

## Restoration Ecology - BIOL 5170

### CSU Stanislaus, Spring 2013

**Instructor:** Dr. Matthew R. Cover, Assistant Professor, Department of Biological Sciences

**Office Hours:** Wednesday 12:30-1:30 (The Commons, N124), Friday 9-10 (my office, N273), or by appointment

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**Office Phone:** (209) 667-3603 (not a good way to reach me)

**Website:** <http://www.matthewrcover.com>

**Course Website:** Blackboard (<http://bb.csustan.edu>)

**Time:** Wednesdays 2:00-4:50; Fridays 2:00-4:50

**Location:** TBD

*"Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed."* – Restoration Primer, Society for Ecological Restoration

*"Here is the means to end the great extinction spasm. The next century will, I believe, be the era of restoration in ecology."* – E.O. Wilson

*"Here is some stuff to piss off almost everyone: three facts and an opinion. One: Hunting and gathering does more than remove target species. Two: We cannot study these changes in real time as no wilderness remains. Three: It will be much more difficult to go back from whence we came. And lastly, an opinion: We need to intervene on a massive scale, but we don't know how to put things back together... We need to start accepting that the train left the station a long, long, time ago and the tracks have been burning behind that train ever since."*

-Jeremy Jackson, 2<sup>nd</sup> Marine Conservation Biology Conference, 2001

### Course Description

Human activities have greatly altered natural landscapes and ecosystem processes in virtually every landscape on earth. These anthropogenic alterations include hydrologic modification of streams and rivers, urbanization and suburban sprawl, fire suppression and logging of forests, draining and filling of wetlands, and livestock grazing and agriculture. Through the disruption of natural processes we have also impacted critical ecosystem services that promote clean water, soil fertility, resilience to floods, etc. This course provides an introduction to the principles of ecological restoration, a field that aims to assist in the recovery of altered or degraded ecosystems. Course readings and discussions will relate ecological restoration to a wide range of potential applications and ecosystem types, with a focus on issues relevant to the Central Valley in particular and California in general. There will be a roughly even balance between theory (readings and discussion) and hands-on work. Hands-on work will involve a small-scale grassland restoration project on our campus, post-project monitoring of a large-scale floodplain and riparian restoration project at the San Joaquin River National Wildlife Refuge, and other field trips and activities. Additionally, students will develop their own individual project related to restoration ecology during the semester.

## **Readings**

There is one required textbook: *A State of Change*, by Laura Cunningham. This book will be available for purchase from the instructor. Additional course readings will be posted on the Blackboard site, or will be handed out in class.

## **Student Learning Objectives**

After successfully completing this course, students will:

1. Have a comprehensive understanding of the theory, philosophy, and terminology of the field of restoration ecology, based on careful readings of journal articles, project reports, and other texts.
2. Be able to critically analyze the design and practice of ecological restoration projects.
3. Gain experience in designing restoration projects and conducting post-project monitoring, including a variety of field and laboratory methods in ecosystem analysis.

## **Activities and Evaluation**

### 1. Reading and Discussion (20% of grade)

Essential to this course is the critical and deep reading of texts and articles. Restoration ecology is a relatively young academic discipline (although people have been “restoring” ecosystems for millennia), and as such there are many theoretical and philosophical differences among its practitioners. Additionally, there are no easy answers to many of the most pressing threats to ecosystems, including invasive species, climate change, biodiversity loss, habitat fragmentation, etc.

It is of the utmost importance that each student engages deeply with the readings. This means not just reading for conceptual understanding, but asking the tough questions, making connections, and synthesizing information. Our goal is to push each other to develop a holistic understanding of the field of restoration ecology, and to learn from as many voices and practitioners as we can in order to develop a range of “toolkits” for designing solutions to environmental problems.

### 2. Selecting Readings and Leading a Discussion (10% of grade)

Each student will be responsible for selecting the readings and facilitating the discussion for one class session during the semester. For all of our benefit, spend some serious time selecting a reading that is thought-provoking, relevant, and of high quality (good writing and good research). You will need to distribute the reading at least one week (preferably two) before the class. During the discussion, you will be responsible for helping us reach a deeper, nuanced understanding of the issues, and putting them in context.

### 3. Idea Journal (25% of grade)

All of the notes you make during class discussions, while reading assigned texts, while brainstorming about your project, etc., should be kept in one place, i.e. your “idea journal.” Ideally the idea journal will be a bound notebook, although any sort of system you want to use is fine (electronic, scraps of paper, etc.), provided you can turn it every 3-4 weeks (I will announce it ahead of time). Your journal should show your thought process, ideas, interpretations, and analyses as you gain a greater understanding of restoration ecology and as you figure out your own project.

#### 4. Individual Project (30% of grade)

Each student will develop their own project related to restoration ecology. Ideally this project should help you along with your thesis. Virtually any type of project is acceptable: a field study, lab study, literature review, critical review, philosophical essay, outreach/education, etc. Group projects are possible as well, provided you get approval from me first.

Examples of Potential Individual Projects:

- Experimental comparison of specific restoration methods
- Design of a restoration plan for a site, either real or imagined
- Literature review of restoration related to a specific ecosystem, type of degradation, restoration method, etc.
- Determination of appropriate restoration targets for a site

Proposal (5%)- A one page project proposal detailing your question, plans, ideas, issues, etc. Due Weds March 13.

Update (5%)- A 2-3 page update on what you have accomplished, problems you've come across, rough draft of your writing, etc. Due April 10.

Presentation (5%)- Weds May 15.

Final Project (15%)- Due Weds May 22 (finals week).

#### 4. Grassland Restoration Class Project (10% of grade)

We will discuss the specifics of the class project early in the semester, including our specific goals and tasks. The class will work together to carry out the restoration project, including planning, design, field work, monitoring, analysis, outreach, etc. Each student will be evaluated on their contribution to the overall project.

#### 5. Field Trip Participation (5% of grade)

We will be taking several field trips to nearby restoration projects. The exact choice of locations will depend upon the interests of the group. We will definitely be taking two field trips to the San Joaquin River National Wildlife Refuge in April. During the first trip we will visit and observe some floodplain riparian vegetation restoration sites that are up to 10 years old. On the second trip we will do a "bio-blitz" study to rapidly investigate differences in ecosystem function and biodiversity among the sites. Your participation and leadership will be important to the success of the class.

## Initial Schedule

Weds, 1/30: Introduction to the course. Planning and brainstorming.

Fri, 2/1: Visit restoration site and greenhouse. Begin developing project plan.

Discuss: SER Restoration Primer and A State of Change, pgs 101-126, 145-152

Weds, 2/6: Philosophy.

Discuss: Higgs, Nature by Design, 2003, Introduction, and Chp. 4: Historicity and Reference in Ecological Restoration

Fri, 2/8: Grassland restoration challenges. Finalize restoration plan.

Discuss: Barry et al. 2006, California native grasslands: a historical perspective; Stromberg et al. 2007, California grassland restoration. In: *Ecology and Management of California Grasslands*.

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## Other important dates (tentative):

Weds, 3/6: Proposal writing: the “Pyramid” outline for scientific writing, example proposals and articles

Weds, 3/13: Proposals due.

Fri, 4/12: SJRNWR Trip 1

Weds 4/17: BioBlitz study design

Fri 4/19: SJRNWR Trip 2

## Discussion Leader Dates

W 2/20                      F 2/22

W 2/27                      F 3/1

W 3/13                      F 3/15

W 3/20                      F 3/22

W 3/27                      F 3/29