Starling				
Total Abundance				

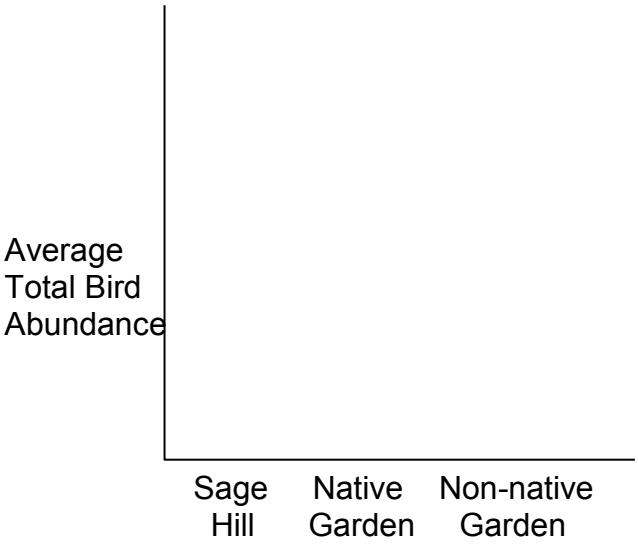


Figure ____. Total bird abundance at each development.

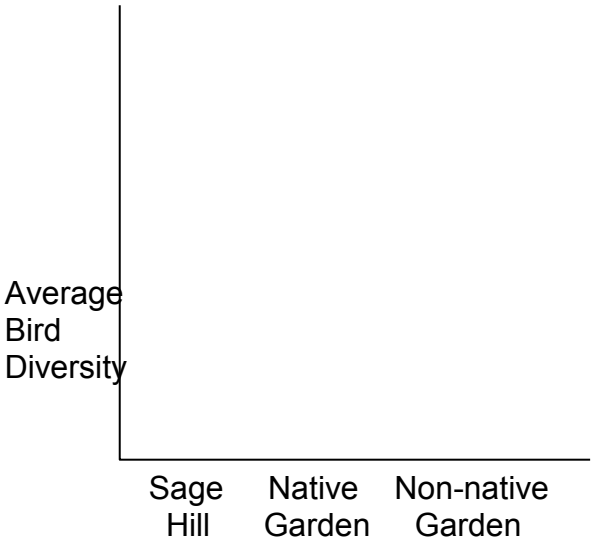


Figure ____. Average bird diversity at each development.

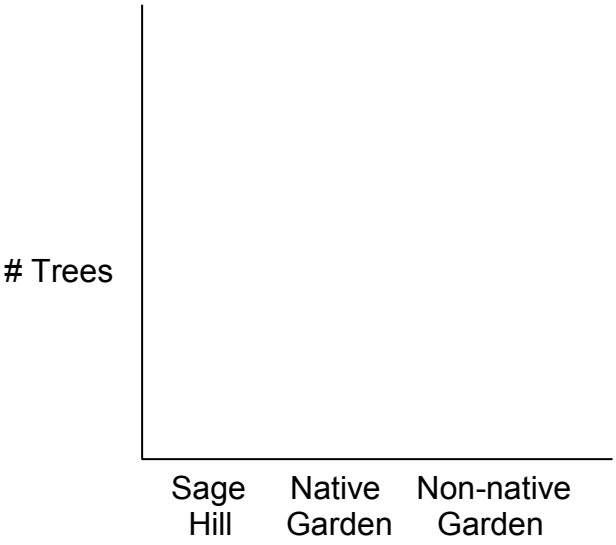


Figure ____. Number of tall trees at each development.

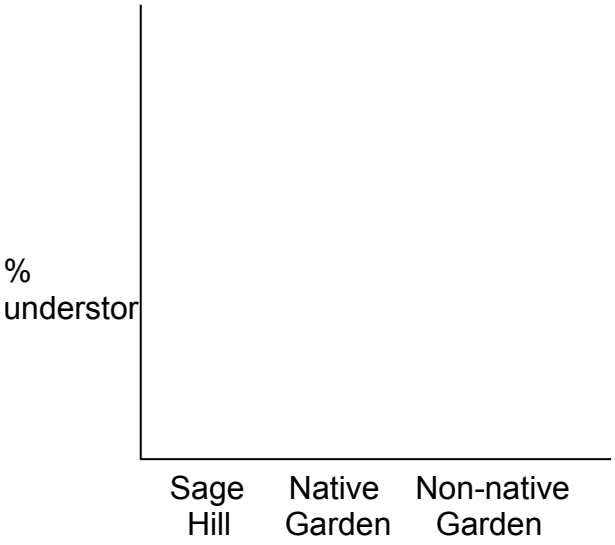


Figure ____. Percent understory vegetation at each development.

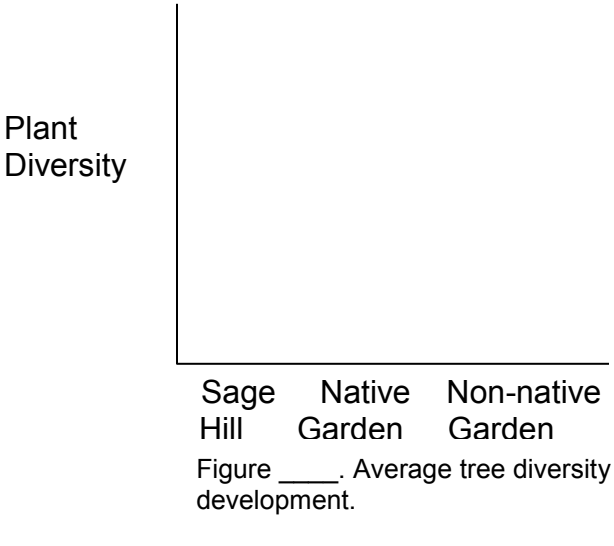


Figure ____. Average tree diversity at each development.

References Cited

Porter, J.W. 2003. Laboratory Manual for Environmental Science. John Wiley John Wiley & Sons, Inc., New York, NY. xxvii + 700 pp. ISBN 0-471-47027-9.

BIRD LAB DATA SHEET

General site observations

Habitat	Ave % Understory	Ave # Shrubs/Trees	Ave # Shrubs/Tree spp	Ave Bird Abundance	Ave Bird Diversity	Time of day	Other wildlife	Temperature and cloud cover
Sage Hill A								
Sage Hill B								
Sage Hill C								
Sculpture Garden A								
Sculpture Garden B								
Sculpture Garden C								
Bombshelter Landscape A								
Bombshelter Landscape B								
Bombshelter Landscape C								

Using Guide to Common Birds of the UCLA Campus.

Requirements for the bird communities paper:

Type a 4-6 page scientific paper. Be sure to refer to the general guidelines for writing a scientific paper. These guidelines are posted on the course website.

Write the report individually using your field observations and the data provided to you by the TA. Include the tables and figures. The best reports are objective, informative, accurate, and use correct grammar. Do not be overly wordy. Below is a list of topics to address in your paper.

Title: Must be descriptive of what you studied and where you studied it. Be original. Do not simply use the title of the lab.

Introduction: Include background information on the subject, the objectives of the study, and the important concepts that an uninformed reader needs to know. End with your hypotheses. Cite sources that you use using the format outlined in the lab handouts.

Methods: Describe the methods that you used to conduct the experiment. Do this in a way that would allow the reader to go out and repeat the experiment exactly. Describe the study sites using your site observations and refer to the site observation table. Do not simply re-write the lab handout, but be sure to cite it.

Results: Summarize the important findings shown in your tables and figures. Be sure to refer to the tables and figures (e.g. Figure 2). Focus on the trends of your data and include summary statistics (e.g. averages). These questions are provided to help you START thinking about the content of your results.

- How old were the plants found at each site?
- What was the % understory at each site?
- What was the average number of tall trees at each site?
- What were some of the plant species observed, how many species did you observe at each site?
- What were some of the bird species that you observed and where did you observe them?
- What was the average and maximum diversity and abundance of birds at each site?

Discussion: Explanations for the results are provided in this section. Why do we see the results that we see? Be sure to relate the results that you found to the background information (from the introduction) and to the bigger picture. Cite any sources that you use. These questions are provided to help you START thinking about the content of your discussion.

- Did your results and observations support your hypotheses?
- If bird diversity and abundance are different between the sites, what are the potential reasons that they differ?
- If plant diversity and abundance are different between the sites, what are the potential reasons that they differ? How might this affect wildlife and ecosystem services?
- Why did some birds occur at one site but not at the other? Provide an example.
- Is your study conclusive? Are there any other variables that may have influenced your findings?
- How can the information that you collected be used to manage urban areas?

References: List full citations of the information that you cited in the text.

Water Quality of Tap vs. Bottled Water

Introduction

(from the Five Gyres Website)

Take a look around you- most of what we eat, drink, or use in any way comes packaged in petroleum plastic- a material designed to last forever, yet used for products that we then throw away. This throwaway mentality is a relatively recent phenomenon. Just a generation ago, we packaged our products in reusable or recyclable materials – glass, metals, and paper, and designed products that would last. Today, our landfills and beaches are awash in plastic packaging, and expendable products that have no value at the end of their short lifecycle.

The short-term convenience of using and throwing away plastic products carries a very inconvenient long-term truth. These plastic water bottles, cups, utensils, electronics, toys, and gadgets we dispose of daily are rarely recycled in a closed loop. We currently recover only 5% of the plastics we produce. What happens to the rest of it? Roughly 50% is buried in landfills, some is remade into durable goods, and much of it remains "unaccounted for," lost in the environment where it ultimately washes out to sea.

Around the world, plastic pollution has become a growing plague, clogging our waterways, damaging marine ecosystems, and entering the marine food web. Much of the plastic trash we generate on land flows into our oceans through storm drains and watersheds. It falls from garbage and container trucks, spills out of trashcans, or is tossed carelessly.

In the ocean, some of these plastics- Polycarbonate, Polystrene, and PETE- sink, while LDPE, HDPE, Polypropylene, and foamed plastics float on the ocean's surface. Sunlight and wave action cause these floating plastics to fragment, breaking into increasingly smaller particles, but never completely disappearing- at least on any documented time scale. This plastic pollution is becoming a hazard for marine wildlife, and ultimately for us.

As plastic particles circulate through oceans, they act as sponges for waterborne contaminants such as PCBs, DDT and other pesticides, PAHs and many hydrocarbons washed through our watersheds. These persistent organic pollutants, called "POPs", absorb and adsorb onto plastic pollution in high concentrations. Plastic pollution is not a benign material in the ocean. Scientists are studying whether these POPs transfer to the marine organisms that mistakenly consume them.

The Problem

Many of us buy our water in convenient single use plastic bottles, which we throw away after only one use. We now know that this plastic is bad for the environment. Why do we do this? It's convenient, and many people believe that the water in plastic bottles is safer/cleaner than tap or filtered water. However, if we could demonstrate that tap and/or filtered tap water are just as safe, if not more safe, than bottled water, then maybe we could convince people to use reusable bottles, which can refilled with tap or filtered tap water. Not only is this better for the environment, but it saves a lot of money!

Objectives

1. To build an awareness of the influence of single use plastic on natural habitats and fauna.
2. To build an awareness of the potential negative effects of single use plastic on human health.
3. To compare the water quality of bottled water, tap water, and filtered tap water.
5. To become familiar with methods for testing water quality.

Research Methods

In class you will divide into groups of three. We will be testing five different water samples: two different brands of bottled water, two different sources of tap water, and distilled water (control). You will receive water quality testing kits from you TA. These kits will contain directions on how to test your samples for various water quality variables: pH, alkalinity, lead, bacteria, pesticides, nitrates, nitrites, chlorine, and hardness. Be sure to report your results in the chart provided by your TA.

Hypotheses

Be sure to form hypotheses before you conduct your experiment. Choose one of the following hypotheses below, or form your own:

1. Tap water and filtered tap water have less contaminants than bottled water.
2. Bottled water has less contaminants than tap water or filtered tap water.
3. Filtered tap water has the least amounts of contaminants.

Requirements for the water quality paper:

Type a 4-6 page scientific paper. Be sure to refer to the general guidelines for writing a scientific paper. These guidelines are posted on the course website.

Write the report individually using your lab observations and the data provided to you by the TA. Include the tables and figures. The best reports are objective, informative, accurate, and use correct grammar. Do not be overly wordy. Below is a list of topics to address in your paper.

Title: Must be descriptive of what you studied and where you studied it. Be original. Do not simply use the title of the lab.

Introduction: Include background information on the subject, the objectives of the study, and the important concepts that an uninformed reader needs to know. End with your hypotheses. Cite sources that you use using the format outlined in the lab handouts.

Methods: Describe the methods that you used to conduct the experiment. Do this in a way that would allow the reader to go out and repeat the experiment exactly. Describe the study sites using your site observations and refer to the site observation table. Do not simply re-write the lab handout, but be sure to cite it.

Results: Summarize the important findings shown in your tables and figures. Be sure to refer to the tables and figures (e.g. Figure 2). Focus on the trends of your data and include summary statistics (e.g. averages). These questions are provided to help you START thinking about the content of your results.

How might the sources of water in each sample differ?
What different constituents were found in each sample?

Discussion: Explanations for the results are provided in this section. Why do we see the results that we see? Be sure to relate the results that you found to the background information (from the introduction) and to the bigger picture. Cite any sources that you use. These questions are provided to help you START thinking about the content of your discussion.

Did your results and observations support your hypotheses?
If constituents are different between samples, what are the potential reasons that they differ?
How might these differences affect human health and environmental health?
Which constituents might be natural to the water source, and which might be added contaminants?
What does this mean for human and environmental health?
Is your study conclusive? Are there any other variables that may have influenced your findings?
How can the information that you collected be used to inform human and environmental health?

References: List full citations of the information that you cited in the text.

WATER QUALITY DATA SHEET

Water Quality Variables	Sources	Negative Effects	Maximum Contaminant Level Goal (epa) (mg/L)	Maximum Contaminant Level (epa) (mg/L)	Bottled Water A	Bottled Water B	Tap Water A	Tap Water B	Filtered Tap Water A	Filtered Tap Water B	Distilled Water A	Distilled Water B
Lead	Corrosion of household plumbing systems; erosion of natural deposits	Infants and children: Delays in physical or mental development; children could show slight deficits in attention span and learning abilities; Adults: Kidney problems; high blood pressures	0	0.015								
Bacteria (Total coliform)	Coliforms are naturally present in the environment; as well as feces; fecal coliforms and E. coli only come from human and animal fecal waste.	Not a health threat in itself; it is used to indicate whether other potentially harmful bacteria may be present5	0	0								
Pesticides	Agriculture & landscape runoff; grey water	Developmental affects / ADD (Bouchard et al. 2010); Reproductive effects (Meeker et al. 2006, Recio et al. 2005); Cancer (CDC)										

		Parkinson's disease (Gatto et al. 2009); endocrine, reproductive, immune systems, cancer, neurobehavioral disorders, infertility, mutagenic effects, (Ritter et al. 2007)		
Nitrates	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	10	10
Nitrites	Runoff from fertilizer use; leaking from septic tanks, sewage; erosion of natural deposits	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may	1	1

		die. Symptoms include shortness of breath and blue-baby syndrome.		
Chlorine	Water additive used to control microbes	Eye/nose irritation; stomach discomfort	4	4
Hardness (Total Dissolved Solids)	Natural sources are dissolved polyvalent metallic ions from sedimentary rocks, seepage and runoff from soils. Calcium and magnesium, the two principal ions, are present in many sedimentary rocks, the most common being limestone and chalk. They are also common essential mineral constituents of food.	hardness; deposits; colored water; staining; salty taste		500

pH	pH is a measure of the acidic or basic property of water. It is measured on a scale of 0-14, with a pH of 7 being neutral.	between 6.5 and 8.5	between 6.5 and 8.5
Alkalinity	ability of water to resist changes in pH. Low alkalinity may cause corrosion of pipes and fixtures. High alkalinity may cause the water to appear cloudy.	between 80 and 180	between 80 and 180

Course Revision Proposal

	Ecology and Evolutionary Biology 18 Why Ecology Matters: Science Behind Environmental Issues	
	Requested revisions that apply:	
	☐Renumbering ☐Title ☑Format ☐Requisites ☐Units ☐Grading ☐Description	
	Multiple Listing: ☐Add New ☐Change Number ☐Delete	
	Concurrent Listing: ☐Add New ☐Change Number ☐Delete	
	CURRENT	**PROPOSED**
Course Number	**Ecology and Evolutionary Biology 18**	**Ecology and Evolutionary Biology 18**
Title	**Why Ecology Matters: Science Behind Environmental Issues**	**Why Ecology Matters: Science Behind Environmental Issues**
Short Title	**SCI-ENVRNMNT ISSUES**	**SCI-ENVRNMNT ISSUES**
Units	Fixed: **5**	Fixed: **5**
Grading Basis	**Letter grade or Passed/Not Passed**	**Letter grade or Passed/Not Passed**
Instructional Format	Primary Format **Lecture**	Primary Format **Lecture - 3 hours per week**
	Secondary Format **Discussion**	Secondary Format **Laboratory - 2 hours per week**
TIE Code	**LECS - Lecture (Plus Supplementary Activity) [T]**	**LABR - Laboratory (Research) [I]**
GE	**No**	**Yes**
Requisites	**None**	**None**
Description	Lecture, three hours; discussion, two hours. Basic ecological concepts, scientific method, and ecological basis for local and global environmental issues. Major challenges to be faced in this century, including need to find interdisciplinary and collaborative solutions to world's worsening environmental problems (e.g., global climate change, biodiversity loss, deforestation, pollution, declining water resources, declining fisheries). Environmental literacy to equip students to become leaders in growing green economy and to help forge solutions to current and future environmental crises that threaten natural resource base. P/NP or letter grading.	**Lecture, three hours; laboratory, two hours. Basic ecological concepts, scientific method, and ecological basis for local and global environmental issues. Major challenges to be faced in this century, including need to find interdisciplinary and collaborative solutions to world's worsening environmental problems (e.g., global climate change, biodiversity loss, deforestation, pollution, declining water resources, declining fisheries). Environmental literacy to equip students to become leaders in growing green economy and to help forge solutions to current and future environmental crises that threaten natural resource base. P/NP or letter grading.**
Justification		**The Department reviewed the course syllabi for other courses included under the Life Sciences Laboratory/Demonstration category. We found**

		that the activities and projects that are part of EE BIOL 18 are similar to these other courses. For example, in Molecular, Cell and Developmental Biology (MCD BIO) 70 - Genetic Engineering and Society, students engage in activities similar to those in EE BIOL 17, including viewing relevant films and videos, as well as completing reports based on observational studies. Required projects in EE BIOL 18 afford students to learn how to design research protocol, formulate hypotheses, and discuss and present their findings. These projects are similar to the "Double Helix Report" that is one of the requirements of MCD BIO 70. **Reviewed and approved by Peggy Fong, Vice Chair for Undergraduate Studies**
Syllabus		File *EE Biol 18 Lab-Demo[1].doc* was previously uploaded. You may view the file by clicking on the file name.
Supplemental Information		**Proposal to GE Governance Committee will be submitted for 14W meeting.**
Effective Date	**Fall 2012**	**Fall 2014**
Department	**Ecology and Evolutionary Biology**	**Ecology and Evolutionary Biology**
Contact		Name **JESSICA ANGUS**
Routing Help		E-mail **jangus@lifesci.ucla.edu**

ROUTING STATUS

Role:	Registrar's Office
Status:	Processing Completed

Role:	Registrar's Publications Office - Hennig, Leann Jean (LHENNIG@REGISTRAR.UCLA.EDU) - 56704
Status:	Added to SRS on 3/24/2014 12:04:49 AM
Changes:	Instructional Format, TIE Code
Comments:	Edited course description into official version.

Role:	Registrar's Scheduling Office - Thomson, Douglas N (DTHOMSON@REGISTRAR.UCLA.EDU) - 51441
Status:	Added to SRS on 3/6/2014 3:13:24 PM
Changes:	TIE Code
Comments:	No Comments

Role:	L&S FEC Coordinator - Castillo, Myrna Dee Figurac (MCASTILLO@COLLEGE.UCLA.EDU) - 45040
Status:	Returned for Additional Info on 1/3/2014 11:46:39 AM
Changes:	TIE Code
Comments:	Routing to Doug Thomson in the Registrar's Office.

Role:	FEC Chair or Designee - Palmer, Christina (CPALMER@MEDNET.UCLA.EDU) - 44796
Status:	Approved on 12/27/2013 11:16:04 AM
Changes:	TIE Code

Comments:	No Comments

Role:	L&S FEC Coordinator - Castillo, Myrna Dee Figurac (MCASTILLO@COLLEGE.UCLA.EDU) - 45040
Status:	Returned for Additional Info on 12/20/2013 2:24:46 PM
Changes:	TIE Code
Comments:	Routing to Christina Palmer for FEC approval.

Role:	Department/School Coordinator - Angus, Jessica Abijay (JANGUS@LIFESCI.UCLA.EDU) - 51680
Status:	Approved on 12/20/2013 1:54:25 PM
Changes:	TIE Code
Comments:	Submitted by Jessica Angus on behalf of: Daniel T. Blumstein, Department Chair Peggy Fong, Vice Chair for Undergraduate Studies

Role:	L&S FEC Coordinator - Castillo, Myrna Dee Figurac (MCASTILLO@COLLEGE.UCLA.EDU) - 45040
Status:	Returned for Additional Info on 12/20/2013 1:21:10 PM
Changes:	TIE Code
Comments:	Routing to Jessica for Chair approval.

Role:	Initiator/Submitter - Angus, Jessica Abijay (JANGUS@LIFESCI.UCLA.EDU) - 51680
Status:	Submitted on 12/18/2013 11:57:25 AM
Comments:	Initiated a Course Revision Proposal

Back to Course List

Comments or questions? Contact the Registrar's Office at
cims@registrar.ucla.edu or (310) 206-7045