

**AEDECON 4330**  
**Sustainable Economy: Concepts and Methods**

Credit Hours: 3

Spring 2024

**Lecture:** Monday/Wednesday 9:35-10:55 a.m.  
Agricultural Engineering Building 104

**Lab:** Tuesday 5:30-6:25 p.m.  
Agricultural Admin Building 108

**Professor:** Elena Irwin

Email: [irwin.78@osu.edu](mailto:irwin.78@osu.edu)

Office: Ag Admin 316

Weekly Office Hours: Mondays and Wednesdays 11:15 a.m. -12:15 p.m. I'm also happy to set up an alternative time to meet via Zoom. Please email me to schedule a time.

**Lab Instructor/Grading Assistant:** Yunan Zhu

Email: [zhu.2904@buckeyemail.osu.edu](mailto:zhu.2904@buckeyemail.osu.edu)

Office: Ag Admin 227

Weekly Office Hours: Wednesdays 12:00 -2:00 p.m.

If this time window doesn't work for some reason, email Yunan to check her availability at another time.

**Course Description**

The course introduces students to core concepts of sustainability in economics and the quantitative methods necessary to understand and evaluate sustainable development. This is a core upper-level course in sustainability concepts and methods developed specifically for the EEDS major. It builds on concepts from environmental and resource economics and incorporates concepts from ecological economics, which is an interdisciplinary field that combines elements of economics and ecology. We will consider sustainability methods used by economists, such as wealth accounting, as well as some methods used largely outside of economics, such as ecological footprint analysis. We will apply the tools and concepts acquired in the class to analyze existing sustainability policies in the US and globally.

Defining a sustainable economy requires that we grapple with unresolved questions about the sustainability of our current economic systems. These are some deep questions, including: What are the constraints to economic production and consumption that are imposed by the Earth's ecosystem? What are the trade-offs in terms of the economy, environment, and human well-being that are implied by these constraints? What trade-offs are we willing and able to make as individuals and as a society to achieve a more sustainable economy? What are the best policies, including the right incentives for individuals, firms, communities, and nations, to reach this goal? While there is no single "right answer" to any of these questions, there are key concepts and theories that provide a framework for defining a sustainable economy and tools and methods for evaluating the sustainability of economic activities within a given region (e.g., country or community) or enterprise.

**Prerequisites:** AEDE 4310 and ENR 3900

## Course Learning Objectives

Successful students will have the ability to:

- Discuss multiple definitions of sustainability, the assumptions and trade-offs behind each.
- Use quantitative methods and tools (e.g., Inclusive Wealth Index, Ecological Footprint Analysis, carbon accounting, non-market valuation) to evaluate sustainability at different scales (individual organization, community, region, nation, world).
- Assess the sustainability of domestic or international policies and projects.
- Communicate sustainability concepts, applications, and challenges to a variety of audiences.

## Required Texts and Readings

There is no textbook for this course. Instead, we will use a number of readings from various sources and other resources; the readings for a given class session are expected to be completed before class. All readings and other resources will be posted on the Carmen website under each class topic.

Students are encouraged to keep an environmental and/or resource economics textbook on hand, so that they can review the relevant economic principles as needed.

## CarmenCanvas and Online Course Content

If you have any concerns about using Carmen or are unclear on where to find any of the online content, please let me know as soon as possible so we can make sure everything is working properly. Similar to things announced in class, **it is my expectation that you keep up to date on things posted in Carmen.**

You should consider taking a minute to review your notification settings in Carmen to ensure that you do not miss important updates, particularly announcements.

## Evaluation

This is a **3-credit-hour course**. You should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) on average.

**How your grade is calculated:**

Assignment category	Points	Learning goal
Exams (1 midterm, 1 final)	30 points each, 60 points total	<ul style="list-style-type: none"><li>• Compare and contrast different concepts, methods, and approaches to sustainability measurement, assessment, and policies</li><li>• Understanding of the application and challenges of common sustainability policies</li></ul>
Excel-based homework assignments (4 total)	20 points each, 80 points total	<ul style="list-style-type: none"><li>• Application of sustainability theory and tools with data analysis and interpretation</li><li>• Sustainability assessment</li><li>• Sustainability communication</li></ul>
Challenge question presentation	15 points	<ul style="list-style-type: none"><li>• Synthesize evidence and connect it to theory</li><li>• Apply sustainability concepts and methods to real-world events and examples</li></ul>

Assessments (3)	5 points each, 15 total	<ul style="list-style-type: none"> <li>Provide feedback to instructor about your pre-existing knowledge and knowledge gained</li> </ul>
Participation	30 points	<ul style="list-style-type: none"> <li>Gain experience in discussing and communicating your questions and ideas</li> </ul>
Total	<b>200</b>	

## Description of Evaluation Activities

**Exams:** The midterm is a closed-book, in-class exam and may include any content from lectures, readings, homework assignments, and in-class discussions. More information regarding the structure of the final exam will be available later in the semester. Students are highly encouraged to attend the in-class review session. Make-up exams will be given only when prior arrangements are made and only for documentable and unavoidable circumstances.

**Excel-based Homework Assignments:** Each assignment will be posted at least 2 weeks before it is due. Homework assignments should be uploaded to the Carmen website before 11:59PM the day of the due date unless otherwise noted. Lab sessions are designed to help students with the homework assignments. Key Excel topics that are relevant for the homeworks will be reviewed in the weekly lab sessions.

**Challenge question presentation:** There are six challenge questions that we will consider and discuss in class at specified times (see the course outline). Each student will develop a Powerpoint presentation that supports either a YES or NO answer to one of the six challenge questions. Students will upload a Powerpoint presentation in advance and will give their presentation in class on the day of the challenge question.

**Assessments:** These are short exercises designed to test student comprehension of material (think take-home quiz). These will book-end the course with one at the very beginning to assess your pre-existing knowledge; one at the mid-point to assess the first part of the course and get feedback for the second part; and one at the end to assess your knowledge gained.

Detailed information on each assignment will be posted on Carmen.

**Participation:** There is no formal attendance policy but active and constructive participation during class is a critical part of this course. Students are expected to come prepared to discuss questions raised by the material, peers, and the instructor. The substance of your contributions will be considered, as well as the frequency. Written responses to in-class questions will be collected and will count towards the participation grade. Behavior that distracts fellow students will be particularly penalized, including but not limited to, talking, texting, or using computers/tablets for non-course related activities. Attendance factors into your participation as you cannot participate if you are not present. However, while attendance is a necessary condition for participation, it is not a sufficient condition.

**Grading Scale:** The standard grading scale is below. If deviating from the standard grade scale, the grade scale must be complete and span the total possible grades from A to E.

<u>Percentage</u>	<u>Grade</u>	<u>Percentage</u>	<u>Grade</u>
93-100	A	73-76.9	C
90-92.9	A-	70-72.9	C-
87-89.9	B+	67-69.9	D+
83-86.9	B	60-66.9	D
80-82.9	B-	<60	E
77-79.9	C+		

## Course Policies

**Late Work:** All assignments as electronic copies are due on the date announced on Carmen and may be submitted via the Carmen Dropbox. Unless a student has obtained an explicit extension from me, any late assignment will have 1 point deducted each day it is late (including weekends). An assignment is considered late when it is submitted after the stated deadline. At my discretion, exceptions may be made for emergencies or other well-documented issues. These exceptions are easiest to make when you notify me before the deadline. No assignment will be accepted after everyone else's assignments have been graded and returned.

**Grade appeals:** The assigned grade is designed to show the overall quality of work performed by each student. If you believe that any grade was not properly assigned, you may write an email to the instruction team (both the instructor for this class and the teaching assistant) explaining why you believe the grade was incorrectly assigned within one week of receiving the graded assignment back. Each appeal will be considered, and if a re-grade is performed, the entire assignment will be re-graded. The final grade may be greater, less, or equal to the original grade.

**Feedback and response time:** The following gives you an idea of our intended availability throughout the course.

- **Grading and feedback:** For the homework assignments, you can generally expect feedback within **10 days**.
- **E-mail:** Please include AEDE 4330 in your email subject line. We will seek to reply to e-mails within **24 hours on school days**. If you do not get a response after this time, please email again—I get well over a hundred emails per day and may miss an email.

**Attendance policy:** Your attendance and participation in class is critical. I expect you to attend every class, ask questions, and regularly participate in class discussions.

**Logging into Carmen site:** Be sure you are logging in to the course in Carmen at least once each week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably login many times.)

**Class attendance:** So long as you are healthy and abiding by the safety guidelines of the university, I expect you to attend class sessions in person so that you can best participate in class discussions. If you have a situation that might cause you to miss an entire week of class, email me ahead of time *as soon as possible*.

**Lab attendance:** Lab attendance is expected given the importance of labs to successfully completing the homework assignments.

**Office hours:** I strongly encourage you to take advantage of this time to clarify any questions you may have about the course material.

**Communications:** When we have in-class or on-line discussions, please always be respectful, thoughtful, and constructive. Listen intently to others and with an open mind.

**Writing style:** All written assignments should use good grammar, spelling, and punctuation. All figures and tables should be properly captioned in a Word document and referenced in the text. Informality (including an occasional emoticon) is fine for non-academic topics.

**Citing your sources:** When stating empirical evidence or referring to a theory or idea that is associated with a specific person or school of thought, please cite your sources. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.) More guidance on writing with sources is provided on the OSU's library website: <https://guides.osu.edu/c.php?g=735128&p=7248617>

**E-Mail Etiquette:** Professional relationships should be maintained when using e-mail for a class. We will not respond to e-mails that we consider inappropriate. We will respond to appropriate emails in a timely manner, but please do not expect an immediate reply.

**Exams:** The exams are closed-book and are intended to ensure you have learned the class materials and can synthesize and apply concepts.

**Homework assignments:** You are allowed to work together on homework assignments in a small group of up to 3 people. If you choose to work together, there are a few rules that you will need to follow: (i) Indicate clearly on the front-page of your assignment or in the top row of your Excel spreadsheet all the members of your group. (ii) You may work together on the Excel homework to do the calculations, but each person must turn in their own Excel spreadsheet with the answers appropriately filled out. (iii) You may discuss the written questions and your thoughts about how to answer them with your group, but the answers that you write down must be **your own — i.e., do not write the answers as a group and then just cut and paste them into your own homework.** You may discuss your thoughts as a group. However, all answers must be in your own words.

**AI-based assistance:** We treat AI-based assistance, such as ChatGPT and Copilot, the same way we treat collaboration with other people: you are welcome to talk about your ideas and work with other people, both inside and outside the class, as well as with AI-based assistants. However, all work you submit must be your own. **You should never include in your assignment anything that was not written directly by you without proper citation** (including quotation marks and in-line citation for direct quotes) **and do not copy anything from the AI assistant.** Instead, use your conversation with the AI as a learning experience, then close the window, open your assignment, and let your assignment reflect your revised knowledge.

**Copyright disclaimer:** The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course. Intellectual Property (covered by copyright) includes Course materials (Text, Audio, Video, Multimedia, Sims, Apps, etc.), and Student Generated materials.

### **Academic Integrity/ Academic Misconduct Policy**

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute Academic Misconduct.

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: Any activity that tends to compromise the academic integrity of the University, or subvert the educational process. Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an excuse for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

## **Accommodation Policy**

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are isolating while waiting for a COVID-19 test result, please let me know immediately. Those testing positive for COVID-19 should refer to the Safe and Healthy Buckeyes site for resources. Beyond five days of the required COVID-19 isolation period, I may rely on Student Life Disability Services to establish further reasonable accommodations. You can connect with them at [slds@osu.edu](mailto:slds@osu.edu); 614-292-3307; or [slds.osu.edu](http://slds.osu.edu).

It is Ohio State's policy to reasonably accommodate the sincerely held religious beliefs and practices of all students. The policy permits a student to be absent for up to three days each academic semester for reasons of faith or religious or spiritual belief.

Students planning to use religious beliefs or practices accommodations for course requirements must inform the instructor in writing no later than 14 days after the course begins. The instructor is then responsible for scheduling an alternative time and date for the course requirement, which may be before or after the original time and date of the course requirement. These alternative accommodations will remain confidential. It is the student's responsibility to ensure that all course assignments are completed. For more information about religious accommodations at Ohio State, visit [odi.osu.edu/religious-accommodations](http://odi.osu.edu/religious-accommodations).

## **Counseling and Consultation Services/Mental Health**

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing.

If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting [ccs.osu.edu](https://ccs.osu.edu) or calling 614-292-5766. CCS is located on the 4th floor of the Younkin Success Center and 10th floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available 24/7 **by dialing 988 to reach the Suicide and Crisis Lifeline.**

For students in the College of Food, Agricultural, and Environmental Sciences, David Wirt, [wirt.9@osu.edu](mailto:wirt.9@osu.edu), is the CFAES embedded mental health counselor on the Columbus campus. To contact David, please call 614-292-5766. Students should mention their affiliation with CFAES if interested in speaking directly with David.

### **Creating an environment free from harassment, discrimination, and sexual misconduct**

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

1. Online reporting form at [equity.osu.edu](https://equity.osu.edu),
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or Email [equity@osu.edu](mailto:equity@osu.edu)

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

### **Diversity Statement**

The Ohio State University affirms the importance and value of diversity of people and ideas. We believe in creating equitable research opportunities for all students and to providing programs and curricula that allow our students to understand critical societal challenges from diverse perspectives and aspire to use research to promote sustainable solutions for all. We are committed to maintaining an inclusive community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among all members; and encourages each individual to strive to reach their own potential. The Ohio State University does not discriminate on the basis of age, ancestry, color, disability, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, race, religion, sex, gender, sexual orientation, pregnancy, protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment.

To learn more about diversity, equity, and inclusion and for opportunities to get involved, please visit:

- [odi.osu.edu](https://odi.osu.edu)
- [odi.osu.edu/racial-justice-resources](https://odi.osu.edu/racial-justice-resources)
- [odi.osu.edu/focus-on-racial-justice](https://odi.osu.edu/focus-on-racial-justice)
- [cbisc.osu.edu](https://cbisc.osu.edu)

In addition, this course adheres to **The Principles of Community** adopted by the College of Food, Agricultural, and Environmental Sciences. These principles can be found at [cfaesdei.osu.edu/about-us/cfaes-principles-community](https://cfaesdei.osu.edu/about-us/cfaes-principles-community). For additional information on Diversity, Equity, and Inclusion in CFAES, contact the CFAES Office for Diversity, Equity, and Inclusion ([cfaesdei.osu.edu](https://cfaesdei.osu.edu)). If you have been a victim of or a witness to harassment or discrimination or a bias incident, you can report it online and anonymously (if you choose) at [equity.osu.edu](https://equity.osu.edu).

### **Weather or other short-term closing**

Should in-person classes be canceled, I will notify you as to which alternative methods of teaching will be offered to ensure continuity of instruction for this class. Communication will be via the CarmenCanvas course site.

### **Safe and Healthy Buckeyes**

All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance ([safeandhealthy.osu.edu](https://safeandhealthy.osu.edu)). Non-compliance will result in a warning first, and disciplinary actions will be taken for repeated offenses.

### **Land Acknowledgement Statement**

We would like to acknowledge the land that The Ohio State University occupies is the ancestral and contemporary territory of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and many other Indigenous peoples. Specifically, the university resides on land ceded in the 1795 Treaty of Greeneville and the forced removal of tribes through the Indian Removal Act of 1830. As a land grant institution, we want to honor the resiliency of these tribal nations and recognize the historical contexts that has and continues to affect the Indigenous peoples of this land (Source: *Center for Belonging and Social Change* [cbisc.osu.edu/about-us/land-acknowledgement](https://cbisc.osu.edu/about-us/land-acknowledgement)).



**Tentative Course Schedule**  
(subject to change—all changes will be announced in class and on the Carmen website)

	<b>I. INTRODUCTION</b>
Jan 8	1. Course introduction and overview
Jan 10	2. Economic growth and the environment
Jan 15	<i>Martin Luther King Day - no class</i>
	<b>II. WEAK SUSTAINABILITY</b>
Jan 17	3. Capital stocks, ecosystem service flows, and human well-being <i>Assessment #1 Due</i>
Jan 22	4. Wealth accounting and the Inclusive Wealth Index (IWI)
Jan 24	5. Applying IWI to test weak sustainability: Is the world getting more sustainable?
Jan 26	<i>HW#1 Due: Inclusive wealth accounting</i>
Jan 29	6. Challenge Question: Do markets reflect resource scarcities and limits to growth?
Jan 31	7. Challenge Question: Can technology make the world sustainable?
Feb 5	8. Challenge Question: Will getting prices right ensure sustainability?
	<b>III. STRONG SUSTAINABILITY</b>
Feb 7	9. Ecological economics and strong sustainability rules
Feb 12	10. Ecological footprint analysis
Feb 14	11. Material flows analysis
Feb 16	<i>HW#2 Due: Ecological footprint analysis</i>
Feb 19	12. Carbon accounting
Feb 21	13. Challenge Question: Are produced and natural capitals mostly substitutable?
Feb 26	14. Challenge Question: Should cities (or local communities) implement strong sustainability rules?
Feb 28	15. Challenge Question: Can resource consumption be decoupled from economic growth?
Mar 4	16. In-class review
Mar 6	17. MIDTERM
Mar 11-15	<i>Spring Break – no classes</i>
	<b>IV. HARNESSING SUSTAINABILITY THEORY TO ADDRESS PRESSING PROBLEMS</b>
Mar 18	18. Ecosystem services valuation (ESV) (part 1)
Mar 20	19. Ecosystem services valuation (ESV) (part 2)
Mar 22	<i>HW#3 Due: Greenhouse gas accounting</i>
Mar 25	20. ESV: Ecological production functions
Mar 27	21. ESV application: Assessing land use trade-offs
Apr 1	22. Cost benefit analysis
Apr 3	23. Cost benefit analysis case study
Apr 8	24. Resilience vs. sustainability
Apr 10	25. Planetary boundaries and doughnut economics
Apr 12	<i>HW#4 Due: Trade-off analysis</i>
Apr 15	26. Sustainability/policy assessment #1
Apr 17	27. Sustainability/policy assessment #2
Apr 19	<i>HW#5 Due: Benefit-cost analysis</i>
Apr 22	28. Course synthesis and review (Earth Day!) <i>Assessment #2 Due</i>
Apr 26	FINAL 10:00 – 11:45 AM

See Carmen website for required reading assignments to be completed before each class and for the challenge question presentation assignment due dates. All homework (HW) and the challenge question presentation must be uploaded to the Carmen class website on or before the due date. Note that the excel-based HW#1-4 are due on Fridays so you can maximize the Tuesday lab sessions for help. See Carmen website for lab session dates.