Syllabus

WILD 4700, Ecological Foundations of Restoration
Spring 2018

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Class: TR, 12:00-1:15+, BNR 314

Office Hours: MWF, 10:30-11:30; TR, 11:00-11:50 (except for occasional emergency absences)

If you cannot come at this time, make an appointment after class, by phone, or by e-mail. Please note that my e-mail is for notifying me in emergencies and for making appointments, not as a substitute for office visits.

Format:
Two 75-min+ “lectures” per week. Although most of these will indeed be primarily me talking, some periods will be devoted to other activities such as working on the group project, giving student presentations, etc. However, the “lectures” will be different from the typical lecture. I will post on Canvas pdfs of very detailed notes covering each topic in advance and expect them to be read and thought about in advance. Then in class I will go over those notes with a PowerPoint. Instead of taking non-stop notes you will be paying attention, thinking, questioning, discussing, and adding additional thoughts to your handouts. So in a sense, the “lecture” is a review/clarification of the notes – repetition helps – and an opportunity for us to talk in more detail about things that are less clear or more interesting. Hopefully we will have good dialogue.

Educational Objectives:
This course is the Capstone Course for the Conservation and Restoration Ecology degree. Thus, it will be integrative and will be partially used to assess your entire educational experience, mostly through a group project that constitutes the Capstone Experience and requires integrating information from this class with knowledge you have obtained throughout your education – both in classroom settings and real-world hands-on experiences.

The specific content presented in this course is designed to build on basic natural science knowledge developed in courses such as Biology I and II (Biol 1610 and 1620), General Ecology (NR/Biol 2220), and Fundamentals of Soil Science (PSC 3000); and to complement the more applied knowledge obtained in courses such as Vegetation and Habitat Management (WILD 3850). Specific objectives are:

1) To develop an advanced understanding of principles of basic plant ecology and evolution especially relevant to the restoration of healthy and functioning natural ecosystems, with an emphasis on issues related to the establishment, survival, growth, and reproduction of plants.

2) To develop an ability to integrate information across levels of ecological organization (e.g., links between ecosystem function and plant establishment) and across temporal and spatial scales (e.g., effects of short-term climatic changes on long-lived species).
3) To gain an understanding of how ecological information can improve restoration decisions and explain restoration failures.

**IDEA Center Evaluation Objectives:**

22. Learning fundamental principles, generalizations, or theories
23. Learning to apply course material (to improve thinking, problem solving, and decisions)
25. Acquiring skills in working with others as a member of a team

**Readings:**
There is no textbook for this class. However, I will assign required readings and suggest additional useful readings – journal articles, book chapters, etc. – throughout the course. These readings either will be available to download electronically from the library or they will be placed on the course Canvas page. Remember, if you are off campus connect to the vpn to get access to journals through the library.

**Required Electronic Resource:**
Go to [http://www.ser.org/page/SERDocuments](http://www.ser.org/page/SERDocuments), the publications listing on the web site of the “Society for Ecological Restoration.” There are many valuable resources here but two in particular will be important for us. Print or save them, read them, and keep them in mind throughout the course. They are compact but are relevant to a lot of what we will talk about in class:

1) “The SER International Primer on Ecological Restoration” (15 pp). Scroll down through the publications to find it.
2) “International Standards for the Practice of Ecological Restoration.” Near the top. Published in December 2016, this combines some information from a number of SER’s previous publications, including the Primer.

**Important Electronic Resources To Be Aware Of:**
“Clewell, A., J. Riegler, and J. Munro. December 2005. Society for Ecological Restoration International: Guidelines for Developing and Managing Ecological Restoration Projects, 2nd Edition.” Also from SER’s website. Although we will not directly cover developing and managing restoration projects in class, this is useful information and will likely be very relevant to your group project.


Or hard copies can be ordered from the Rocky Mountain Research Station site.


NRCS Idaho-Utah Plant Materials Technical Notes: There is quite a range of fact sheets here covering all kinds of topics, some of which is very relevant.

http://www.nrcs.usda.gov/wps/portal/nrcs/detail/id/technical/?cid=nrcs144p2_047763#technotes

Great Basin Consortium: The consortium is a “network of networks” linking six groups of managers and researchers dealing with management of Great Basin landscapes. All groups can easily be accessed from this site and this gives access to a lot if information, some directly relevant to this class, some relevant to your future if you expect to remain in land management in the Intermountain Region. See:

http://greatbasinresearch.com/consortium/index.html

Sage Grouse Initiative: Especially consider the “Great Basin Fact Sheet Series” at http://www.sagegrouseinitiative.com/category/great-basin-factsheet-series/

Sagebrush Steppe Treatment Evaluation Project (SageSTEP): The web site of our research consortium is also a place to look for information.

http://www.sagestep.org/


Student Evaluation:
There will be no exams in this class. Assessment of your performance will be based exclusively or nearly so on an individual student presentation and two group presentation. There might be one or more opportunistic short writing assignments, but that depends on how the semester goes and what interesting opportunities arise (for example, a relevant seminar).

Each student will be responsible for one individual PowerPoint presentation (20 minutes each) during the semester. Details and a schedule will be provided later, but presentations will be based on a scientific paper on a restoration ecology topic from the peer-reviewed literature selected by you and approved by me. This is a chance to explore more thoroughly a topic of interest to you.

Final group presentations will be based on an analysis of a restoration scenario and will be by PowerPoint. These will be presented at the end of the semester by the entire group to the entire class. I will assign groups and the specific scenario to be assessed fairly early in the semester. This is a project that should be worked on throughout the semester, although I imagine much of the work will be later in the course after more material has been covered. However, to insure that groups are organizing their
project and working on it groups will give “progress report” presentations about half way through the semester. Keep in mind that in this project you will be drawing on all of your formal and informal education, not just material from this class. Consequently, the presentation is expected to incorporate information ranging across ecology, natural resources management, soils, economics, policy, and more.

**Grading:**

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<th>Component</th>
<th>Points</th>
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<tr>
<td>Final presentation</td>
<td>150</td>
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<tr>
<td>Progress report presentation</td>
<td>50</td>
</tr>
<tr>
<td>Individual presentation</td>
<td>40</td>
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<tr>
<td>Any writing assignments</td>
<td>30</td>
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Grading will be based on a 90-100% = A, 80-89% = B, etc. scale. Depending on scores, these cutoffs may be shifted slightly up or down, but not by much.

**Student Progress on Departmental Learning Objectives:**
Performance in this course will contribute to the evaluation of your individual progress on the following departmental learning objectives:

- **Primary Objective:** C5. Understanding of and ability to apply what is learned in the major to conserve and restore natural resources – ability to research possible solutions to natural resource problems, then develop a conservation or restoration management plan with specific objectives and constraints. **60% weight.**

- **Secondary Objective:** C4. Ability to communicate – includes the ability to understand scientific and other documents in order to critically evaluate opposing viewpoints in conservation and restoration; to prepare and deliver effective oral presentations to professionals and stakeholders; and to write clearly for both technical and non-technical audiences. **30% weight.**

- **Tertiary Objective:** C3. Understanding of the social context in which conservation and restoration are conducted – includes basic understanding of human behavior, economics, and culture and their impacts on natural resources; of human demands for natural resources and their effects on resource availability and quality; of natural resource policy and how it is developed; of how federal, state, and local laws and regulations govern natural resource management; and of the ecosystem services that wildlands provide to society. **10% weight.**

**Academic (Dis)honesty:**
This course will have zero tolerance of cheating and plagiarism. Read and believe the statement on “Academic Honesty/Integrity” ([http://catalog.usu.edu/content.php?catoid=12&navoid=3140&hl=academic+dishonesty&returnto=search](http://catalog.usu.edu/content.php?catoid=12&navoid=3140&hl=academic+dishonesty&returnto=search)). If you have any question about what constitutes academic dishonesty, or what the consequences of dishonesty may be, see Article V, Section V-3, and Article VI of the USU Student Code ([https://studentconduct.usu.edu/studentcode/](https://studentconduct.usu.edu/studentcode/)). In brief, academic dishonesty is not only grounds for failing the course, but potentially for being expelled from the University.

**Students with Disabilities:**
If you have any disability that requires accommodation, such as the use of a reader, scribe, interpreter, alternatives to print media (e.g., Braille, large print, or audio format), or extra time for exams, the
University and I are more than happy to accommodate you to the fullest extent possible. You must, however, document your disability and needs at the Disability Resource Center in University Inn 101 and talk to me as soon as possible.
### VERY TENTATIVE Course Outline

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<th>Week(s)</th>
<th>Topics</th>
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| 8 Jan   | **Foundations**
|         | disturbances; definitions; what is “natural?”; what are we trying to restore?; “reference communities” as restoration models; historic and future climate change |
| 15 Jan  | **Soils and landscapes from a restoration perspective**
|         | topographic effects/topographic heterogeneity; review of soil structure and chemistry relevant to plant establishment; nutrient availability and redistribution; water infiltration/soil erosion |
| 22 Jan  | **Genetic considerations for restoration**
|         | genetic variation, plasticity, and adaptation; seed source considerations; natural selection and evolution; *in situ* evolution vs. selected ecotypes for restoration |
| 29 Jan  | **Plant physiological ecology and restoration**
|         | resource capture and use; adaptations to stress |
| 5 Feb   | **Seed banks, germination, and establishment ecology**
|         | seed dormancy and germination; safe sites; seed bed conditions; limits to recruitment: seed availability vs. environmental conditions |
|         | **Note:** USU has declared Tuesday 20 February to NOT be a Tuesday. Attend Monday classes |
| 12 Feb, 19 Feb | **Population ecology**
|         | populations and metapopulations; minimum viable population size; implications for restoration |
| 26 Feb | **Spring Break! Go to southern Utah and live it up! Woohoooo!** |
| 5-9 Mar | **Plant-plant interactions: competition and facilitation**
|         | intraspecific competition; self-thinning; density dependence; interspecific competition; competitive response vs. competitive effect; traits associated with competitive ability; resource capture and resource use in relation to competition; facilitation of recruitment |
| 12 Mar, 19 Mar | **Community ecology**
|         | regional processes; environmental filters; biotic interactions; multiple states and restoration trajectories; diversity effects |
| 26 Mar, 2 Apr | **Ecosystem processes from a restoration perspective**
|         | food web dynamics; nutrient cycling; disruption and repair of ecosystem processes; feedbacks |
| 9 Apr, 16 Apr | **Issue: restoration and invasive species**
|         | integrating a variety of issues in the context of weed invasion |
| 23 Apr | **Final group project presentations:**
|         | Two will be on 1 May, 9:30-11:20, during the scheduled final. The other(s) will be in the last week of class |