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Office hours: drop by anytime between 8-5 or arrange for specific times via email

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Office hours: Thursdays, 1-2 pm or by prior arrangement

Lectures: Tuesday and Thursday, 10:45 am - 12:05 pm, LS 101

Discussion sessions (optional): TBD in class first day

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1. Course learning objectives

As an interdisciplinary upper division biology course, the learning objectives of this lecture course are

1. To introduce students to concepts in ecology and plant distribution, so they are able to understand how the principles of natural selection and mechanisms of genetic change, explain the observed diversity of life that has arisen over long-term as well as over recent evolutionary time frames.
2. To introduce structure and function concepts so that students are able to apply knowledge of molecular, cellular, and organismal structures to explain the diverse set of functions – ranging from the subcellular to behavioral to ecological – that underlie the remarkable diversity of individual organisms as well as communities of organisms.
3. To introduce systems-level concepts, including the interactions of ecological cycles, so that students are familiar with natural systems and how humans impact vegetation at landscape and regional scales.
4. To develop critical thinking skills through data evaluation and group discussions (ability to apply the process of science and quantitative reasoning)
5. To develop collaboration skills through group projects, debates, and exam preparation so that students are able to apply concepts and interdisciplinary knowledge from within and outside of biology to interpret biological phenomena, communicate, and work collaboratively to solve problems.
6. To expose students to the interactions between science and society, including the application of ecological knowledge to evaluate the interactions between biology and society.

7. To develop writing skills through project assignments and written feedback from instructor and TAs
8. To develop oral skills through debates and group discussions.

2. Achieving learning objectives

These course learning objectives will be achieved through lectures, discussions, reading assignments, independent assignments with feedback, and opportunities to develop and increase a student's oral and written communication skills. Assignments will require that students are familiar with Microsoft Office Products (MS Word, Excel, and PowerPoint) or equivalent computer programs for data analysis, word processing, and graphics preparation.

3. Text books (optional) and reading materials

- Bailey, *Ecoregions*
- Lambers et al., *Plant Physiological Ecology*
- Both books are available for check out at the Marriott Library.
- PDF copies of background literature for each lecture are found at the UU CANVAS site.

4. CANVAS and course websites

- The UU CANVAS site contains all of the downloadable files (e.g., reading assignments, PDF copies of lectures, project details, downloadable data sets, copies of previous exams, and current exam materials), duplicating essential elements of the public website. The CANVAS website also contains videos of all lectures.
- All assignments must be turned in by uploading through the UU CANVAS site.
- The additional course website URL visible to students and the public is <http://plantecology.net>, which will contain a list of weekly activities, PDF copies of lectures, project details, downloadable data sets, copies of previous exams, and current exam materials.

5. Lecture Schedule and Lecture Style

Come prepared by viewing the lecture prior to class. As all of the lectures will be available online in advance of each lecture date (videos of lectures and PDFs of slides shown in the videos), we expect that you are familiar with the materials before coming to class. In other words, watch the lecture and take the online quiz. In that way, we can better use class time to discuss key concepts and to engage in a discussion of the examples provided that support lecture themes and principles. The lecture schedule is available at the UU CANVAS site; the lecture videos are viewable on UU CANVAS and there are also links to a private YOUTUBE channel with the lectures as well.

6. Assignments, Quizzes, and Examinations Schedule

The assignments and examinations schedule is provided in Section 20 of the syllabus and also available at the UU CANVAS site. **Please note that you are expected to watch the recorded lectures prior to class and to take a quiz prior to each class.**

7. Not Officially 'Writing Intensive', but with a Strong Focus on Improving Your Writing Skills

1. We expect papers to reflect your best effort. If there are excessive grammatical and/or spelling errors in your paper, we will discuss this with you individually, we will offer help in improving the quality of the presentation, and we will expect that you will correct and improve the paper before a grade for that submission is received.
2. When your first graded paper is returned to you, you will be expected to incorporate the comments and resubmit the revised paper for a second round of grading where your total score can reach a maximum of the original score plus one-half the difference between your original score and 100. This option is not available for the second paper.

3. Although this is not a “writing intensive” class, we do expect that papers will be written with reasonable quality in terms of content, data analysis, and presentation. After all, once employed after finishing school, you certainly would not think of turning in shoddy work to your employer.

8. Group Projects

- Collaboration and communication are important skills in the workforce today.
- For each of two group projects, you are encouraged work in groups of 2-6 students to collect and analyze the data, publications, or other pieces of information relevant to the project.
- Each group will be expected to share and to analyze the data together; they may also decide to jointly produce graphs and/or tables as a part of their analyses.
- However, when it comes to actually writing a report, individual writing efforts are required.

9. Examinations

- Tests will primarily focus on problem solving and evaluation of experimental data. You will be given the data for the exam two weeks prior to the exam. There may be a few multiple choice and fill-in-the-blank for those who feel most comfortable with those testing approaches.
- Exams will be based on the lectures, but you must be familiar with the assigned reading.
- Previous examinations will be available through CANVAS and the course home page.
- Exams are taken online at the location of your choice.
- There will be no regularly scheduled final exam.

10. Grading for Course

Students are not competing with each other for a grade. A student’s final grade will be based on a cumulative point total.

90-100% = A; 80-89% = B; 70-79% = C; 60-69% = D; <60% = E

The grading points will come from the following:

Quizzes

- 120 points, pre-lecture, online quizzes, 24 @ 5 points each
- 80 points, Mini-test and data evaluation exercises, 4 @ 20 points each

Exams

- 100 points, Examination 1 based on data provided to evaluate
- 100 points., Examination 2 based on data provided to evaluate

Papers

- 125 points, Campus as a Living Lab Paper
- 100 points, Plant and Ecosystem Policy Paper

Presentation

- 25 points, Participation in an oral debate

Total 650 points: written and oral presentations (250), exams (200), and quizzes (200)

11. Optional Discussion Session

(not to be confused with group discussions described below). There will be an optional one-hour discussion each week led by the Teaching Assistant to answer questions from the lectures, to get additional training on computer programs, and to cover other topics of interest.

12. All Papers are to be Uploaded through CANVAS

All project papers must

- Be uploaded electronically as PDF files at the UU CANVAS site associated with the assignment
- Be in readable English, free of grammatical and typographical errors
- Contain high-quality and clear figures or tables inserted into the appropriate parts of the text and each containing a figure legend or table legend
- Have at least one graphic that is computer generated so that we know you have acquired computer-based, data-analysis skills
- Contain a list of scientific references presented in the Ecology or Ecological Applications style citation format

There are plenty of computers available on campus and within the department to assist you. Spell checking and grammar checking programs, spreadsheet programs, drawing programs, statistical programs, and data-analysis programs are also available.

13. Group Debate Discussions

Students are given the opportunity to participate in one of several debate group discussions (12 minutes maximum for pro/con, position/response), which focus on issues of interest to the general public and related to plant ecology. These discussions will take place during class for about a 20-minute period. Each discussion debate will consist of pro and con positions for a particular topic.

The debate topics are

- 11/12, Should xeriscaping be mandated by law or receive tax incentives?
- 11/14, Should shrub-grassland wildfires be suppressed or allowed to burn in Utah's deserts?
- 11/19, Should the Central Wasatch National Conservation & Recreational Area Act be passed?
- 11/26, Should we mandate control of invasive species in the foothills along the Wasatch Front?
- 12/3, Should dogs be allowed to roam freely in canyons along the Wasatch Front, since 60% of our drinking waters comes from these mountains?
- 12/5, Should regulations be put in place to reduce algal blooms in Utah Lake, Scofield Reservoir, and/or the Jordan River?

What is expected as part of this debate:

- You will work in groups of 4 students – 2 'pro' and 2 'con' on the issue; pro-con groups will talk to each other well in advance of the debate so that they know they are debating the same topic
- To prepare for these discussions, groups will want to review recent literature (scientific articles, magazine articles, newspaper articles, etc.).
- Your assignment will be to lead a debate style discussion on this topic between the pro/con groups for a total of 12 minutes (10 points). In order, this format will consist of
 - 3 minute 'pro' presentation
 - 3 minute 'con' presentation
 - 3 minute 'pro' rebuttal presentation
 - 3 minute 'con' rebuttal presentation
 - open discussion with all class members
- The debate is a presentation and subsequent discussion without slides.
- A 1-page handout describing your position is required and will be presented to the class at the time of the debate (15 points).

14. ADA Information

The Americans with Disabilities Act. The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

15. Course Drop Policy

The withdrawal policy is the same as the University policy described in the Class Schedule. Students may drop without penalty or permission up through early September (see schedule). Up through mid October, students may withdraw without permission, but will receive a “W” grade. Course withdrawal after this date is possible with permission of the instructor, but requires a significant medical or personal situation in order for the withdrawal to be approved.

16. Addressing Sexual Misconduct

Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

17. Plagiarism

Plagiarism will not be tolerated. Please read the document for details about this form of cheating within the CANVAS folder associated with this class. You may also download a copy at http://www.plantecology.net/uploads/3/1/8/3/31835701/avoid_plagiarism_advice.pdf.

18. University Safety Statement

The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit <http://safeu.utah.edu>.

19. Inclusivity Statement

Names/Pronouns. Class rosters are provided to the instructor with the student’s legal name as well as “Preferred first name” (if previously entered by you in the Student Profile section of your CIS account, which managed can be managed at any time). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels best for you in class or on assignments.

Please advise me of any name or pronoun changes so I can help create a learning environment in which you, your name, and your pronoun are respected. If you need any assistance or support, please reach out to the LGBT Resource Center. https://lgbt.utah.edu/campus/faculty_resources.php

Wellness Statement. Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at www.wellness.utah.edu or 801-581-7776.

Diversity / Inclusivity. It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you. (Source: University of Iowa College of Education)

Veterans Center. If you are a student veteran, the U of Utah has a Veterans Support Center located in Room 161 in the Olpin Union Building. Hours: M-F 8-5pm. Please visit their website for more information about what support they offer, a list of ongoing events and links to outside resources: <http://veteranscenter.utah.edu/>. Please also let me know if you need any additional support in this class for any reason.

English Language Learners. If you are an English language learner, please be aware of several resources on campus that will support you with your language and writing development. These resources include: the Writing Center (<http://writingcenter.utah.edu/>); the Writing Program (<http://writingprogram.utah.edu/>); the English Language Institute (<http://continue.utah.edu/eli/>). Please let me know if there is any additional support you would like to discuss for this class.

20. Guidelines and Instructions for Papers Submitted in Biology 5460

Topic and length

The "5-3-15" guidelines are required for all papers. Your paper is submitted as a PDF and must be

- 5-pages in length (double spaced text and including figures/tables, but not including references)
- Contain 3 figures or tables (included within the 5 pages)
- Include a minimum of 15 fully cited references related to the selected topic and that were cited within the text. Only one or two of these references can be web-page citations. The other citations must come from original, relevant scientific literature. And presented in the journal Ecology style format.

Title and text of paper

- The text must be in font size 11 or 12. 'Times New Roman' is the preferred font. The text must be an analysis, synthesis, summary, or review of the topic area as described for the specific assignment.
- Each page must be numbered.
- It is your responsibility to confirm the title and scope of your paper with the instructor or TA.
- You may work in groups of 2-6 for development of the paper concept, figures, and references. However, all writing must be completed individually.

Figures

- Preferably figures should be constructed using a drawing program (e.g., Illustrator, iDraw, Kaleidagraph, Prism).
- Each figure (or photo) must accompany a brief figure legend describing the contents of the figure and identifying the source of the information (if appropriate).
- Scanning figures and then importing them as JPEG files is OK, but please make sure that they are readable once the paper is in PDF format.

Tables

- Each table must be accompanied by a brief table legend describing the contents of the table and identifying the source of the information (if appropriate).
- Scanning tables and then importing them as JPG files is OK, but please make sure that they are readable once the paper is in PDF format.

References

- All references are presented at the end of the paper and must be in a consistent citation format.
- Many of you will use a literature-bibliographical program (e.g., EndNote, Mendeley, Zotero) for inserting cited papers into the text and bibliography. That is great. I have no preferences.
- While I prefer the citation format used by the journals Ecology or Ecological Applications, you may use any citation format you prefer that completely meets the following criteria:
 - A complete list of authors and the year of the publication are presented.
 - The full title of the article, book, or report is presented.
 - For journal article citations, the complete name of the scientific journal, volume, and all pages are presented; a DOI can also be included but is not required.
 - For books and reports, the complete name of the publisher, city of publication, and page numbers are presented.

If you want advice, here is more guidance on writing style and structure in your paper

1. Please write a nice, solid introduction and add a concluding paragraph or summary. Your reader will appreciate that.
2. An incomprehensible writing style and/or bad sentence structure frustrates those reading your paper. More importantly, your research and critical thinking will be obscured.
3. Do yourself a favor and proofread. Are you satisfied with the product? Was it readable?
4. Ditto for the organization of your paper: it's nice to read an organized, well structured paper that doesn't jump erratically from idea to idea, but rather, flows logically. Use an outline to develop a progressive, logical sequence! They exist for that reason.
5. Organize distinct thoughts/ideas into separate paragraphs. Remember to use a topic sentence.
6. A few spelling errors I can handle, but why when your word-processor has a spell checker?
7. Always, use your own words. Paraphrase - do not transcribe - other people's text. With or without quotations and citations, direct quotes just make the text read choppy.
8. Plagiarism – avoid it! This should be obvious to most people, but make sure you know what plagiarism is, especially since I have provided a separate topic on this topic. Again, always use your own words; it is really easy for us to find if you copied something from the web. If you do not understand plagiarism, GOOGLE the term on the web and take the time to read different presentations that describe the same basic phenomenon. Plagiarism is a violation of the University of Utah Student Conduct Code. (See class guidelines on plagiarism).
9. Do not use colloquial language and do not use abbreviations like “don't” or “isn't”. We are talking about a scientific paper here, not a personal essay or a pop magazine article.
10. Get in touch with your inner 'teen' and check out websites on writing essays. For instance, try <http://www.ipl.org/teen/aplus> and <http://members.tripod.com/lklivingston/essay/>

Information and Content

High scores are given if the TA feels the paper has pulled real substance from sources and put it together in a way that demonstrates an understanding of the topic. Your document should describe how all the details described come together in an explanation. Low grades for content are typically given to papers that do not seem to bring in much literature (often stretching a sentence or two into long paragraphs), give disconnected bits of information not related to a central idea, or contain many factual errors.

1. Ask yourself: Why am I writing about this topic? Why is it interesting to me? Convey the 'why' to the reader.
2. Analyze and think about what you read: what is the literature telling you? What is the scientific literature NOT telling you? Add your own insight.
3. Develop a thesis, or point of view, which you will support with facts or arguments. This should be apparent from your introduction. The following example tells the reader what the paper is about, and why it's interesting: "This paper will review the ecology and physiology of halophytic species around the Great Salt Lake. Living in some of the most stressful environments, halophytes employ physiological, biochemical and structural adaptations to thrive in extreme edaphic conditions where only a handful of plants are likely to survive." The author will then follow through and lay out the body of your essay accordingly, addressing the specific stresses and the adaptations, the landscape, ecology, physiology, biochemistry and other fascinating tidbits in a nice progression.
4. Always add a concluding or summary paragraph: restate the thesis, discuss some possible implications or wider significance of your topic and add a final statement on the subject.
5. Stay within the 5-page limit. Five pages are permissible, but the TA will not look kindly upon 6+ pages. The TA will not read beyond 5 pages of text.

Figures

1. We require 3 different figures or tables.
2. Each figure should highlight something interesting in your thesis.
3. The figures should be referred to in the text. The TA will reduce the score for figures that are only decorative and have no obvious relation to the text. The TA will also reduce the score for figures that are of low quality – always scan at the appropriate resolution.
4. Each figure must have it's own caption including figure number, description of the data/picture, and a reference. E.g. "Figure 1: Millions of dollars invested in the last 4 years by the US government in the control of invasive species. Source: Smith, 2003"
5. The figure is referred to in the text using the number, e.g. "The economical costs of managing invasive species are increasing every year (Figure 1)".
6. The figure should not be too big or too small--somewhere in the range of 7 x 10 cm is appropriate. In other words, do not present me with three huge figures and little text, or conversely, postage-stamp sized pictures that the TA cannot read. The TA will deduct points for poor scans, unappealing pictures, and tiny fonts.

References

1. Of the 15 required scientific references, a maximum of 2 can be from websites.
2. If you have to use websites, please use stable websites: e.g., www.noaa.gov, www.co2science.org. Pretty much any .com site is unacceptable.
3. All the references should be cited properly in the text and referenced correctly at the end of the document.
4. For the citation style you can use any acceptable format. Whichever citation approach you use, use it consistently throughout the paper.
5. Also be consistent in the reference style in your list at the end of the paper. A commonly used style is: author(s), year, title of article, source journal, volume, pages.
 - a. Example: Raven J.A. and D. Edwards (2001) Roots: evolutionary origins and biogeochemical significance. *Journal of Experimental Botany* 52: 381-401.

Don't underestimate the instructor or the TAs -- they may check your sources. They may also copy chunks of your text and search the web for the exact same word sequences. This is an easy way to detect plagiarism. Thanks to GOOGLE and plagiarism-checking software in Canvas, it is becoming easier to detect plagiarism.

Overall Impression

1. Did you put in an earnest effort?
2. Is the paper well prepared, easy to read/follow with nice graphics and interesting material?

Here is the grading rubric for papers submitted as part of this class:

Actual points	Possible points	
0	4	The obvious
	1	Is the text in size 11 or size 12 font?
	1	Is there a title for the paper?
	1	Was the paper submitted through the CANVAS website?
	1	Are there page numbers on each page?
0	15	Structure
	5	Is there a clear introduction that provides background information and an indication of why the study was conducted?
	5	How well does the paper provide an an orderly, logical presentation of information?
	5	Does the paper contain a brief and informative summary?
0	48	Content
	3	How well does the material presented relate to the assignment theme?
	10	How well does the paper provide an informative synthesis related to the chosen topic?
	10	Does the text provide sufficient depth and content to inform and educate the reader?
	10	Does the text effectively use literature to support claims or statements in the text?
	10	Is the writing style clear and easy to follow?
	5	Is the paragraph structure appropriate and the sequence logical?
0	18	Figures or tables
	5	Figure 1 or Table 1; is the content appropriate and relevent, is it of adequate quality
	1	Figure 1 or Table 1; is there an adequate figure legend or table description?
	5	Figure 2 or Table 2; is the content appropriate and relevent, is it of adequate quality
	1	Figure 2 or Table 2; is there an adequate figure legend or table description?
	5	Figure 3 or Table 3; is the content appropriate and relevent, is it of adequate quality
	1	Figure 3 or Table 3; is there an adequate figure legend or table description?
	15	Literature
	15	Literature cited - requirement is 15 citations; formatted completely and in consistent style at the end of the end of the paper (1 point each)
0		Submitted late (minus 10 points)
0	100	Total points

21. Lecture, Examination, Quiz, and Paper-due Schedule

Plant Ecology in a Changing World, Fall 2019

Date	Lecture #	Topic
Biomes and Climates of the World (The world as we see it)		
8/20/19	1	Adaptation, biodiversity, and the environment
8/22/19	2	Climate constrains plant distributions
8/27/19	3	Biome and climate relationships (<i>Online Mini-test 20 points</i>)
8/29/19	4	Desert and steppe ecosystems
9/3/19	5	Grassland, savannah, and shrub ecosystems
9/5/19	6	Forest ecosystems
9/10/19	7	Alpine and tundra ecosystems
Plant Adaptation (Environment and resource capture)		
9/12/19	8A	Microclimate 1 - the biophysical environment
9/17/19		Exam 1 on lectures 1-7 (100 points)
online only	8B	Microclimate 2 - the biophysical environment
9/24/19	9	Plants exchange energy with their environment
9/26/19	10	Plants acquire carbon and energy through photosynthesis (<i>Online Mini-test 20 points</i>)
10/1/19	11	Photosynthetic responses and adaptation to light and temperature
10/3/19	12	Water movement through the soil-plant continuum
10/3/19		Campus as a Living Lab paper due (paper #1, 100 points)
10/8/19		Fall Break
10/10/19		Fall Break
online only	13	Plant responses and adaptation to water stress
online only	15A	Environmental stresses limit resource capture and use
10/22/19	15B	Water stress and climate change impacts on western forests (Anderegg lecture)
Resource Utilization (Integrating plant characteristics to enhance performance)		
10/24/19	16	Plant architecture and carbon balance integrate plant activities
10/29/19	17	Plant phenology and resource allocation enhance performance
online only	19	Life history, and reproduction: its all about timing and provisioning
11/5/19		Exam 2 on lectures 8-19 (100 points)
Plant Responses to a Changing World (Sustainability, persistence, or disappearance)		
online only	22	Global anthropogenic changes occurring today that impact sustainability
10/31/19	23	Increased invasive species - characteristics of a serious invasive species
11/7/19	24	Atmospheric changes impact plant performance and evolution (<i>Mini-test, 20 points</i>)
11/12/19	25	Atmosphere and climate impact photosynthetic pathway advantages
11/14/19	26	Global carbon balance, bending the curve, and terrestrial subsidies to anthropogenic emissions
11/19/19	27	Warming impacts: phenology, fires, drought stress, and species range changes
11/19/19		Policy paper due (paper #2, 100 points)
Engineering Plant Communities (What we design as plant communities)		
11/26/19	28	Envision Utah - what the pioneers saw, what we see, and what our children will see
11/28/19		Thanksgiving Break
12/3/19	29	Restoration ecology - plant tolerances and putting the system back together again
12/5/19	30	Urban ecosystems and land-use changes (<i>Online Mini-test, 20 points</i>)
online only	31	Urban green infrastructure

Note that there is an online quiz to be taken in advance of each class lecture.