AGRO 425/825 **Cover Crops in Agroecosystems**

Updated October 21, 2021 Note updates to points and assignments

Course Information: AGRO 425/825

Semester: Fall 2021

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 10-10:50am (Multi-state meetup) via Zoom

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 quiz
- *Lab and experiential learning*: Wednesdays 10 - 11:50 am
- *Multi-state meetup*: Fridays 10 - 10:50 am for students across all participating institutions

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

Instructor Information

Andrea Basche, Ph.D.
279G Plant Sciences Hall
abasche2@unl.edu
402-472-6413
Office Hours: By appointment

Sam Wortman, Ph.D.
362F Plant Sciences Hall
swortman@unl.edu
402-472-6404

Note, this course will be co-taught and we ask that course-related requests are directed both to Drs. Basche and Wortman.

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 Quizzes: Each series of weekly lecture videos will be accompanied by an online quiz to assess comprehension and readiness for the activities that week. Your lowest score will be dropped at the end of the semester. Late quizzes will not be accepted.

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.

Farm Budget Project: Students will work in teams to develop a partial budget analysis for cover crop use on a farm in their region that considers the direct and indirect benefits and potential economic value of cover crops, and the expenses and opportunity costs associated with planting cover crops.

Cover Crop Reflection: Students will synthesize knowledge, experience, and skills gained during the semester to reflect on the challenges and opportunities for cover crop adoption in their region or target farm, and how cover crops can (and cannot) transform management of current cropping systems. Findings will be communicated through a reflection paper.

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 Participation: During each synchronous multi-state meetup session, students will be asked to complete a number of in-class formative assessments with students within and across institutions. You may drop your lowest score.

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). Extension products can be supplemented by additional resources not assigned in class, but

each product must provide synthesis of (and citations for) at least three resources from class (e.g., scientific papers, videos, other Extension guides, decision-support tools, etc.).

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

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 on Fridays (via Zoom). Synchronous meeting participation points (100 total) will be derived from discussions, assignments, and activities and cannot be earned without attending class.

Grading Breakdown

Graded Items	Points	Total
Exam	100	100
Farm Budget Project	100	100
Cover Crop Reflection	75	75
Lecture quizzes	10 x 11 possible	100
Lab Assignments Cover Crop Challenge Project Innovation Design Seed germination Adoption town hall preparation Lab Worksheets	 100 30 20 15 10 x 6	 100 30 20 15 60
Synchronous meeting participation	10 x 12 possible	100
Undergraduate TOTAL		700
Cover Crop Extension Products (graduate)	50 x 2	100
Cover Crop Grant Proposal (graduate)	50	50
Graduate TOTAL		850

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

Week	Topic	Assessments
Week 1 August 30 - September 3	Introduction to cover crops: define and history of cover crops, cover crops from different regions, integrating a cash crop into different agroecosystems	Lecture quiz, Lab worksheet, Sync session participation
Week 2 September 6 – September 10	Cover crop types: functional groups, ecosystem services and cover crop species/functional groups	Lecture quiz, Lab worksheet, Sync session participation

Week 3 September 13 – September 17	Cover crop management: Establishment timing and seeding methods	Lecture quiz, Lab worksheet (seed germination part 1), Sync session participation
Week 4 September 20 – September 24	Cover crop management: seeding rates and termination methods	Lecture quiz, Lab worksheet, Sync session participation
Week 5 September 27 – October 1	Cover crop management: cover crop mixtures and herbicide use in cover crops	Lecture quiz, Lab worksheet, Sync session participation, 1st extension product (grad students)
Week 6 October 4 – October 8	Exam during Wednesday lab October 6	
Week 7 October 11 – October 15	Agroecosystem impacts of cover crops: overview and physical impacts including compaction, erosion, soil moisture and temperature	Lecture quiz, Lab worksheet (seed germination part 2), Sync session participation
Week 8 October 18 – October 22	Agroecosystem impacts of cover crops: biological impacts including biodiversity, integrated pest management (beneficial/detrimental pests) and weed suppression	Lecture quiz, Sync session participation
Week 9 October 25 – October 29	Agroecosystem impacts of cover crops: chemical impacts including nitrogen uptake, retention, leaching, grasses and legumes, and water quality implications and policy	Lecture quiz, Lab worksheet, Sync session participation, Cover crop challenge assignment
Week 10 November 1 – November 5	Economics of cover crops: Private economic costs and benefits	Lecture quiz, Sync session participation, 2nd extension product (grad students)
Week 11 November 8 – November 12	Economics of cover crops: Public economic benefits and innovation	Lecture quiz, Sync session participation, Cover crop innovation assignment

Week 12 November 15 – November 19	Cover crop challenge synthesis	Sync session participation
Week 13 November 22 – November 26	Thanksgiving Holiday – No course meetings	Partial budget assignment
Week 14 November 29 – December 3	Cover crop adoption	Lecture quiz, Lab worksheet, Sync session participation, Grant Proposal (grad students)
Week 15 December 6 - 12		Reflection paper

<u>Support Services and Policy Statements</u>

Department of Agronomy and Horticulture Academic Integrity Statement

Academic integrity is an essential indicator of the student's ethical standards. For this reason students are expected to adhere to guidelines concerning academic honesty outlined in Section 4.2 of University's Student Code of Conduct which can be found at http://stuafs.unl.edu/dos/code/. Students are encouraged to contact the instructor to seek clarification of these guidelines whenever they have questions and/or potential concerns.

Enforcing and Appealing Academic Integrity Violations in the Department of Agronomy and Horticulture

- Breaches of academic integrity and their consequences vary considerably, so it is not possible to outline one set of absolute chain of consequences for every situation.
- Each instructor may impose a consequence(s) for a breach of academic integrity in his/her own course, consistent with the magnitude of the breach. The consequences may range from reduced credit for a test or assignment to failure in the course.
- If the student feels that the consequence(s) imposed are inappropriate, the student should discuss the matter first with the instructor within 7 days of the incident.
- If the student is still dissatisfied with the consequences imposed, he/she may appeal to the Department Head or his/her designee within 14 days of the incident.
- If the student is dissatisfied with the results of his/her appeal to the Department Head, then he/she may appeal to the Dean of the College of Agricultural Sciences and Natural Resources within 21 days of the incident.
- Further appeal may be pursued with the University Judicial Officer as described in http://stuafs.unl.edu/dos/code/.
- The course instructor will inform the student's academic advisor of the final disposition of the breach of academic integrity within 7 days after the final decision.

Classroom Emergency Preparedness and Response Information

- *Fire Alarm (or other evacuation):* In the event of a fire alarm: Gather belongings (Purse, keys, cellphone, N-Card, etc.) and use the nearest exit to leave the building. Do not use the elevators. After exiting, notify emergency personnel of the location of persons unable to exit the building. Do not return to building unless told to do so by emergency personnel.
- *Tornado Warning:* When sirens sound, move to the lowest interior area of building or designated shelter. Stay away from windows and stay near an inside wall when possible.
- *Active Shooter:*
  - Evacuate: if there is a safe escape path, leave belongings behind, keep hands visible and follow police officer instructions.
  - Hide out: If evacuation is impossible secure yourself in your space by turning out lights, closing blinds and barricading doors if possible.

- - ○ Take action: As a last resort, and only when your life is in imminent danger, attempt to disrupt and/or incapacitate the active shooter.
  - *UNL Alert:* Notifications about serious incidents on campus are sent via text message, email, unl.edu website, and social media. For more information go to: http://unlalert.unl.edu.

Additional Emergency Procedures: https://emergency.unl.edu/

ADA Statement:

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience barriers based on your disability (including mental health, chronic or temporary medical conditions), please let us know immediately so that we can discuss options privately. To establish reasonable accommodations, we may request that you register with Services for Students with Disabilities (SSD). If you are eligible for services and register with their office, make arrangements with us as soon as possible to discuss your accommodations so they can be implemented in a timely manner. SSD contact information: 117 Louise Pound Hall Bldg. Please know that we are constantly working to improve inclusivity and accessibility in the classroom, so if there is something you feel that we can do to better support you, please do not hesitate to reach out to us.

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).

COVID related course considerations

An individual in this course has a documented need for face coverings to be required in this course. Without divulging personal or identifying information, such a documented need might be that a member of their household is unable to be vaccinated or has a health condition that makes vaccines less effective for them. As a result, the College of Agricultural Sciences and Natural Resources has determined that face coverings will be required in this course. If you are unwilling to comply with this requirement, please visit with your advisor about different sections or possible alternative courses that you might take in lieu of this one.

Further, due to the evolving nature of COVID-19 infections in our community and region, we may anticipate that expectations for the learning environment change over the course of the semester. Based on communications from the University President in Summer 2021, students should plan to utilize the Safer Community app and will need to have "Access Granted" status to participate in on-campus learning. This will require either entry into the vaccine registry or weekly testing. More information is available at https://covid19.unl.edu/fall-2021-campus.

Additionally, we recognize that we are all under very different and unique circumstances due to the ongoing global pandemic. We would ask all students in the course is to prioritize your health and safety as well as the health and safety of the teaching team, your classmates, and the broader community. Please plan to communicate with the teaching team if you are feeling sick, quarantining or struggling in any other way. *We are here to help everyone succeed in the course!* As a teaching team we strive to be as supportive and accommodating as possible but *ask that you to communicate your needs and challenges with us.*