Cover Crops in Agroecosystems

Course Information: PLAS 425/AGRO 825

Semester: Fall 2025

Meeting Times and Location: Recorded lectures posted to Canvas on Mondays (no in-person meeting); Wednesdays 10 - 11:50 am (Lab) in Keim 264; Fridays 10-10:50 am via Zoom (Multi-state meetups)

Format: Content will include a weekly mix of asynchronous pre-recorded lectures, synchronous meetings of faculty and students across multiple states through virtual exchange, and experiential web-, lab-, and field-based activities.

- *Pre-recorded lectures:* Posted to Canvas on Monday of each week with accompanying notes submission assignment
- *Lab activities*: Wednesdays 10 - 11:50 am
- *Multi-state meetups and associated activities*: Fridays 10 - 10:50 am on zoom with UNL students and or with students across participating institutions (see schedule)

Prerequisites: PLAS 131 Plant Science or PLAS 278 Botany; PLAS/SOIL 153 Soil Resources (or equivalent)

Instructor Information

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Course Description and Learning Outcomes

Objective: Explore the management, environmental, economic, and social considerations of cover crops across a diversity of agricultural production systems. Grow cover crops, measure benefits and tradeoffs, and apply knowledge to make management and policy recommendations.

Learning Outcomes:

As a result of this course, all students will be able to:

1) Define cover crop types and describe characteristics of **cover crop species** and **functional groups** and their agroecosystem services
2) **Manage** and make decisions about cover crops across a diversity of climates, soils, and cropping systems.
3) Measure the short- and long-term **economic** impacts of cover crop management decisions.
4) Quantify the **environmental** benefits of cover crops using digital tools and describe how those benefits are influenced by **management** decisions across environments.

5) Apply cover crop system knowledge to design and assess **policy** and **social** initiatives to help overcome barriers to cover crop adoption.

Additionally, graduate students will be able to:

6) Synthesize the cover crop scientific literature and create written and visual **extension products** for farmers.

Text and materials: There is no required text for this course. Reference reading material and data sets will be provided through Canvas. A stable internet connection is necessary for routine access to the Canvas page and synchronous Zoom meetings. Students should plan to bring tablets or laptops to the lab sections to access resources in completing activities.

Planned Assessments for Measuring Progress Toward Learning Outcomes:

Lecture Notes: Each series of weekly lecture videos will be accompanied by an online submission of lecture notes to assess comprehension and readiness for the activities that week.

Exam: There will be one exam administered in this course at the end of the first unit of the course. The purpose is to ensure all students have a common foundational knowledge about cover crops that will be needed to explore topics in more depth during the rest of the semester.

Cover Crop Innovation Project: Identify a cover crop problem, explore current approaches, design and create a prototype solution, discover customers for this solution, and pitch your innovation to the class and a professional panel.

Lab Reports: Students will complete lab experiments and activities throughout the semester and complete a report or worksheet for each lab.

Cover Crop Challenge Project: Students will work in teams to design a cover crop system that achieves a maximum number of ecosystem services for the least cost in their region. Students will justify their cover crop choice, plant and grow their cover crops, and collect, analyze, visualize, and interpret the data.

Multi-state Meetup (Friday) Participation: During Friday sessions, we will complete activities on zoom with UNL students and across institutions. During these sessions you will be asked to complete a brief assignment summarizing what you learned and what was discussed.

Cover Crop Extension Products (additional 800-level requirement): Pick two themes or topics from the module content (including lectures, suggested readings, scientific papers, and labs) and synthesize information to create a total of two extension products to communicate cover crop science to farmers. You will create one written and one visual extension product throughout the semester. Examples of written extension products include bulletins, blogs, pamphlets, or guides (less than 2 pages of content). Examples of visual extension products include videos or animations for social media (less than 2 minutes of recorded content).

Cover Crop Grant Proposal (additional 800-level requirement): Prepare a two-page grant proposal for a research or education project that aims to improve cover crop adoption in your region.

LockDown Browser Requirement for Quizzes and the Exam
This course requires the use of LockDown Browser for online quizzes and exams. Watch this video to get a basic understanding of LockDown Browser:
https://www.respondus.com/products/lockdown-browser/student-movie.shtml

Download Instructions
Download and install LockDown Browser from this link:
https://download.respondus.com/lockdown/download.php?id=456252970

Once Installed

- Start LockDown Browser
- Log into to Canvas
- Navigate to the exam

Note: You won't be able to access an exam that requires LockDown Browser with a standard web browser. If this is tried, an error message will indicate that the test requires the use of LockDown Browser. Simply start LockDown Browser and navigate back to the exam to continue.

Guidelines
When taking an online exam follow these guidelines:

- Select a location where you won't be interrupted
- Before starting the test, know how much time is available for it, and also that you've allotted sufficient time to complete it
- LockDown Browser will prevent you from accessing other websites or applications; you will be unable to exit the test until all questions are completed and submitted

Getting Help
Several resources are available if you encounter problems with LockDown Browser:

- The Windows and Mac versions of LockDown Browser have a "Help Center" button located on the toolbar. Use the "System & Network Check" to troubleshoot issues.
- Respondus has a Knowledge Base available from support.respondus.com. Select "LockDown Browser & Respondus Monitor" as the product to view helpful articles.
- If you're still unable to resolve a technical issue with LockDown Browser, go to support.respondus.com and select "Submit a Ticket". Provide detailed information about your problem and what steps you took to resolve it

Grading Scale:

100 – 97% A+	<76 – 73% C
<97 – 93% A	<73 – 70% C-
<93 – 90% A-	<70 – 67% D+
<90 – 87% B+	<67 – 63% D
<87 – 83% B	<63 – 60% D-
<83 – 80% B-	<60% F
<80 – 77% C+	

Late Work Policy: Please submit all assigned work before the assigned deadlines. Late assignments will be graded at the discretion of the instructors and subject to a 10% per day late penalty.

Attendance Policy: Attendance is required during in-person class meetings for lab (Wednesdays) and online for synchronous sessions across Institutions (see schedule for Zoom session weeks) on Fridays. Multi-site meeting participation points (120 total) will be derived from discussions, assignments, and activities and cannot be earned without attending class. Please plan to communicate with the teaching team if you cannot attend class to make arrangements for missed assignments.

Grading Breakdown

Graded Items	**Points**	**Total**
Exam	100	100
Innovation Project	50	50
Lecture notes	10 x 13	130
Lab Assignments Cover Crop Challenge Project Lab Worksheets	 100 9 x 15	 100 135
Multi-site meeting (Friday) Weekly assignments Rotation activity (40 points)	10 x 8 40	80 40
Undergraduate TOTAL		**635**
Cover Crop Extension Products (graduate)	50 x 2	100
Cover Crop Grant Proposal (graduate)	50	50
Graduate TOTAL		**785**

Projected Course Schedule and Assignment due dates (subject to change)

Week	**Topic**	**Friday session** *Zoom*	**Assessments** *Grad student only work noted in italics*
Week 1 August 25 – August 31	Introduction to cover crops: history of cover crops, cover crops from different regions, integrating a cash crop into different agroecosystems	Introductions to course participants across universities	Lecture notes, Lab worksheet, Multi-site meet up session participation
Week 2 September 1 – September 7	Cover crop management: introduction to cover crop species/functional groups and benefits	Considering benefits of cover crop monocultures and mixtures	Lecture notes, Lab worksheet, Multi-site meet up session participation
Week 3 September 8 – September 14	Cover crop management: Seeding rates, methods and establishment timing	Integrating cover crops into crop rotations part 1	Lecture notes, Lab worksheet, Multi-site meet up session participation

Week 4 September 15 – September 21	Cover crop management: termination methods and timing	Integrating cover crops into crop rotations part 2	Lecture notes, Lab worksheet, Multi-site meet up session participation
Week 5 September 22 – September 28	Cover crop management: cover crop mixtures	Integrating cover crops into crop rotations part 3	Lecture notes, Lab worksheet, Multi-site meet up session participation, *1st extension product (grad students)*
Week 6 September 29 – October 5	Exam		
Week 7 October 6 – October 12	Agroecosystem impacts of cover crops: overview and physical impacts including compaction, erosion, soil moisture and temperature	Presentations of crop rotation design assignment	Lecture notes, Lab worksheet, Multi-site meet up session participation
Week 8 October 13 – October 19	Agroecosystem impacts of cover crops: biological impacts including biodiversity, integrated pest management (beneficial/detrimental pests) and weed suppression	Nutrient cycling farmer panel	Lecture notes, Lab worksheet, Multi-site meet up session participation
Week 9 October 20 – October 26	Cover crop innovations	Urban and smaller scale professional panel	Lecture notes, Innovation Part 1, Multi-site meet up session participation, *2nd extension product (grad students)*
Week 10 October 27 – November 2	Agroecosystem impacts of cover crops: chemical impacts including nitrogen uptake, retention, leaching, grasses and legumes, and water quality implications and policy	Innovation in cover crop management panel	Lecture notes, Multi-site meet up session participation, Cover crop challenge assignment
Week 11 November 3 – November 9	Cover crop adoption	Cover crop challenge synthesis	Lecture notes, Lab worksheet, Multi-site meet up session participation, Innovation Part 2
Week 12 November 10 – November 16	Economics of cover crops	Cover crop business innovation panel	Lecture notes, Lab worksheet, Multi-site meet up session participation
Week 13 November 17 – November 23	Innovation pitches with professional panel	Cover crop adoption panel	Lecture notes, Innovation Part 3, Multi-site meet up session participation

Week 14 November 24 – November 30	Thanksgiving Holiday – No course meetings		
Week 15 December 1 - 7	Cover crop research in Nebraska	No Friday session	Lecture notes, Lab worksheet, *Grant Proposal (grad students)*

Support Services and Policy Statements

UNL Course Policies and Resources

Students are responsible for knowing the university policies and resources found on this page (https://go.unl.edu/coursepolicies):

- University-wide Attendance Policy
- Academic Honesty Policy
- Services for Students with Disabilities
- Mental Health and Well-Being Resources
- Final Exam Schedule
- Fifteenth Week Policy
- Emergency Procedures
- Diversity & Inclusiveness
- Title IX Policy
- Other Relevant University-Wide Policies

Policy on Artificial Intelligence

The use of AI tools such as ChatGPT is allowed in this course under some circumstances. Acceptable uses of AI in this course help you learn, understand, and improve your academic skills. This includes:

- Using AI to help brainstorm ideas and organize thoughts.
- Using AI to help with grammar and spelling checks.
- Using AI to explain confusing concepts in simple language as a supplementary tool during your study times.
- Using AI to suggest steps to complete your assignment(s) or provide feedback during your assignment completion.
- Maintaining transparency in your use of AI-based tools, including what work is your original contribution in assignments where you have used AI-based tools. Two parts to this:
    - Clearly identify the use of AI-based tools in your work. For example, if you use ChatGPT-3, you must cite "ChatGPT-3. (YYYY, Month DD of query). "Text of your query." Generated using OpenA.I.. https://chat.openai.com/"
    - Provide information/context on what part of the work was yours and what you used the AI for.

Unacceptable uses of AI replace your individual effort or original work with AI-generated work or do not include transparency in the usage of AI. This includes:

- Using AI to answer exam or quiz questions.
- Using AI to generate content for assignments.
- Using AI to automate the completion of assignments, whether written, visual, or auditory in nature.
- Using AI to plagiarize content from other sources.
- Using AI without citing AI usage and providing context on what portion of the work is your and what the AI contributed to the product (see last point above on transparency requirements).

In summary, do not use AI to cheat or to automate the completion of assignments.
Using AI-generated content without proper citation could result in academic dishonesty charges. A score above and including 50% content detected as AI from 3 detectors -- QuillBot (https://quillbot.com/ai-content-detector), Sapling (https://sapling.ai/ai-content-detector), and GLTR (http://demo.gltr.io/client/index.html) constitutes evidence of inappropriate AI usage because the work is too similar to AI-based content. Any misuse or violation of the policy, including unauthorized or excessive use of AI, will be considered a breach of academic integrity and may receive a zero and / or be reported for academic misconduct. In any situation where these three detection systems are no longer free or other more accurate, free options appear, the instructor can change the sites used with proper notification to the students.

Experiencing difficulties?

We understand that college is a period of transition in life that can be exciting at some times, but also extremely challenging and stressful at other times. If you are experiencing difficulties in this class, please do not hesitate to visit with us to discuss on how you can respond to improve your performance. Below we have included a few additional resources that might be helpful if you are struggling with class or beyond. Remember that *everyone* goes through periods of life when they need to ask for help from others.

Classes*:* If you are experiencing difficulties with more than just our class, you may want to visit with your advisor or take advantage of the CASNR Cares program. You can make an appointment with Megan Schaefer, Student Development Coordinator, (megan.schaefer@unl.edu; (402) 472-7812) in 103 Ag Hall. From the CASNR Cares website: "CASNR Cares is the first point of contact for students, faculty, staff and parents when there are questions, concerns or situations that affect a student's educational experience at CASNR."

Mental health and well-being: If you feel like you are overwhelmed and/or experiencing general problems with depression, anxiety or other issues, we encourage you to contact the Counseling and Psychological Services office in the Student Health Center to utilize the resources that they have available to students (http://health.unl.edu/counseling-and-psychological-services-caps; (402) 472- 7450). In addition, Big Red Resilience & Well-Being (BRRWB) provides one-on-one well-being coaching to any student who wants to enhance their well-being. Trained well-being coaches help students create and be grateful for positive experiences, practice resilience and self-compassion, and find support as they need it. More information about BRRWB is available at https://resilience.unl.edu/home or 402-472-8770.

Basic needs and security: It can be challenging to do your best in class if you have trouble meeting basic needs like safe shelter, sleep, and nutrition. If you have difficulty affording

groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, we urge you to contact the Husker Pantry (https://pantry.unl.edu) located at the University Health Center room 123 (550 N. 19th Street). From the Husker Pantry website: “Food and shelter insecurities are an unfortunate reality for students at the University of Nebraska-Lincoln and nationwide. Nearly one in three students on our campus worries about not having enough food until they have money to buy more.” They are there to help and can provide food, other items and resources to students with their NCard.

Childcare and students who are parents*:* To our knowledge, the university does not have a formal policy on children in the classroom. If you are a primary caregiver, we understand that unforeseen disruptions to childcare might occur and require you to bring children to class. While this is not meant to be a long-term childcare solution, occasionally bringing a child to class in order to cover gaps in care is perfectly acceptable. We ask that all other students work with us to create a welcoming environment that is respectful of your colleagues who are also parents. In all cases where children come to class, we may ask that you sit close to the door so that if your child needs special attention and is disrupting learning for other students, you may step outside until their need has been met. While we maintain the same high expectations for all students in our classes regardless of parenting status, we are happy to problem-solve with you in a way that makes you feel supported as you strive for school-parenting balance. You may find support and connection via the Students with Children RSO (https://womens-center.unl.edu/student-parents).