GREAT PLAINS ECOSYSTEMS

AGRO 440/840/840-700, NRES 440/840, PLAS/RNGE 440

Instructor

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General information

Credit hours: 3
Delivery format: In-person and online (remote graduate students)
Keim 264 East
Tues & Thurs 9:30–10:45am

Course description

Characteristics of Great Plains ecosystems, interrelationships of ecological factors and processes, and their application in the management of grasslands. Interactions of fire, vegetation, grazing animals and wildlife.

Course goals

1. Recognize the Great Plains as an ecologically distinct region.
2. Relate past, present, and future ecosystem patterns to landscape system processes.
3. Appreciate the past, present, and future roles of people in shaping Great Plains ecosystems.

Course objectives

1. Delineate the Great Plains region, according to its defining characteristics.
2. Recognize Great Plains ecosystems as complex adaptive systems.
3. Relate ecological patterns and landscape processes.
4. List geologic, climatic, biogeographic, and anthropogenic legacies shaping past and contemporary Great Plains ecosystems.
5. Describe how interactions among climate, soils, and disturbance regimes shape variation in ecosystem structure, composition, and function.
6. Interpret trends in climate, biodiversity, nutrient cycling, water, fire, herbivory, and land use, and relate changes in their interactions to changes in ecological systems.
7. Apply key ecological principles to the understanding of how management and land use can increase or decrease the vulnerability of ecosystems to disturbance and change.
8. Evaluate the trade-offs of current and future land use and management within the context of providing for multiple ecosystem services.
9. Understand and appreciate the role of fire in the Great Plains.
10. Demonstrate proficiency in science-based self-education and use of scientific literature to

structure arguments and support decision-making.

Graduate students will demonstrate advanced proficiencies in one or more course objectives through a presentation, activity, or essay.

Readings

No textbook is required. Instead, readings are assigned from peer-reviewed scientific literature. Readings will be available on Canvas. Please note that readings are an important part of your preparedness for class and that lectures are not a replacement for the readings. Plan to spend a minimum of two hours studying for each hour of class. Your understanding of the information in the readings will be assessed in the form of short essays submitted in Canvas and test questions, including those that are covered in the readings but not the lectures.

Undergraduate student grading policy

Assessment	Points	(% of final grade)*
Quizzes (pre- and post-course)**	40	5
In-class activities	40	10
Short essays	40	20
*Scientific Scoreboard****	40	25
Exam 1	100	20
Exam 2	100	20
Total	360	100

*Assessment groups weighted independently of points (final percentages may not equal proportion of total points; points subject to change).
**Pre- and post-course quizzes are completion-based.
***Bonus points awarded through *Scientific Scoreboard* added to lowest exam score.

Graduate student grading policy

Assessment	Points	(% of final grade)*
Quizzes (pre- and post-course)**	40	5
In-class activities	40	10
Short essays	40	20
*Scientific Scoreboard**** & Graduate student presentation/activity	80	25
Exam 1	100	20
Exam 2	100	20
Total	400	100

*Assessment groups weighted independently of points (final percentages may not equal proportion of total points; points subject to change).
**Pre- and post-course quizzes are completion-based
***Bonus points awarded through *Scientific Scoreboard* added to lowest exam score.

Grading scale

Grade	Weighted % of available points
A+	97.0 – 100
A	90.0 – 96.9
B+	87.0 – 89.9
B	80.0 – 86.9
C+	77.0 – 79.9
C	70.0 – 76.9
D+	67.0 – 69.9
D	60.0 – 66.9
F	< 59.9

Quizzes

This course contains two quizzes (pre-course and post-course), the purpose of which is gauging student familiarity with course material. These quizzes provide useful feedback for tailoring content to student knowledge and experience. Quizzes are completion-based and must be finished by 9:30am on the assigned date (see syllabus). Together, **pre- and post- course quizzes account for 5% of your final grade.**

In-class activities

We will be working through several (~4) in-class activities throughout the semester, **each of which is worth 10 points**. Individuals/groups should submit assignments according to **detailed instructions on Canvas**. Please see the detailed course outline for planned activity dates. If you are unable to join class on an activity day, please check with me about completing the activity on your own outside of class. **Collectively, in-class activities account for 10% of your final grade.**

Short essays

Several (~4) short essays will be assigned throughout the semester. Essays are to be uploaded to Canvas by the assigned due date and time (see specific instructions on Canvas). I will select from the short essays to facilitate discussions during *Scientific Scoreboard* and to emphasize critical lecture, reading, and/or activity materials. Short essays may cover assigned readings, lectures, activities, and/or other materials assigned for the day of the class, as well as those from previous class meetings.

Short essays should reflect the assigned theme, which will be detailed in Canvas instructions. When developing your short essay, support your points by citing information from publications in the peer-reviewed scientific literature. Include a list of references at the end of your essay, consistently and correctly formatted with the full citation. **Each short essay is worth 10 points. Short essays are due at 9:30 A.M. on the specified due date.** Late submissions may result in only partial credit being awarded. **Grades will be based on your ability to use the scientific literature to support your central thesis (see grading rubric on Canvas for details).** I am not looking for a review of prior lectures/readings/activities. Simple repetition of content from lectures/readings/activities will receive poor grades. Rather, the lectures/readings/activities are to serve as the basis for addressing a complex issue relevant to Great Plains ecosystems. Your mission is to use the scientific literature to creatively confront/challenge/reject/promote the issue or question you are assigned. Collectively, **short essays account for 20% of your final grade**.

Scientific Scoreboard (in-person students)

The class will be divided into teams to discuss and debate a key question or issue associated with Great Plains ecosystems. Topics assigned for *Scientific Scoreboard* may be taken from the short essay assignments, lectures, videos, or other course materials. Your team is to use the peer-reviewed scientific literature to support, refute, or expand upon the points brought up by the paper/video, the moderator (instructors), and the other teams. This means that you will need to become proficient at finding and comprehending information from the scientific literature that is relevant to, but not part of, the assigned reading(s).

Your team does not need to form a consolidated stance and argue a singular point. You can disagree with members of your team and agree with members from other teams. Similarly, collaborating scientists disagree throughout the process of establishing, testing, and publishing their scientific hypotheses. Yet, the common goal is to advance the state of knowledge. You and your teammates should be willing to change your mind based on the points made by other individuals, as well as stand firm when you feel their premise is not sufficiently supported – especially when evidence from the literature is lacking. A major objective of this exercise is to make you familiar with the process used to enter into an objective discussion, with the intent of limiting personal biases and opinion and instead constructing viewpoints around a systematic, organized means of advancing knowledge (i.e., science). Collectively, **Scientific Scoreboard sessions will account for 25% of your final grade.**

Rules of *Scientific Scoreboard:*

- Class divided into teams.
- Ten minutes will be allocated prior to *Scientific Scoreboard* for teams to discuss the topic and develop a team strategy. A representative for each team will be asked to **write the names and main points of your group on a Google Jamboard frame (link will be provided)**.
- Groups reconvene for entire-class activity.
- Support your discussion points with the scientific literature and note the paper(s) you are using to support your argument when making your point. Limit presentations based on personal experiences/opinions, unless they are analogous to points raised in the literature.
- Use facts/data, confirmed hypotheses (or rejected ones), conceptual frameworks, scientific conclusions, and scientific debates to expand or refute points of discussion.
- Multiple people need to give their viewpoint on each team. A single individual is not to be the sole communicator of discussion points or grades for the entire team will suffer.
- Discussions must be cordial. Teams will lose points for failing to act in an appropriate manner. All team members will be affected, even if points are lost as a result of the actions of a single individual. Individuals acting in an unruly manner will be excused for the remainder of the *Scientific Scoreboard* exercise.
- I will assign points to each team as the discussion occurs. Points will be accrued based on the validity of your point and mechanisms of support used to frame your argument.
- *Scientific Scoreboard* exercises are worth **10 points each**. Because this is a team exercise and individual grades are dependent on the performance of your team members, I will remove each person's lowest score from the semester's exercises when computing final grades.
- **The team with the most points at the end of each *Scientific Scoreboard* exercise will receive 1 bonus point.** At the end of the semester, bonus points will be added to your lowest exam score**.**

Round 1 – At the beginning of *Scientific Scoreboard,* a representative for each team will be asked to concisely present an overview of the team's most important points (time limit = 3 minutes).

Round 2 – Groups will be given an opportunity to expand their arguments and respond to those of other teams (time limit = 3 minutes).

Round 3 – Wildcard Round – This round is about bringing in new perspectives and thinking critically about the topic (time limit = 3 minutes).

Point category	**Examples**
Basic points	- Quotes from scientific literature - Examples from class lectures or materials - Citing foundational articles on topic - Repeating citation already mentioned (must be a new point)
Additional points	- Multiple scales - Original example - Acknowledging point from classmate - Unique contributions to argument
Maximum points	- Interdisciplinary idea/concept - Synthesizing multiple ideas - Building off another group's idea

Scientific Scoreboard (online students)

Due to their inability to participate in *Scientific Scoreboard* during in-person class sessions, certain individuals (**especially online graduate students)** will use Canvas Discussion Boards to respond to the assigned *Scientific Scoreboard* prompt. The format of this exercise will largely mirror that of *Scientific Scoreboard* in in-person class sessions, with a few exceptions. This online option of Scientific Scoreboard **may also serve as an alternative way for students (undergraduate and graduate) who miss in-person sessions in which we play Scientific Scoreboard to receive their points**.

- Instead of being divided into teams, students will participate individually.
- As detailed in the in-person/synchronous *Scientific Scoreboard* section above, this is meant to take the form of a cordial discussion that advances the state of knowledge.
- *Scientific Scoreboard* exercises are worth **10 points each**. To align with the in-person/synchronous group, I will remove each person's lowest score from the semester's exercises when computing final grades.
- **One bonus point may be awarded to one or two students who go above and beyond in their demonstration of the validity of their arguments with supporting scientific information.** At the end of the semester, bonus points will be added to your lowest exam score.
- To receive full credit, all posts and replies must be submitted by the specified due date.
- Please see Canvas for topics, due dates, and a detailed grading rubric.

Round 1 – Each student will post an initial reply to the discussion prompt that summarizes their central argument and supports it with scientific evidence (see detailed instructions above for synchronous *Scientific Scoreboard*.

Rounds 2–3: Students will respond to the posts of others in some way (disagreeing, agreeing, expanding, etc.), but you in doing so, you must reference additional evidence (e.g., facts/data, confirmed or rejected hypotheses), conceptual frameworks, scientific conclusions, scientific debates, etc. This is also an opportunity to expand on your original argument (post).

Scientific Scoreboard Questions:

1. February 9 – Can we escape the effects of erosion?
2. March 2 - Should we conserve historical ecosystems or embrace new ones?
3. April 13 - Can agriculture save Great Plains Ecosystems?
4. May 4 - What is the future of Great Plains ecosystems?

Additional requirements for graduate students

Graduate students will be expected to add to the class by delivering content on their own research/interests, as it relates to ecosystems and landscapes of the Great Plains. This is meant to benefit your own research, as well as the rest of the class by introducing us to additional content/perspectives that may or may not have been already covered. This content may even be included on exams, referenced in *Scientific Scoreboard*, etc. You may engage the class in the format you prefer, which could include, but is not limited to:

- Delivering a short presentation and facilitating discussion
- Leading an in-class activity
- Facilitating a game of Scientific Scoreboard

There will be a series of opportunities to sign up for the class session in which you will lead your presentation/activity. You are encouraged to look at the detailed course outline and consider where your subject might fit in best in the course schedule. As you choose a topic and develop content, please be cognizant of the audience and do your best to make the content accessible and applicable to this course and your own research. If you are uncertain about your topic, presentation format, or presentation date, we would be happy to discuss it with you.

You will be evaluated (graded) on several facets of your presentation/activity, quality of content, relevance for Great Plains ecosystems, and engagement with the class. Please see the rubric for evaluation details.

Exams

This course contains two exams—a midterm and a final—with the final being cumulative. Exams may cover topics from all course materials (readings, lectures, short essays, *Scientific Scoreboard*, graduate student presentations/activities). This is another reason class participation is important. Together, **exams will account for 40% of your final grade.**

Students may either complete exams in-person, during the normally scheduled class time, or through the Digital Learning Commons (DLC; available for seven days). There are DLC locations on both City and East Campus.

Information about the DLC:

- Hours and Locations
- FAQ
- Reserve a spot for your exam

Remote graduate students should visit with me about scheduling an exam time.

General course outline

Module 1: Introduction to Region and Ecology
Module 2: Shaping Processes
Module 3: Contemporary Trajectories
Module 4: Social-ecological futures

Note: We will do our best to stay on the schedule below; however, we may adjust it to cover additional content, reinforce existing content, and/or cater content to the interests and expertise of the group. Please check Canvas for updates to the detailed course outline.

Detailed course outline

Date	Module	Class session lectures/activities	Assigned readings/videos*	Assignments due**
24 Jan	1	Introductions and orientation Lecture: The Great Plains Region		
26 Jan	1	Video: M. Forsberg – *The Great Plains, America's Lingering Wild* (regional intro) In-class activity: Regional delineation (Google My Maps)	Reading: Rossum & Lavin (2000)	
31 Jan	1	Lecture: Ecosystems		Jan 26 in-class activity Pre-course quiz
2 Feb	1	In-class activity: Systems modeling	Reading: Knapp et al. (1999)	
7 Feb	2	Lecture: Shaping processes: Geology and climate	No reading	Feb 2 in-class activity Short essay #1: Can we escape the effects of erosion?
9 Feb	2	Scientific Scoreboard #1: Can we escape the effects of erosion?		
14 Feb	2	Shaping processes: Historical disturbance regimes and traditional ecological knowledge	Reading: Augustine et al. (2021)	Scientific Scoreboard #1 discussion board (online students only, Feb 9 topic)
16 Feb	2	Lecture: Soils and belowground ecosystems	Reading: Wishart (2004), pp. 639–640	
21 Feb	3	Lecture: Changing disturbance regimes in the Anthropocene	Reading: Twidwell et al. (2021)	
23 Feb	3	Graduate student presentations		
28 Feb	3	Ecosystem service tradeoffs and	Reading: Belnap et al.	Short essay #2:

		synergies	(2012)	Should we conserve historical ecosystems or embrace new ones?
2 Mar	3	Scientific Scoreboard #2: Should we conserve historical ecosystems or embrace new ones?		
7 Mar	3	Midterm exam prep		Scientific Scoreboard #2 discussion board (online students only, Mar 2 topic)
9 Mar	3	Midterm exam		
14 Mar	3	Spring Break: No class		
16 Mar	3	Spring Break: No class		
21 Mar	3	Lecture: Landuse and landcover change	Reading: Geoff Cunfer, TBD	
23 Mar	3	Graduate student presentations		
28 Mar	3	Lecture: Afforestation and woody plant encroachment	Twidwell et al. (2013)	
30 Mar	3	In-class activity: Prairie Protector		
4 Apr	3	Lecture: Rangeland ecology and management	Reading: Augustine et al. (2021)	Mar 30 in-class activity
6 Apr	3	In-class activity: The Central Grasslands Roadmap and the Rangeland Analysis Platform		
11 Apr	3	Lecture: Nutrient dynamics in Great Plains ecosystems	Reading: Cunfer (2021)	Apr 6 in-class activity Short essay #3: Can agriculture save Great Plains ecosystems?
13 Apr	3	Scientific Scoreboard #3: Can agriculture save Great Plains ecosystems?		
18 Apr	3	Lecture: Wetland ecology and management Video: M. Forsberg – *The Great Plains, America's Lingering Wild* (playas)	Reading: Londe et al. (2022)	Scientific Scoreboard #3 discussion board (online students only; Apr 13 topic)
20 Apr	3	Lecture: Fire in the Great Plains	Reading: Donovan et al. (2017)	
25 Apr	4	Lecture: Social-ecological resilience	Reading: TBD	

27 Apr	4	Graduate student presentations Alternative: Field trip (Marsh Wren, Nine Mile, Spring Creek, East Campus, etc.)		
2 May	4	Lecture: Uncertainty, scenarios, and collaborative adaptive management	Reading: TBD	Short essay #4: What is the future of Great Plains ecosystems?
4 May	4	Scientific Scoreboard #4: What is the future of Great Plains ecosystems?		
9 May	4	Final exam prep		Post-course quiz Scientific Scoreboard #4 discussion board (online students only; May 2 topic)
11 May	4	Final exam prep		
16 May	4	Final exam		

Graded assignment
Graded assignment (online students only)
Graded assignment (graduate students only)

*See Canvas (Modules section) to download/link to assigned readings and videos.
**Upload all assignments to Canvas by 9:30am on the due date, unless otherwise specified in Canvas instructions

Course policies and resources

Students are responsible for knowing university policies and resources found here: https://executivevc.unl.edu/academic-excellence/teaching-resources/course-policies

Academic integrity

Academic integrity is defined in the Student Conduct and Community Standards (https://studentconduct.unl.edu/student-code-conduct#sectionii). Plagiarism and all other forms of cheating—as defined in Section II of the student code of conduct—are prohibited. Violations to this policy will be reported. A first offense will result in a warning and failure of the assignment. Additional violations may result in failure of the course. Information on policy and decision appeal processes can be found here: http://snr.unl.edu/undergrad/undergraduatehandbook.aspx

Attendance policy

Attendance of lecture and lab sessions is strongly encouraged, but not mandatory. With that being said, it may be difficult to meet class requirements with sporadic or infrequent attendance. You can find the UNL Faculty Senate's current Class Attendance Policy here: https://www.unl.edu/facultysenate/policies/Class-Attendance-Policy-081121.pdf

Make-up exams are not allowed unless exceptional circumstances occur. If you cannot attend the exam on the scheduled day, please schedule a time to take the exam on your own in the Digital Learning Commons (DLC; details in Exam section above). Please get in contact with me about any additional scheduling difficulties. Any exceptions to the policy in this class must be formally appealed in writing based on the guidelines set forth by the university (https://registrar.unl.edu/academic-standards/policies/class-attendance/). Otherwise, a make-up exam will not be granted. It is unfair to the rest of the class.

Instructional continuity (inclement weather policy)

In the event that in-person classes are cancelled, you will be notified of the instructional continuity plan for this class by Canvas email.

The university's campus closing options regarding classes are the following:

- all classes are canceled.
- in-person classes are canceled and follow instructional continuity plans.
- all classes are conducted as usual.

The university's full inclement weather policy can be found at https://bf.unl.edu/policies/inclement-weather

Instructor correspondence

I am committed to providing prompt feedback on all course assignments and responding to student emails in a timely manner. However, I will not be responsive to emails 24 hours a day, so please be flexible and patient in waiting for a response. If you do not receive an initial response within 24 hours, please send a follow-up email.

Instructional methods

This course will be delivered in-person in Keim 264 East on Tuesdays and Thursdays from 9:30–10:45am. In-person class sessions will be recorded and posted to Canvas to serve as a student resource for all students, especially online graduate students.

Student concerns and feedback

Your experiences in this course are important to me. If you have questions, concerns, or positive feedback, please contact me via Canvas or email: duden2@unl.edu. If I am unable to respond, or you feel I've not adequately addressed your concerns, you may contact Dirac Twidwell via email: dirac.twidwell@unl.edu.