Applied Ecology

EHS 212
Winter 2015

Instructor: Professor Richard F. Ambrose
46-078 CHS
(310) 825-6144
email: rambrose@ucla.edu

Class meeting: Mon/Wed 1:00-2:50 pm
61-269 CHS
Office hours: By appointment

Course overview

The objective of *Applied Ecology* is to provide insight into how ecological theory and principles can be applied to solving environmental problems. *Applied Ecology* covers a variety of current environmental issues, organized into the following four general themes: (1) methods for detecting environmental impacts, (2) restoring damaged habitats, (3) conservation biology, and (4) ecological effects and mitigation alternatives for global climate change.

Course Philosophy

This course is designed to provide students with opportunities for active engagement in learning the material. Class participation is critically important, as is appropriate preparation before class.

Lectures will focus on providing a high-level overview of topics, with the majority of class time devoted to discussions. It is essential that students do the readings before class so they will be prepared to contribute to the discussions. Course effort will include compilation and critical evaluation of the applied ecological literature on specific topics, in-class discussions, presentations, and effective writing for scientific and general audiences.

In addition to the specific subject matter, this course emphasizes the development of two skills that are critical for the success of every scientist: critical thinking, and clear written and oral communication.

Course Learning Objectives

This course has the following learning objectives, listed along with associated ASPH (Association of Schools of Public Health) competencies. Note: the ASPH competencies have been developed to identify the competencies master's students in Environmental Health Sciences should have developed by the time they graduate; they have no direct relevance to students in other graduate programs, although of course many would be useful for any environmental scientist.

Course Learning Objectives By the completion of this course, students should be able to:	ASPH Competencies
1. Understand different approaches for assessing environmental impacts, with an emphasis on sampling design, including the assumptions and limitations of common assessment methods; evaluate the appropriateness of a particular sampling design for assessing a specific	A.7. Apply descriptive and inferential methodologies according to the type of study design for answering a particular research question. A.9. Interpret results of statistical analyses found in public health studies. B.5. Specify approaches for assessing, preventing

environmental impact; and design a rigorous impact assessment study based on general ecological and statistical principals.	and controlling environmental hazards that pose risks to human health and safety.
2. Articulate the basic elements of restoration ecology and how to mitigate environmental impacts.	B.5. Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety.
3. Articulate the basic elements of conservation biology, focusing on scientific aspects of the biodiversity crisis, including analytical approaches to preserving species and communities and designing refuges.	B.1. Describe the direct and indirect human, ecological and safety effects of major environmental and occupational agents. B.5. Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety.
4. Understand the ecological aspects of global change, including ecologically based methods for mitigating greenhouse gas emissions and approaches for managing natural resources in a changing world.	B.1. Describe the direct and indirect human, ecological and safety effects of major environmental and occupational agents. B.5. Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety.
5. Synthesize applied ecological principals and knowledge in order to solve novel ecological problems.	B.8. Develop a testable model of environmental insult.
6. Present information about a complex topic in an organized formal presentation (written and oral).	F.7. Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities.
7. Critically evaluate and discuss popular and scientific literature about applied ecological issues.	H.4. Engage in dialogue and learning from others to advance public health goals. J.3. Apply evidence-based principles and the scientific knowledge base to critical evaluation and decision-making in public health.

Prerequisites

This course assumes knowledge of the basic ecological principles that provide the foundation for applied ecology, including population growth and dynamics, species interactions (such as competition, predation and mutualism), community structure, and ecosystem processes. Students without a firm ecological background will need to acquire a working knowledge of this material through additional reading; any good ecology textbook (such as Ricklefs' *Economy of Nature*) will suffice.

Reading

Required readings will be available on the course CCLE site (available through My UCLA or https://ccle.ucla.edu/course/view/15W-ENVHLT212-1). Class discussions depend on the assigned reading, so all of the readings for each class session **must** be completed **before** class.

Grading

Grades will be based on (1) quizzes, (2) written assignments, (3) oral presentations, and (4) participation in class discussions and critiques of papers. Points will be allocated as indicated below.

Quizzes (4@50 pts each)	200 pts
Written assignments	
Critical evaluation of a scientific paper	100 pts
Issues related to assigned papers	120 pts
Current topics briefing paper	100 pts
Presentations	
Paper critique	50 pts
Current topics presentation	100 pts
Group presentation	100 pts
Class participation	130 pts
TOTAL	900 pts

Quizzes

At the end of each of the four themes, there will be a 25-minute quiz worth 50 pts (each). The quiz questions are designed to integrate key facets of each theme. After the quizzes are submitted, there will be a class discussion about the questions.

Written assignments

There will be three types of written assignments: a critical evaluation of a scientific paper, a short discussion of issues related to each of the papers assigned for the critical evaluations, and a briefing paper. Written assignments must be uploaded to the course CCLE site by the due date; late assignments will be penalized 10% of the points per day.

Critical evaluation of peer reviewed literature (100 pts)

An important learning objective of this course is to learn to critically evaluate and discuss the scientific literature relating to applied ecology. This will be formalized in a scientific critique of a paper published in the peer-reviewed literature.

The critical evaluations will be based on paper related to each of the four themes of the course. For each theme, all students will read 3-4 relevant peer-reviewed journal papers, with one student assigned to be the primary discussant for each paper. (This student leads the discussion about the paper; see below) The discussant will write a critical evaluation of the paper. The critique should be up to four pages long (double-spaced). [More detail about what goes into a critical evaluation is provided in a separate document, available on the course CCLE site.]

The critical evaluation paper is due at midnight before the class period during which the paper will be discussed. During the course, each student will write a critical evaluation of one paper.

Issues related to the critical evaluation papers (4 sets@30 pts each)

For the critical evaluation papers to be discussed in class, each student must read the 3-4 papers assigned for each theme. Although one student is assigned as primary discussant for each paper, all students are expected to read the papers critically. More importantly, each student must create and briefly discuss three substantive scientific issues related to each paper. These issues could relate to methods (e.g., adequate sample size), conclusions (e.g., recognition of the potential impacts of unusual climatic conditions during the study), or any other aspect of the paper (including limitations of the conclusions); they should reflect a critical evaluation of the paper. The primary goal of this assignment is to sharpen your critical evaluation skills, so you should think carefully about the paper when developing the issues you discuss, and the issues identified should be substantive and important.

The three issues for each assigned paper are due at midnight before the class period during which the papers will be discussed. These should all be included in one file. The discussant for each paper must complete this assignment for the paper they will be discussing as well as the other assigned papers.

Briefing paper (100 pts)

Scientists need to communicate information via a number of different means. An important skill for applied ecologists is to be able to communicate complex scientific information to managers, executives, policy makers, or decision makers in a concise and understandable manner. This is often accomplished through written briefing papers.

Each student will write a briefing paper for the current topic presentation he or she participates in. [More detail about what goes into a briefing paper is provided separately, available on the course CCLE site.] The briefing papers should be up to four pages long (double-spaced).

The briefing paper is due at midnight before the class period during which the current topic will be discussed.

Presentations

Three types of presentations will be graded: (1) a presentation and discussion of the paper for which a critical evaluation was written, (2) a presentation on one of the current topics, and (3) a presentation related to the group projects on the main themes of the course.

Paper critique (50pts)

For each theme, we will discuss and critique scientific studies concerning that theme. All students will read and critique 3-4 papers related to the theme before class (see above), but for each paper, one student will be assigned as the primary discussant. The discussant will write a critical evaluation of his or her assigned paper (see above), but the primary role of the discussant is to provide a brief (5 minute) overview of the paper, including a critical evaluation of the methods, data interpretation and conclusions. This should *not* be a synopsis of the paper (we all will have read the paper), but rather a highlight of the main scientific issues – good and bad – associated with the paper. The discussant also facilitates the discusson of the paper by other students. Each student will be the discussant for one paper during the course.

Although only one student is assigned the role of discussant for each paper, participation by all students in the discussion is important (see below).

Current topics presentation (100 pts)

Current topics cover controversial topics currently being vigorously debated in the literature. For each current topic, there are two (or more) distinct positions. Each student will participate in one current topics presentation. For each current topic, the assigned students will split into two groups, each taking a side in a controversy. Each student will make a presentation arguing their side of the controversy. Note that the assigned readings for the course provide an introduction into each controversy, but students are expected to conduct their own research into the topic to support their positions.

Each student's presentation should be 5-10 minutes long. There will be class discussion and peer evaluation of the presentation after the presentations.

Group presentation (100 pts)

There will be a group presentation for each major theme, and each student will participate in one of these presentations. The presentation will focus on a major topic in that theme (selected in consultation with the instructor; general topics are given in the syllabus), with each student selecting an aspect to research and present to the class. For example, students in the restoration ecology group might choose to compare restoration efforts in different habitat types. Confirm your topics with the instructor at least ONE WEEK before your presentation.

Although the entire group needs to be coordinated and students are encouraged to debate, discuss, compare and synthesize the different topics covered by the group, students will be graded individually on their presentations. Each student's presentation should be 5-10 minutes long. There will be class discussion and peer evaluation of the presentation after the presentations.

Class participation

Class participation is essential for this course. Every student is expected to be an active and well-informed participant in all class discussions. Class participation will be judged for each class meeting, including discussion of news reports, questions and discussion about lecture material, discussion about paper critiques, questions and discussion about class presentations, critiques of student presentations, and discussion about quizzes.

As noted above, each student should identify three substantive issues about each paper read for the critical evaluations. Students should come to class prepared to discuss their questions and their implications for the paper. Students should also be prepared to discuss the questions raised by other students in the class, and critically evaluate their implications.

Completing the assigned reading before class is essential for you to be a well-informed participant. This is true for all assignments, but particularly for the current topics.

Note about file names: Do not name your files with a generic name such as "assignment 1.docx". There may be files from ten different students named the same! Your file names should include

your last name, a descriptive title, and often the date (to keep track of versions, such as “Smith cons bio briefing paper 2-14-15”.

Date	Class Topic	Reading
Jan 5	**Introduction and Overview** Course overview; develop. communication skills Environmental Sustainability	Millenium Ecosystem Assess. 2005: Living beyond means
Jan 7	**Environmental assessment** Overview, impact assessment designs, statistics	Karr 1991 Schroeter et al. 1993 Wiens and Parker 1995
Jan 12	**Guest lecture: Brandon Winfrey**	Roy-Poirier et al. 2010 Vymazal 2010
Jan 14	**Environmental assessment** Discussion/critique of environ. assessment studies *Critical evaluation paper due for discussants*	TBD
Jan 19	Martin Luther King Holiday	
Jan 21	**Environmental assessment** Quiz 1 Group 1 presentation: ecological impact assessment	
Jan 26	**Conservation Biology** Overview, threats to biodiversity	WWF 2014
Jan 28	**Conservation Biology** Current topics: Use versus non-use value Invasive species: good or evil? *Conservation Biology briefing papers due*	Doak et al. 2014 Kareiva and Marvier 2012 Davis et al. 2011 Richardson and Ricciardi 2013
Feb 2	**Conservation Biology** Discussion/critique of conservation biology studies *Critical evaluation paper due for discussants*	TBD
Feb 4	**Conservation Biology** Quiz 2 Group 2 presentation: conservation strategies	
Feb 9	**Restoration Ecology** Overview	Palmer et al. 1997 Higgs et al. 2014
Feb 11	**Restoration Ecology** Current topics: Novel ecosystems *Restoration Ecology briefing papers due*	Hobbs et al. 2009 Murcia et al. 2014
Feb 16	Presidents Day Holiday	
Feb 18	**Restoration Ecology** Discussion/critique of restoration ecology studies *Critical evaluation paper due for discussants*	TBD
Feb 23	**Restoration Ecology** Quiz 3 Group 3 presentation: restoration of degraded habitats	
Feb 25	No lecture	

Mar 2	**Global change** Overview: Ecological effects of global climate change Mitigation and adaptation	Staudt et al. 2013 Ockendon et al. 2014
Mar 4	**Global change** Current topics: Geoengineering Assisted migration *Global Change briefing papers due*	Schellnhuber 2011 Pope et al. 2012 Seddon 2010 Ricciardi and Simberloff 2009
Mar 9	**Global change** Discussion/critique of global change studies *Critical evaluation paper due for discussants*	TBD
Mar 11	**Global change** Quiz 4 Group 4 presentation: Global change and conservation strategies	