

ENVECON 161: Advanced Topics in Environmental and Resource Economics SPRING 2025

Instructor: Aaron Smith (AaronSmith@berkeley.edu, Giannini 301, AaronSmithAgEcon.com)
Office hours: Tue 11:15-12:15 (Giannini 301), Friday 2-3pm ([zoom](#))

GSI: Shuo Yu (shuoy@berkeley.edu)
Office Hours: Wednesday 4-5pm (Giannini 237)

Course Summary: About 25% of greenhouse gas emissions come from the food system. Agricultural production is also responsible for significant water and air pollution. On the other hand, fuels produced from agricultural products may provide potential low-carbon alternatives to fossil fuels. In this class, we will study the large challenges in environmental quality, energy production, and climate that stem from agriculture. We will seek to understand why things are as they are and how government policies affect outcomes. We will build our understanding from economic theory and data analysis. Disagreement and debate are encouraged.

Computing: We will use R for computing in the class. Prior experience with R will be helpful, but not necessary.

Reading: Students will read and interpret academic and policy papers. There is no textbook.

Discussion: Early in the semester, students will learn to use R for data analysis. Later in the semester, students will do their own analysis of environmental, climate and energy challenges related to agriculture. This analysis will equip the students to do the research for their final paper and will help prepare them for the midterm. Students will be expected to work on discussion exercises outside of class time so as to get the most out of class time.

Assessment:

Item	Weight	Date(s)	Format
Reading reflections	10	Most Mondays at noon	Quiz on bCourses. Full credit if submitted with reasonable effort.
Participation	10	Tue/Thu 12:30-2:00	Full credit if attend >75% of classes and participate in class discussion. If you are unsure whether you are participating enough, ask me.
Blog	20	Draft 2/21 @ 5pm Final 3/7 @ 5pm	Submit first draft on bCourses. GSI and grader will provide feedback within a week. Submit final draft on bCourses.
Midterm	30	3/20 in class	Questions will be similar to analyses done in class, including both lecture and discussion.
Paper+presentation	30	Propose: 4/4 Present: 4/29 & 5/1 Paper due: 5/15 @ 6pm	Details in the final paper assignment document on bCourses

More details for each assessment item are available on bCourses. There is no final exam.

Late assignment and sick policies

Late reading reflections will not be graded. I will excuse late reading reflections under extenuating circumstances.

For blog or paper submissions, I will deduct five percentage points for every day late (or part thereof).

If you are sick during regular class time, please stay home. Watch the recording on bCourses.

If you are sick during the midterm or your presentation, we will re-schedule it for you.

Calendar:

Week	Date	Topic	Discussion
1	1/21-1/23	The agricultural economy	Introduction to R
2	1/28-1/30	Welfare analysis	Introduction to R graphics
3	2/4-2/6	Econometrics	Introduction to regression
4	2/11-2/13	US government subsidies	COVID payments
5	2/18-2/20	How will climate change affect agriculture and food?	Effects of climate on ag (part 1)
	<i>2/21</i>	<i>Blog first draft due</i>	
6	2/25-2/27	How does agriculture affect the climate?	Effects of climate on ag (part 2)
7	3/4-3/6	How does agriculture affect the climate?	Effects of ag on climate (part 1)
	<i>3/7</i>	<i>Blog final draft due</i>	
8	3/11-3/13	Biofuel (RFS)	Effects of ag on climate (part 2)
9	3/18	Biofuel (LCFS)	Midterm review
	<i>3/20</i>	<i>Midterm</i>	
		<i>Spring break</i>	
10	4/1-4/3	CSA	TBA
	<i>4/4</i>	<i>Final paper proposal deadline</i>	
11	4/8-4/10	Nitrates and water quality	TBA
12	4/15-4/17	Conservation policies	TBA
13	4/22-4/24	Ag Tech	TBA
14	<i>4/29-5/1</i>	<i>Students present final paper</i>	<i>No discussion</i>
	<i>5/15</i>	<i>Final paper due</i>	

Topics:

Module A – Foundation

Week 1 (1/21-1/23): The agricultural economy

Facts about the world. How much land is used for agriculture? How is that land used? How does it affect the climate and environmental outcomes such as air and water quality?

Week 2 (1/28-1/30): Welfare analysis

How economists determine whether economic outcomes improve societal wellbeing. Focus on land use and the environment/climate.

Week 3 (2/4-2/6): Introduction to (or refresher on) econometrics

In subsequent weeks, students will do their own data analysis. We will spend this week setting everyone up for success.

Week 4 (2/11-2/13): US agricultural policy

Outline of past and current agricultural policy in the United States, including various subsidy and conservation programs. Analysis of the 2025 farm bill.

Module B – Climate

Week 5 (2/18-2/20): How climate change affects food production

Climate change will bring (and is already bringing) dramatic changes in the weather, including increased intensity of extreme heat and drought. Crop production is sensitive to the weather. What do the data tell us about how climate change is likely to affect agriculture?

Weeks 6-7 (2/25-3/6): How agricultural production affects the climate

Agricultural production generates carbon dioxide emissions primarily through conversion of forested land to cropland. It generates high emissions of other greenhouse gases, including nitrous oxide from fertilizer and methane from livestock and rice. What do the data tell us about how agriculture is likely to affect the climate?

Week 8-9 (3/11-3/18): Biofuels

Policymakers in California, Washington DC, and around the world have created programs to replace fossil fuels with biofuels made from crop and livestock products. How do these policies work? How much do they mitigate climate change?

Midterm (3/20)

Spring Break (3/24-3/28)

Module C – Policies and Solutions

Week 10 (4/1-4/3): Climate smart agriculture

Recent policies in the US and around the world seek to sequester carbon in agricultural fields by changing the way farmers work their fields. What is the potential effect of these policies? What would be better policies?

Week 11 (4/8-4/10): Fertilizer and water quality

Synthetic fertilizers have provided massive value to humanity by increasing agricultural production. However, fertilizer that is not used by plants often finds its way into waterways where it causes significant pollution.

Week 12 (4/15-4/17): Agricultural conservation policy

Federal programs such as EQIP and CRP pay farmers to adopt conservation measures, such as retiring farmland, reducing tillage, or using more efficient irrigation technology. State programs such as California's SWEEP have similar objectives. How well do these programs work to improve environmental outcomes?

Week 13 (4/22-4/24): Agricultural technology

AI and robotics are among the new technologies entering agriculture with the promise of both increasing efficiency and improving environmental outcomes. For example, robots that identify and remove weeds can dramatically reduce pesticide use. What is the potential of these technologies to improve environmental outcomes? What policies make sense?

Week 14 (4/29-5/1): Student presentations

Students will present their final papers.

Academic Integrity

You are a member of an academic community at one of the world's leading research universities. Universities like Berkeley create knowledge that has a lasting impact in the world of ideas and on the lives of others; such knowledge can come from an undergraduate paper as well as the lab of an internationally known professor. One of the most important values of an academic community is the balance between the free flow of ideas and the respect for the intellectual property of others. Researchers don't use one another's research without permission; scholars and students always use proper citations in papers; professors may not circulate or publish student papers without the writer's permission; and students may not circulate or post materials (handouts, exams, syllabi--any class materials) from their classes without the written permission of the instructor.

Any test, paper or report submitted by you and that bears your name is presumed to be your own original work that has not previously been submitted for credit in another course unless you obtain prior written approval to do so from your instructor. In all of your assignments, including your homework or drafts of papers, you may use words or ideas written by other individuals in publications, web sites, or other sources, but only with proper attribution. If you are not clear about the expectations for completing an assignment or taking a test or examination, be sure to seek clarification from your instructor or GSI beforehand. Finally, you should keep in mind that as a member of the campus community, you are expected to demonstrate integrity in all of your academic endeavors and will be evaluated on your own merits. The consequences of cheating and academic dishonesty—including a formal discipline file, possible loss of future internship, scholarship, or employment opportunities, and denial of admission to graduate school—are simply not worth it.

Cheating: Anyone caught cheating on a quiz or exam will receive a failing grade and will also be reported to the University Office of Student Conduct. In order to guarantee that you are not suspected of cheating, please keep your eyes on your own materials and do not converse with others during the quizzes and exams.

Plagiarism/Self-plagiarism: You must be original in composing the writing assignments in this class. To copy text or ideas from another source (including your own previously, or concurrently, submitted course work) without appropriate reference is plagiarism and will result in a failing grade for your assignment and usually further disciplinary action. For additional information on plagiarism, self-plagiarism, and how to avoid it, see, for example [this link](#).

Academic Integrity and Ethics: Cheating on exams and plagiarism are examples of violations in the realm of ethics and integrity. Honesty, integrity, and ethical behavior are of great importance in all facets of life. They are so important that it is generally assumed that one has learned and internalized these qualities at an early age. As a result, these issues rarely get explicitly addressed by the time one gets to be a university student. However, it cannot be overstated just how important honesty is to the academic enterprise.

[Policy on Academic Dishonesty/ Berkeley Campus Code of Student Conduct](#)

[Resources on promoting Academic Integrity](#)

Academic Accommodations: The purpose of academic accommodations is to ensure that all students have a fair chance at academic success. If you have Letters of Accommodations from the Disabled Students' Program or another authorized office, please share them with me as soon as possible, and we will work out the necessary arrangements. While individual circumstances can vary, requests for accommodations often fall into the categories listed on the Academic Calendar and Accommodations website. The campus has well-developed processes in place for students to request accommodations, and you are encouraged to contact the relevant campus offices listed on the [Academic Accommodations Hub](#). These offices, some of which are confidential, can offer support, answer questions about your eligibility and rights, and request accommodations on your behalf, while maintaining your privacy.

Student Advocate's Office [Confidential]: Provides free, confidential, student-to-student assistance for undergraduate and graduate students navigating issues with academics, financial aid, accusations of misconduct, instances of harassment and discrimination, and other grievances within the scope of the university. Phone: (510) 642-6912 | Website: <https://advocate.berkeley.edu/> | Email: help@berkeleysao.org

Ombuds Office for Students and Postdoctoral Appointees [Confidential]: Confidential conflict resolution services, coaching, referrals, clarifying policies and procedures. Empowering students to make informed decisions with the goal of resolutions that meet their needs. Phone: (510) 642-5754 | Website: <https://sa.berkeley.edu/ombuds>

Syllabus is a Contract and Subject to Change:

This syllabus is a contract that you, as an enrolled student in this course, agree to abide by throughout the semester. You agree to complete the assignments in a timely manner in accordance with the schedule printed in the syllabus and to participate in the class using proper student conduct and etiquette. As part of this agreement, your responsibilities are printed clearly within this syllabus with deadlines so that you will know well in advance when readings and assignments are due. The syllabus is also subject to change if deemed necessary by the instructor. You will be afforded ample warning before any new responsibility or assignment is due. Most often, a change to the syllabus will constitute a minor change in reading materials or the cancellation of a day of class. If such a change occurs, a revised syllabus will be made available to students and replace any old copies of the syllabus.

The [Basic Needs Center](#) is a virtual & physical hub located in the lower level of the MLK Student Union that supports students' holistic wellbeing through a set of essential programs and services. Our programs include education, prevention & emergency relief for the following areas: food, housing, finances, health, and wellness. All students including undergraduate, graduate, international and undocumented students are eligible for Basic Needs Center resources and services