Syllabus

REM 459 Rangeland Ecology

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Course Goals

This course is my favorite course of those that I teach. I enjoy introducing students to the ecology of sagebrush steppe, juniper woodlands and other semi-arid and arid ecosystems that occupy nearly 50% of the world's land surface. I hope that they come to appreciate them and become as interested in these lands as I am.

During the course we will discuss the major ecological principles and processes that influence the function of rangeland ecosystems. Ecological processes are similar across all types of ecosystems. However, some processes are more important determinants in some ecosystems than in others. We will focus on those processes that greatly influence the function of rangeland ecosystems such as succession, disturbance (e.g. herbivory, fire, and climatic variation), and nutrient cycling. Diversity and sustainability of ecosystems are ever- increasing important considerations. We will discuss these topics as they are currently applied to rangelands. I will often use examples from other types of ecosystems, such as wetlands, tide marshes, and temperate forests, to illustrate particular points.

Learning Outcomes

In this course, we will discuss the development of ecological principles and concepts that relate to the vegetation of rangeland ecosystems. Students will:

- Understand the development of ecological principles and concepts that pertain to the vegetation of rangeland ecosystems.
- Learn how plant communities develop and apply these concepts to ecosystem management.
- Learn the importance of secondary and primary succession as applied in rangeland management.
- Learn and practice common rangeland vegetation classification procedures.
- Learn the ecological role of disturbance in biotic community function.
- Understand concepts related to ecological (range) condition and trend.
- Apply broad-scale management of ecological concepts.

The material related to these concepts will be provided through:

1) Approximately 25 “lectures” delivered via BbLearn
2) Course textbook and supplemental readings
3) Video materials that are found on the internet

Please refer to the Units menu to access Lessons and materials that I expect you to review for each part of the course. Application of these concepts to land management will be illustrated through examples. Student will gain experience in critical evaluation and application of scientific literature.

Course Structure

The course is intended to be completed within the University of Idaho semester timeframe. The material is divided into lessons that focus on general topics. In each lesson module you will find the following:

1. A list of learning objectives for that module
2. Reading assignments (These may either be from the class text or supplemental readings that are available online.)
3. A narrated PowerPoint presentation
4. Assignments associated with that lesson (Note: Not all lessons have specific assignments associated with that specific material.)

Lessons include the following topics:

- What is a community
- Foundations of community ecology
- Succession
- Biological soil crusts
- Mineral cycles and nutrient cycling
- The soil environment
- Plant nutrition and growth
- Vegetation classification
- Disturbance ecology
- Biological invasions
- Biological diversity
- Ecosystem health and sustainability

Students’ grades in the class will be determined through the use of a midterm exam (1), written assignments (2), a field project (4 parts), and a final exam.

Prerequisites

In this course I will assume that you have previously taken a university-level introductory ecology course. You should be familiar with the basic concepts of ecology such as:

1. Trophic levels
2. Inter- and intra-specific interactions
3. Succession
4. Hydrologic cycle
5. Nutrient cycles, and
6. Energy flow through ecosystems

I will be using sagebrush steppe, juniper woodlands, tall grass prairie and other rangeland ecosystems as frequent examples in the course. You may have to seek supplemental information about particular species to help you become more familiar with the vegetation types used as examples.

Ecological and rangeland management terminology is not always consistent between authors and agencies and therefore can be confusing. However, it is important for communication for everyone to understand what is meant by the various terms that will be used in class discussion during the semester. The *Natural Resources Conservation Service (NRCS)* Range and Pasture Handbook contains a glossary that may be useful. The *Sawtooth National Forest Plan* also contains a glossary of terms used by the US Forest Service- Southwest Idaho Group. These glossaries may be useful to see terms defined that are specific to that agency. However, not all terms used in class discussions are found in these two glossaries.

Required Textbook

Barbour, M.G., J.H. Burk, W.D. Pitts, F.S. Gilliam and M.W. Schwartz. 1999. Terrestrial plant ecology- Third edition. Benjamin/Cummings, Menlo Park, CA.

The relevant chapters for each lesson are indicated in the BbLearn 'Lessons' tab.

Additional Reading

The text is written from a general plant ecology perspective and is not specific to rangeland ecology. Consequently, some topics of importance to rangelands are not discussed or only discussed briefly. In order to supplement the text in these areas, additional readings from journals, symposia proceedings and experiment station bulletins will be assigned. I will attempt to select additional reading materials that are either available online or through the electronic subscriptions currently held by the University of Idaho Library. See reference list at the end of this syllabus. The relevant additional readings are also indicated for each lesson in the BbLearn 'Lessons' tab.

See the **Supplemental Reading List** below.

Exams

The 1 midterm exam and the final exam are open note and open book but not "open classmate". The exams will be posted on the web for 1 day and you can log on any time during this period. Once you have logged on, you will have a specified amount of time in which to complete the exam (60 minutes). Consequently, you cannot rely too heavily on your open notes and text, and complete the exam in time. The exams will be composed of multiple choice, definitions, and short answer questions. The final exam will be comprehensive. **All exams will be available on Tuesday of the designated week.**

Assignments

Two assignments and a field project (with 4 parts) are required as part of the course. All assignments must be submitted electronically as **MS Word documents through BbLearn**. **The two assignments must be written in the format of a technical report including introduction, methods, results and discussion sections.** The first two parts of the field project are written as technical memos, Part 3 is written as a technical report, and Part 4 is submitted as a Powerpoint presentation. Both assignments and all four parts of the field project **must follow the guidelines described in the 'Writing Guide'** with respect to

table and figure formats, citation style, referencing of material in text, use of scientific names, use of metric units, etc.

When submitting files through BbLearn, please begin the name of each file with your last name and then first initial, and finally assignment name. For example, "**Doe-J-Field-Project-Part 1.doc**" would be the file name for my submission for the first part of the field project. This will greatly facilitate us being able to track your files and help make sure that you get credit for it.

All documents submitted must follow the organization commonly used scientific writing. I have briefly summarized these points of technical writing in the "Writing Guide" that is available with each assignment in BbLeanr. They will be graded in terms of the factors described in Table 1. Also refer to the assignment Grading Rubric for each assignment. These will provide you a better understanding of what is expected for each assignment. Unexcused late submission of assignments will be subject to a late penalty (1-5 days: -10%, 6-10 days -30%, 11-15 days -50%.).

Some assignments will require that you find supporting scientific journal publications. Generally using search tools such as **Google** **WILL NOT** be effective in locating these publications. However, **Google Scholar** can be very effective in helping you locate related documents. It can also help you linking to those references that the University of Idaho Library holds as an electronic version. The field assignment description includes some tips on how to locate scientific information online. See "Searching Online" section.

The field project is focused on the causes and effects of vegetation change. This vegetation change may be initiated by natural or human-cause disturbance, or caused by a change in land management. These changes result in changes to the composition of the site as the site adjusts to those influences. Students will project expected vegetation change (plant species composition change) into the future given your specific scenario. See Field Project assignment for more details.

The first "Assignment" is related to the calculation and interpretation of Ecological Condition and Trend. You will be supplied with a data set from which you will calculate ecological condition at several time periods and determine the ecological trend. See assignment description for more details.

The second "Assignment" involves calculating species richness and two species diversity indices for 10 sites for which species composition data have been previously collected. See assignment description for more details.

All assignments are due at midnight of the assigned day, usually Sunday. I have set up BbLearn to accept late assignments, so submit them through BbLearn even if you miss a deadline. However, late submissions will be subject to a late submission penalty.

Point System

Table 1. Factors used to determine final grade on written assignments and field project reports.

Category	Description	Percentage
Language Skills	Spelling, grammar, punctuation, sentence construction, use of slang, free of technical jargon as possible, logical flow of ideas through paragraphs and paper,	15
Technical Writing Skills	Correct and consistent use of citations in text, reference format in Literature Cited, scientific names of organisms, units of measure, table and figure are used effectively, formatted correctly and are referenced in text, data are clearly presented,	15
Organization	Used required paper format, information presented in a logical manner,	10
Technical Content	Use of relevant and recent scientific literature from a variety of sources to support conclusions, objectives of paper are clearly identified and discussed, information presented supports conclusions made,	60

Grading

Students' grades will be determined by the following:

Component	Percent of Grade
Exams (35%)	
Midterm Exam 1	15%
Final Exam	20%
Field project (35%)	
Project scenario (submitted a written assignment in technical memo form)	3%
Sampling design (submitted as a written assignment in technical memo form)	7%
Data analysis & presentation (submitted as a written assignment in technical paper form)	10%
Final Project Report (submitted as a written assignment in technical paper form)	15%
Assignments (30%)	
Ecological Trend Assignment (submitted as a written assignment in technical paper form)	15%
Species Richness and Diversity Assignment (submitted as a written assignment in technical paper form)	15%
TOTAL	**100%**

The Final grade for the class will be assigned as follows:

A	**90-100 %**
B	**80-90 %**
C	**70-80 %**
D	**60-70 %**
F	**< 60 %**

Disability Support Services

Reasonable accommodations are available for students who have documented temporary or permanent disabilities. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 306 in order to notify your instructor(s) as soon as possible regarding accommodation(s) needed for the course.

- **Phone:** 208-885-6307
- **Email:** dss@uidaho.edu
- **Website:** www.uidaho.edu/dss

University of Idaho Classroom Learning Civility Clause

In any environment in which people gather to learn, it is essential that all members feel as free and safe as possible in their participation. To this end, it is expected that everyone in this course will be treated with mutual respect and civility, with an understanding that all of us (students, instructors, professors, guests, and teaching assistants) will be respectful and civil to one another in discussion, in action, in teaching, and in learning.

Should you feel our classroom interactions do not reflect an environment of civility and respect, you are encouraged to meet with your instructor during office hours to discuss your concern. Additional resources for expression of concern or requesting support include the Dean of Students office and staff (5-6757), the UI Counseling & Testing Center's confidential services (5-6716), or the UI Office of Human Rights, Access, & Inclusion (5-4285).

Supplemental Reading Material

Journal Articles, Bulletins and other Sources

Belnap, J., J.H. Kaltenecker, R. Rosentreter, J. Williams, S. Leonard and D. Eldridge. 2001. Biological soil crusts: ecology and management. USDI Bureau of Land Management, US Geological Survey Tech Ref 1730-2, Chapter 1, Chapter 2 (pp 11-23) and Chapter 3. http://www.blm.gov/nstc/library/techref.htm

Briske, D.D, S.D. Fuhlendorf* and F.E. Smeins. 2003. Vegetation dynamics on rangelands: a critique of the current paradigms. **Journal of Applied Ecology 40:601-614.**

Brown, J.K., and J. Kapler Smith, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol 2. Ogden, UT: US Department of Agriculture Forest Service, Rocky Mountain

Research Station. 250 p. [Read Chap 1 (pp 1-8), Chap 2 (pp 9-34), Chap 9 (pp 185-195)] http://www.fs.fed.us/rm/pubs/rmrs_gtr042_2.pdf

Christensen, N.L., A.M. Bartuska, J.H. Brown, S. Carpenter, C. D'Antonio, R. Francis, J.F. Franklin, J.A.MacMahon, R.F. Noss, D.J. Parsons, C.H. Peterson, M.G. Turner and R.G. Woodmansee. 1996. The report of the Ecological Society of America committee on the scientific basis for ecosystem management. **Ecological Applications 6:665-691.**

Joyce, L.A. 1993. The life cycle of the range condition concept. **Journal of Range Management** 46:132-38.

Mack, R.N., D. Simberloff, W.M. Lonsdale, H. Evans, M. Clout and F.A. Bazzaz. 2006. Biotic invasions: causes, epidemiology, global consequences, and control. **Ecological Applications 10:689-710.**

Neary, D.G., K.C. Ryan, L.F. DeBano, eds. 2005. Wildland fire in ecosystems: effects of fire on soil and water. Gen. Tech. Rep. RMRS-GTR-42-vol 4. Ogden, UT: US Department of Agriculture Forest Service, Rocky Mountain Research Station. 257 p. [Read Chap 1 (pp 1-17), Chap 2 (pp 29-40), Chap 3 (pp 53-71), Chap 4 (pp 73-91] http://www.fs.fed.us/rm/pubs/rmrs_gtr042_4.pdf

Miller, R.F., J. D. Bates, T.J. Svejcar, F.B. Pierson, L.E. Eddleman. 2005. Biology, ecology and management of western juniper. Oregon State University, Agricultural Experiment Station Tech Bull 152. 77p. (Focus on pages 20-34.) http://www.cnr.uidaho.edu/range459bunting/Literature/Miller_et_al_Ecol_of_Juoc_2005.pdf

Polley, H.W. 1997. Implications of rising atmospheric carbon dioxide concentration for rangelands. **J. Range Management 50:561-577.**

Pyke, D.A., J.E. Herrick, P. Shaver and M. Pellant. 2002. Rangeland health attributes and indicators for qualitative assessment. **Journal of Range Management 55:584-597.**

Sutherland, S. 2004. What makes a weed a weed: life history traits of native and exotic plants in the USA. **Oecologia 141:24-39.**

West, N.E. 1993. Biodiversity of rangelands. **Journal of Range Management 46:2-13.**

Web Sources

American Institute of Biological Sciences. 2002. Biodiversity: diversity of species. Interview with Edward O. Wilson.
[http://www.actionbioscience.org/biodiversity/wilson.html Accessed August 22, 2013]

California Department of Forestry and Fire Protection's Fire and Resource Assessment Program (FRAP). No date. State and transition models for California's hardwood rangelands.
[http://www.frap.cdf.ca.gov/projects/hardwood_expert/building_state/overview2.htm Accessed August 22, 2013]

Haines, D.F., T.C. Esque, L.A. DeFalco, S.J. Scoles, M.L. Brooks and R.H. Webb. No date. Fire and exotics in the Mojave Desert: an irreversible change? A state-transition model for blackbrush (Coleogyne ramosissima) habitat. US Geological Survey.
[http://www.dmg.gov/resto-pres/mon-08-haines.pdf Accessed August 22, 2013]

USDA Natural Resources Conservation Service. 1996. Rangeland Health. RCA Issue Brief #10. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/rca/?&cid=nrcs143_014218 Accessed August 22, 2013]