WATS 5310: Ecology and restoration of wetland and riparian plants (3 credits)

Class meeting time: Tuesdays and Thursdays 12:-1:15pm
Classroom: Biology/Natural Resources 113

Instructor:

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Office hours:

Email for appointment

Course web page: All course materials will be posted on and class announcements made via Canvas (https://learn-usu.uen.org/). Adjust your Canvas email notification settings accordingly.

Course readings: There will be no single textbook for this course. Course readings will be pulled from numerous textbooks, the primary literature, and online resources. All readings will be on CANVAS.

Course description

This course explores the ecology of wetland and riparian plants in the context of ecosystem restoration. We will focus on the needs of plant propagules (e.g., seeds, rhizomes, cuttings) to inform effective revegetation to meet habitat and other restoration goals.

Course objectives:

1) Gain an ***understanding of fundamental principles*** of the ecology of wetland and riparian plants, including:
   - The wetland and riparian environment: hydrology, hydric soils, biogeochemistry
   - How plants are adapted and respond to the wetland environment
   - The ecology of wetland and riparian plant regeneration – sexual and asexual reproduction
2) ***Analyze*** **and** ***critically evaluate*** how wetland and riparian plants can be utilized to meet habitat and other restoration goals in aquatic ecosystems
3) ***Apply*** above course material to the restoration of wetland and riparian plants

Course structure

Class periods will consist of a combination of short lectures, class and small group discussions, case study analysis, and in-class exercises. Full participation in on-line modules is required. Module content and assignments will form the basis of class period activities. Modules will generally contain:

1) Multi-media background material such as written material, videos, websites, and links to scientific articles.
2) Journal entries. These will be submitted as Canvas assignments and graded. You may upload as a word document or as an easily readable photo of hand-written notes.

3) Canvas Discussions. These will be graded. Ability to participate in discussions (and receive a grade) will end at 9pm the night before class starts.

Assignments and course grading

60% - Online assignments and class participation; includes reading and responding to background material in Canvas; leading and participating in group discussions; responding to in-class assignments including exercises; and demonstrating professionalism.

40% - Midterm and final exam.

Class policies

Late assignment policy

If you turn in an assignment late, your grade for that assignment will be reduced by 5% for each day it is late.

Classroom environment

We expect all of us to treat each other with respect. Discriminatory behavior related to someone's age, sex, gender identity, sexual orientation, race, ethnicity, national origin, creed, religion, or disability is unacceptable and will not be tolerated.

Plagiarism

Plagiarism includes knowingly "representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes the unacknowledged used of materials prepared by another person or agency engaged in the selling of term papers or other academic materials." In accordance with USU's policy "the penalties for plagiarism are severe. They include warning or reprimand, grade adjustment, probation, suspension, expulsion, withholding of transcripts, denial or revocation of degrees, and referral to psychological counseling" (https://www.usu.edu/provost/faculty/teaching/syllabus_resources.cfm). We expect all material to be properly cited in both written and oral reports. Below is one acceptable format for your bibliography. In the text, you would cite these as (Baskin and Baskin 1998; Adams and Galatowitsch 2006; Bauder et al. 1997).

Book example:

Baskin, C. C. and J. M. Baskin. 1998. Seeds - Ecology, biogeography, and evolution of dormancy and germination. Academic Press, San Diego.

Journal article example:

Adams, C. R. and S. M. Galatowitsch. 2006. Increasing the effectiveness of reed canary grass (*Phalaris arundinacea* L.) control in wet meadow restorations. Restoration Ecology **14**: 441-451.

Report example:

Bauder, E. T., D. A. Kreager, and S. McMillan. 1997. Vernal pools of southern California - draft recovery plan. U.S. Fish and Wildlife Service, Region 1, Portland, Oregon.

Sexual Harassment

Sexual harassment is defined by the Affirmative Action/Equal Employment Opportunity Commission as any "unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature." If you feel you are a victim of sexual harassment, you may talk to or file a complaint with the Affirmative Action/Equal Employment Opportunity Office located in Old Main, Room 161, or call the AA/EEO Office at 797-1266. http://aaeo.usu.edu/

Students with Disabilities

The Americans with Disabilities Act states: "Reasonable accommodation will be provided for all persons with disabilities in order to ensure equal participation within the program. If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center (797-2444), preferably during the first week of the course. Any request for special consideration relating to attendance, pedagogy, taking of examinations, etc., must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative format, large print, audio, diskette, or Braille."

Week #	Day	Topic	Description	Reading	Topic type
1	Tuesday	Introduction to aquatic environments and restoration	-- motivations for revegetation	Ch1_Intro to wetland plants_Cronk and Fennessey	Lecture topic
1	Thursday	Aquatic ecosystem functions and services		Ch2_wetland plant comm_Cronk and Fennessey	Lecture topic
2	Tuesday	Aquatic environment: hydrology and plant adaptations		Ch3_II_Phy Env Wetlands_Cronk and Fennessey; Ch4_Adaptations to anoxia_Cronk and Fennessey	Lecture topic
2	Thursday	Management and restoration techniques: meeting plant hydrology needs			Application topic
3	Tuesday	Aquatic environment: hydric soils and plant adaptations	-- adaptations to anaerobic conditions -- presence of toxins under reduced elements -- salinity and plant adaptations		Lecture topic
3	Thursday	Management and restoration techniques: plant substrate needs			Application topic
4	Tuesday	Aquatic environment: biogeochemistry - nitrogen phosphus	-- N, P -- nutrient acquisition -- nutrient poor conditions	Ch3_III_Phy Env Wetlands_Cronk and Fennessey	Lecture topic

4	Thursday	Management and restoration techniques: meeting plant nutrient and light needs			Application topic
5	Tuesday	Midterm exam			Exams
5	Thursday	Restoration goals, developing a revegetation plan		Rieger et al. 2014_CH8 Plant materials.pdf; Ch9_I_wetland plants in restoration_Cronk and Fennessey	Application topic
6	Tuesday	Case studies of vegetation restoration and management: wetlands and lakes			Application topic
6	Thursday	Aquatic plant population and community dynamics	-- what are aquatic plants? wet meadow, emergent, submergent, floating-leaved, floating leaf communities	Ch7_Community Dynamics_Cronk and Fennessey	Lecture topic
7	Tuesday	(Presidents Day)			Holiday / vacation
7	Thursday	Case studies of vegetation restoration and management: riparian areas		Riparian veg restoration.pdf	Application topic
8	Tuesday	Seed maturation and viability, pollination mechanisms, and pollinator needs		Pre-dispersal Hazards_Fenner and Thompson_Ecology of Seeds.pdf; Ch5_Pollination_Cronk and Fennessey	Lecture topic

8	Thursday	Seed viability testing			Application topic
9		Spring break			Holiday / vacation
10	Tuesday	Seed dormancy		Seed Dormancy_Fenner and Thompson_Ecology of Seeds.pdf	Lecture topic
10	Thursday	Seed dormancy break techniques			Application topic
11	Tuesday	Seed germination		Seed Germination_Fenner and Thompson_Ecology of Seeds.pdf	Lecture topic
11	Thursday	Seed germination in the greenhouse and field			Application topic
12	Tuesday	Dispersal in space and time; propagule banks		Seed Banks_Fenner and Thompson_Ecology of Seeds.pdf; Seed Dispersal_Fenner and Thompson_Ecology of Seeds.pdf	Lecture topic
12	Thursday	Seed bank assays, broadcast seeding techniques			Application topic
13	Tuesday	Seedling establishment		Seedling Establishment_Fenner and Thompson_Ecology of Seeds.pdf; Ch11_Seedling	Lecture topic

				recruitment_Eriksson and Ehrlen in Leck	
13	Thursday	Seedling establishment in the greenhouse and field		Ch17_Seedling est in restoration_Galatowitsch in Leck	Application topic
13	Saturday	local field trip: passive and active restoration			field trip
14	Tuesday	Asexual reproduction: stems/rhizomes/stolons		Ch5_Asexual reproduction_Cronk and Fennessey	Lecture topic
14	Thursday	Clonal propagation in the greenhouse and field			Application topic
15	Tuesday	Plant material sourcing: local adaptation, genetic diversity, evolution potential, supporting functions and services			Lecture topic
15	Thursday	Plant material sourcing: native plant nurseries, self-collection			Application topic
16	Tuesday	Invasive species in aquatic environments		Ch8_Invasive plants_Cronk and Fennessey	Lecture topic
16	Thursday	Limits to revegetation: Invasive species management techniques	Report on revegetation practicum experience (post on CANVAS)		Application topic
		final exam			Exams