

ENVS 160: RESTORATION ECOLOGY - Fall 2009 - MWF – 11:00-12:10 – Kresge 327

Faculty:

Dr. Karen Holl
Natural Sciences II, Rm. 461
Tel: 9-3668, e-mail: kholl@ucsc.edu
Office hours – W: 12:30-1:30, F: 1:30-2:30

TA:

Leighton Reid
NS2 Rm. 427
jlreid@ucsc.edu
Office hours – during section, F: 1-2

Course description: This course is intended as a broad overview of restoration ecology. During the first part of the course we will focus on using knowledge of ecosystem functioning to facilitate the recovery of damaged ecosystems. During the second half of the course we will discuss topics related to the implementation of restoration projects such as planning, evaluating success, legislation, and financing. These two approaches will be integrated through the discussion of case studies.

Course components:

Class participation: The majority of class periods will consist of lectures by Dr. Holl or guest speakers and will draw on assigned readings. These readings will be discussed in more detail in class sections. Success of these discussions requires the preparation and participation of all students. Student participation will be evaluated based on attendance and active participation in class and sections, as well as completion of several short assignments throughout the quarter.

Sections: Section attendance is required. During section students will meet in small groups and discuss readings and various class assignments. Students will work with the same group in section throughout the quarter and will have the chance to evaluate the participation of group mates at the end of the quarter. The TA will be available to answer questions and clarify points.

Required reading: Class readings will consist of papers available on electronic reserves (ER) or reprinted in the course reader (CR), available at the UCSC bookstore. Articles should be read by the dates indicated. The library gets the journals *Restoration Ecology* and *Restoration and Management Notes/Ecological Restoration* which have many additional relevant articles. A number of additional books on restoration ecology are available at the Science Library.

Work Party: All students (except those doing 2-unit internships) are required to participate in one work party on a local restoration project. A list of project dates is available on the course web site and various options will be announced in class. For your workday, wear long pants, and bring water, lunch, and rain gear. Students are required to write a 1-page reflective essay on their work party to be turned in to Dr. Holl within 1 week of completing the workday. This essay should go beyond just reporting what you did, but reflect upon what you learned from the experience, whether it agreed with or refuted what you learned in class, and/or what you might do differently if in charge of the restoration project.

Essays: Each student will be required to write two individual 3-page essays and two group 5-page essays on specific topics.

Midterm and final: The midterm will consist of short answer and essay questions. The final will consist primarily of essay questions, which will be distributed in advance of the exam.

Grading: Class/section participation and small group assignments 20%; Essays 30%; Workday 5%; Midterm 20%, Final 25%. Students not returning borrowed reprints or books at the end of the quarter will be given incompletes.

Class web page: Class notes for Dr. Holl's lectures (but not for guest speakers) will be posted on the class web page. <http://www.ic.ucsc.edu/~kholl/envs160/>. The web page can also be accessed through electronic reserves. The password is "redwood".

Internship option: Those students interested in gaining more hands-on experience in the field of restoration ecology may enroll to do a 2-unit internship with a local agency (~6 hr/week).

Deadline & absence policy: The dates of the exams and the due dates for the various assignments are absolute. Assignments submitted late will be subjected to a 25% deduction in grade for each day late and

multiple late assignments will be noted in evaluations. No credit will be given beyond 4 days of the due date. If extenuating circumstances occur, contact Dr. Holl BEFORE the due date.

Attendance in both section and class is required. One absence from class and section will be allowed with no deduction, but repeated absences will result in a reduction in the class participation grade. In many sections there will be group work, so missing section can negatively impact other group members.

Class conduct:

1. Students are expected to adhere to the UCSC policy on academic integrity - http://www.ucsc.edu/academics/academic_integrity/. All assignments written assignments turned in should be written individually and be original works for this class. All academic integrity violations (e.g. plagiarism, cheating, multiple submissions, facilitating dishonesty) will be prosecuted if encountered.

2. I aim to provide an environment conducive to learning for all students. When students arrive late or talk to their neighbors, it is distracting to both the instructor and other students. Therefore, students are requested to arrive on time and share comments or questions with the entire class. If a student repeatedly chooses not to respect this request they will receive reduced class participation scores and this will be noted in their evaluations.

Course schedule: Note that readings are either on electronic reserves (ER) or in the course reader (CR).

Date	Assignment	Class Content
Sep. 25		Intro. to course and restoration ecology.
Sep. 28	SER Primer 2002 (ER), Hilderbrand et al. 2005 (ER), Clewell and Aronson 2006 (ER).	Introduction to restoration ecology. Why restore ecosystems?
Sep. 28-29 (Section)	Katz 1992 (ER), Jordan 2000 (ER), Alpert et al. 2005 (ER)	Discussion of ethics of restoration and readings.
Sep. 30	MacDonald et al. 2002. (ER & CR 1-8)	Disturbance and recovery in ecosystems.
Oct. 2	Harris et al. 2006 (ER). Jackson & Hobbs 2009 (ER). Dinwiddie et al. 2009 (ER).	Biological processes at large spatial scales. Climate change and restoration.
Oct. 5	Bradshaw 1987 (CR 9-25)	Terrestrial restoration - abiotic factors.
Oct. 5-6 (S)	DRAFT ESSAY DUE	Discussion of readings. Peer review of Essay 1. Organize for debate.
Oct. 7	Whisenant 1999 (CR 27-61). ESSAY 1 DUE.	Terrestrial restoration – abiotic factors and vegetation.
Oct. 9		Terrestrial restoration – vegetation.
Oct. 12		Terrestrial rest. – vegetation case studies.
Oct. 12-13 (S)	Schmidt et al. 1998 (ER). Other articles on the Colorado River	DEBATE
Oct. 14	CA Invasive Plant Council 2004 (CR 157-167), D’Antonio and Meyerson 2002 (ER & CR 63-73).	Exotic species.
Oct. 16		Guest speaker: Brent Johnson, Restoration at Pinnacles National Monument
Oct. 17		FIELD TRIP – Wilder Ranch, Laguna Beach, Soquel Creek. Meet at Barn Theater 9 am. Bring lunch and water. Return ~4 pm.
Oct. 19	Mitsch 1993 (CR 135-156).	Wetland restoration
Oct. 19-20	DRAFT ESSAY DUE	Discussion of readings and review essay 2.

(S)		
Oct. 21	ESSAY 2 DUE	Wetland restoration case studies.
Oct. 23		Catch up day
Oct. 26	Holl 2002 (CR 207-217).	Tropical forest restoration.
Oct. 26-27 (S)	Midterm review	Midterm review
Oct. 28	Midterm review	MIDTERM
Oct. 30	van Wieren et al. 2006 (CR 77-82), and each student look up one article on faunal restoration.	Guest speaker: Leighton Reid. Terrestrial restoration - fauna.
Nov. 2	National Academy of Sciences 1992 (CR 108-134).	River restoration.
Nov. 2-3 (S)		NO SECTION. TA available.
Nov. 4		River restoration case studies.
Nov. 6	National Academy of Sciences 1992 (CR 83-107).	Lake and marine restoration.
Nov. 9	(CR 169-176) Pickart 1998. Bernhardt et al. 2005 (ER).	Restoration planning.
Nov. 9-10 (S)	DRAFT ESSAY DUE	Peer review of essay 3 and discuss case studies.
Nov. 11		HOLIDAY – NO CLASS
Nov. 13	ESSAY 3 DUE.	Guest speaker: Dean Fitch – Campus management and restoration issues. Background for class project.
Nov. 16		Legislating restoration. Case study: surface mines, landfills.
Nov. 16-17 (S)	Holl and Cairns 2002 (CR 177-186).	Monitoring discussion.
Nov. 18		Evaluating restoration success.
Nov. 20	ERES background reading for class project.	Class project on restoration planning.
Nov. 23	Marsh et al. 1996 (CR 195-201)	Mitigation.
Nov. 23-24 (S)		Discuss class project.
Nov. 25		CLASS CANCELLED IN LIEU OF WORK PARTY.
Nov. 27		HOLIDAY – NO CLASS
Nov. 30	Holl and Howarth 2000 (ER & CR 187-194).	Financing restoration.
Nov. 30- Dec. 1 (S)	DRAFT ESSAY DUE	Review of essay 4 and final class review. Bring suggested exam questions.
Dec. 2	Holloran 1998 (CR. 203-205). ESSAY 4 DUE.	Guest lecturer: Josiah Clark. Urban wildlife restoration.
Dec. 4		Restoration education and community involvement. Class wrap up. Evaluations.
Dec. 10	Final exam question preparation.	FINAL 12-3 PM

ESSAY GUIDELINES - Restoration Ecology Fall 2009

You are responsible for writing four short essays on selected topics. Essays 1 and 3 will be written individually. Essays 2 and 4 will be written in groups of 3-4. Individual essays should be no more than 750 words and should include a minimum of 2-3 references with complete citation information. Group essays should be no more than 1250 words and should include a minimum of 5-6 references. Essays should be typed 1.5 or 2-spaced. Essays will be evaluated for content, critical analysis, organization, and clarity of writing. Draft essays are due in the section prior to the due date so you can do peer review. Please bring three copies of a well written draft. Three out of 25 points on each essay will be given for the draft. You will do peer review of all essays during section. Essays are due at the beginning of class on the date listed.

ESSAY 1 - PHILOSOPHICAL BASIS FOR RESTORATION (draft Oct. 5-6 section, final Oct. 7; individual). Reed Noss has written “This is the irony of our age: 'hands-on' management is needed to restore 'hands-off' wilderness character.” By choosing to attempt ecosystem restoration, it can be argued that we are ‘playing God’. In your opinion, should we or should we not restore ecosystems, or are there only certain cases when we should restore ecosystems? And, what should we be aiming to restore given that all ecosystems are changing? Cite at least three reasons to support your point of view; also address one or two potential criticisms of your point of view.

ESSAY 2 - DEBATE ON RESTORATION OF THE COLORADO RIVER (draft Oct. 19-20 section, final Oct. 21; group). During section you will debate different options for restoring the Colorado River. The debate will be framed around the Schmidt, J. C. et al. 1998 “Science and values in river restoration in the Grand Canyon”. There are also a number of articles in the journal *Ecological Applications* vol. 11 (3) 2001 and other more recent peer-reviewed journals that report on controlled releases that were conducted in 1996, 2004, and 2008. Select two contrasting options for management of the Colorado River. First, convincingly argue why each of these options should be pursued providing at least 3 arguments to support each option. Second, conclude which option you would select and explain why. Third, briefly address whether you think there is “right” and “wrong” management option in this case study and in restoration in general.

ESSAY 3 - EVALUATION OF SPECIFIC RESTORATION PROJECT OR STUDY (draft Nov. 9-10, final Nov. 13; individual). Choose a specific restoration case study (A) or a scientific study on restoration (B). Choose a type of ecosystem or a project of interest to you that, preferably, was not discussed in detail in class. You may know of a specific case study already. Otherwise try doing a keyword search on Biosis or browsing through *Restoration and Management Notes/Ecological Restoration, Restoration Ecology*, or one of the edited volumes on restoration ecology in the library. For your project/study, answer the following questions: (A)(1) What is the goal of the project? (2) Who is affected by the project and were they involved in the decision making? (3) What techniques were used to restore this system? (4) How was success of the project monitored and was it successful in achieving the goals? (5) What lessons do you think could be learned from this project and/or what recommendations would you make to improve similar projects in the future? (B)(1) What are the hypotheses or questions being tested? (2) Briefly - How were the hypotheses tested/questions answered and what were the results? (3) Were you convinced of the results? Why or why not? (4) Do you think the results of the study will be useful to land managers? (5) How could the study have been improved? Please include a copy of your article(s) with your essay.

ESSAY 4 - RESTORATION MANAGEMENT PLAN (draft Nov. 30-Dec. 1, final Dec. 2; group). In class on Nov. 20 we will visit an area of the Younger Lagoon Natural Reserve that is scheduled for restoration. You must develop a plan for rehabilitating this area and will have an opportunity to discuss it in section the following week. More details will be provided on Nov. 20.