



THE OHIO STATE UNIVERSITY

SYLLABUS: ENR 3900 – SUSTAINABILITY METRICS SPRING 2024, 4 CREDITS, ONLINE

COURSE OVERVIEW

Teaching Staff

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Course description

This is a completely online course that will utilize multiple platforms supported by The Ohio State University. Course content, including lecture presentations and videos, will be delivered using Carmen, OSU's learning management system. Required readings support the lecture material. Carmen (<https://carmen.osu.edu/>) will also be used to complete knowledge checks, participation activities and other assignments. Other resources, such as the University Libraries, may also be used. All assignments and knowledge checks must be completed by the due date shown in Carmen.

This class will address the use of data and indicators to measure sustainability and track progress. Students will use software tools to quantify sustainability measures.

Computer assignments will require the use of Microsoft Excel. The most recent version of Microsoft Excel is preferred and is available for student download at no cost as part of Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Other versions of Microsoft Excel are acceptable but please note that the laboratory instructions were written for the most recent version of Excel and some functions may vary with other, earlier versions.

Prerequisites

ENR 2000, AEDE 2005 or other GE Data Analysis course. This class is designed for sophomore level undergraduate students in the EEDS program. As such, a basic knowledge of the human dimensions of sustainability is required. The course is available to all students who wish to gain further understanding of the methods and tools used to measure sustainability.

Course learning outcomes

By the end of this course, you should successfully be able to:

- Recognize the environmental and social impacts of a product or service over its life cycle
- Identify and evaluate risks associated with an action or operation
- Identify appropriate indicators to measure the sustainability of public and private organizations
- Locate secondary data sources and analyze data using spreadsheet functions

HOW THIS COURSE WORKS

Mode of delivery: This course is 100% online. There are no required sessions when you must be logged in to Carmen at a scheduled time.

Pace of online activities: This course is divided into **weekly modules** within **three main units**. The weekly modules are released ahead of time, one unit at a time. Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame. Students may also work ahead within the unit.

Credit hours and work expectations: This is a **4-credit-hour course**. According to Ohio State policy, you should expect around 4 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 8 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Attendance and participation requirements: Because this is an online course, your attendance is based on your online activity and participation. The following is a summary of everyone's expected participation:

- **Participating in online activities for attendance: AT LEAST ONCE PER WEEK**
You are expected to log in to the course in Carmen every week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible*.
- **Participating in discussion forums: AT LEAST ONE TIME PER WEEK**
As part of your participation, each week you can expect to post once or twice AND respond to your group members' posts for each lecture as part of our substantive class discussion on the week's topics.
- **Office hours and live sessions: OPTIONAL**
All live, scheduled events for the course, including my office hours, are optional.

COURSE MATERIALS AND TECHNOLOGY

Required Readings

Matthews, Hendrickson, and Matthews (2014). Life Cycle Assessment: Quantitative Approaches for Decisions That Matter. Open access textbook, retrieved from <https://www.lcatextbook.com/> This work is licensed under a [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/), with its associated liability limitations and lack of warranty.

(This is an electronic textbook, available at no-cost. Instructions on where to download will be provided on Carmen.)

Additional readings are provided on Carmen, see detail in the schedule below.

Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
- **Phone:** 614-688-HELP (4357)
- **Email:** 8help@osu.edu
- **TDD:** 614-688-8743

Baseline technical skills necessary for completing the assignments

- Basic computer and web-browsing skills
- Navigating Carmen: for questions about specific functionality, see the [Canvas Student Guide](#).

Required Technology skills specific to this course

- [CarmenZoom virtual meetings](#)
- [Recording a slide presentation with audio narration](#)
- [Recording, editing, and uploading video](#)

Required equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop or tablet mic or external microphone
- Other: a mobile device (smartphone or tablet) or landline to use for BuckeyePass authentication

Required software

- Microsoft 365 including Microsoft Excel: All Ohio State students are eligible for free access to Microsoft 365 through Microsoft's Student Advantage program. Full instructions for downloading and installation can be found at go.osu.edu/office365help.
- Presentation software such as Microsoft Powerpoint. (Powerpoint is also included in the free Microsoft Office package listed above).
- Media Player such as Windows Media Player: <https://support.microsoft.com/en-us/help/18612/windows-media-player>

Carmen Access

You will need to use BuckeyePass multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

GRADING AND FACULTY RESPONSE

Assessment

Your learning will be assessed with knowledge checks, weekly computer assignments, participation in weekly activities (this includes posting and responding to discussion boards), a mid-term project, and a final project and presentation.

Each week you will take an online knowledge check to assess your understanding of the content of the lecture material, required readings, and activities. The knowledge checks do not cover computer homework. These are open-note, book, and computer, but NOT open friend or classmate. Each knowledge check will be made available on Carmen at the beginning of the week it is assigned and will close the following Sunday night at 11:59 pm. Once you begin a knowledge check, you will have 60 minutes to complete it. You may take each knowledge check **twice** within the week period and your highest score will be recorded. The lowest knowledge

check score will be dropped for the final grade calculation. Correct answers for each knowledge check will be released when the knowledge check closes.

Computer homework will be assigned at the beginning of each week and will be due one week after assignment.

Weekly lectures will include group and individual activities that may require a discussion post and responding to other class members' posts. While these activities will not be graded, participation is required for the class participation points.

The mid-term project will incorporate lecture and computer assignment materials and will take the form of a 4- to 6-page report. This will be evaluated on professional appearance as well as content.

You will synthesize your knowledge of the course with a final project relating to the sustainability of The Ohio State University. You will submit a project paper (6 to 8 pages). In addition, on the final week of class you will post a video of yourself presenting one visual graphic that succinctly describes your project. You will also respond to your group members' presentations.

<i>Assessments, See course schedule on Carmen for due dates</i>	Percent of Final Grade
Knowledge Checks (12, drop lowest)	33
Computer Assignments (8)	32
Participation in Weekly Activities	20
Mid-term Project	6
Final Project and Presentation	9
Total	100

Late assignments

The penalty for late assignments (computer or projects) is 10 % of the assignment total per day (each 24-hour period). Knowledge checks must be completed within the open period; they cannot be taken late. Participation activities close at the due date and no partial credit can be given as they are graded as "complete" or "incomplete." All health-related accommodations for late assignments will require documentation (e.g. doctor's note or hospital discharge papers).

Grading scale

93–100: A	80–82: B-	67 –69: D+
90–92: A-	77–79: C+	60 –66: D
87–89: B+	73–76: C	Below 60: E
83–86: B	70–72: C-	

Faculty feedback and response time

Please feel free to contact me by email (toman.11@osu.edu) any questions or concerns come up throughout the term. I am also happy to set up a time to talk in person or through a video format (Skype, Zoom, Facetime).

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

Grading and feedback: For weekly assignments, you can generally expect feedback within 7 days of the assignment due date.

E-mail: I will reply to e-mails within 24 hours on days when class is in session at the university.

OTHER COURSE POLICIES

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online or in writing.
- **Backing up your work:** Consider composing your academic posts in a word processor (like Microsoft Word), where you can save your work, and then copying into the Carmen discussion.

Academic integrity policy

Policies for this online course

- **Knowledge checks:** You must complete the knowledge checks yourself, without any external help or communication from classmates or other individuals. These are open note and book, but not open neighbor.
- **Written assignments:** Your written assignments, including discussion posts, should be your own original work. The misrepresentation of any text or images generated by Chegg, ChatGPT, or other AI tool as your own work is not allowed. In formal assignments, you should follow **APA** style to cite the ideas and words of your research sources.
- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- **Collaboration and informal peer-review:** The course includes opportunities for collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a knowledge check or using someone else's data files is not permitted. If you're unsure about a particular situation, please feel free to ask ahead of time.

Ohio State's academic integrity 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.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages ([COAM Home](#))
- *Ten Suggestions for Preserving Academic Integrity* ([Ten Suggestions](#))
- *Eight Cardinal Rules of Academic Integrity* (www.northwestern.edu/uacc/8cards.htm)

Copyright for instructional materials

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.

Accessibility accommodations for students with disabilities

Requesting accommodations

The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services. 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. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with me.

- Carmen (Canvas) accessibility: <https://community.canvaslms.com/docs/DOC-2061>

- Streaming audio and video

Health and Safety

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,
2. Call 614-247-5838 or TTY 614-688-8605, or
3. Email 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.

This course adheres to The Principles of Community adopted by the College of Food, Agricultural, and Environment Sciences. These principles are located on the Carmen site for this course, and can also be found at <https://go.osu.edu/principlesofcommunity>. For additional information on Diversity, Equity, and Inclusion in CFAES, contact the CFAES Office for Diversity, Equity, and Inclusion (<https://equityandinclusion.cfaes.ohio-state.edu/>). If you have been a victim of or a witness to a bias incident, you can report it online and anonymously (if you choose) at <https://studentlife.osu.edu/bias/report-a-bias-incident.aspx>.

Personal Well-Being and Mental Health

Please take time to take care of yourself! Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress.

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 or calling 614-292-5766. CCS is located on the 4th Floor of the Yountkin 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 through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at <https://suicidepreventionlifeline.org>

David Wirt, wirt.9@osu.edu, is the CFAES embedded mental health counselor. He is available for new consultations and to establish routine care. To schedule with David, please call 614-292-5766. Students should mention their affiliation with CFAES when setting up a phone screening.

Online Safety

Looking after your online presence is also important. The following resources can help you stay safe online and protect your privacy:

<https://online.osu.edu/privacy-policy>

<https://cybersecurity.osu.edu/students>

COVID-19 Specific Policies

Health and safety requirements: All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (<https://safeandhealthy.osu.edu>).

If you are required to go into quarantine at any point during the semester for reasons related to COVID-19 and you expect this to affect your ability to access course material or complete course assignments, please contact Student Life Disability Services as soon as possible.

Course schedule (subject to change)

Week Dates	Topic	Assignments	Readings
Measuring Sustainability			
1 1/8 – 1/12	Introduction to Sustainability Metrics	Practice Knowledge Check	Nat. Research Council, 2011 “Sustainability and the US EPA,” Chapter 2
	No Computer Assignment		Nat. Research Council, 2011 “Sustainability and the US EPA,” Chapter 4 (pages 54-55 (box), 59-64, 69-70) & Appendix E (E1)
Module 1: Life Cycle Thinking			
2 1/16 – 1/19	Introduction to LCA and Life Cycle Thinking	Knowledge Check 1	Matthews et al., 2015 “Life Cycle Assessment: Quantitative Approaches for Decisions That Matter,” Chapter 1
	Lab: Introduction to computing with Microsoft Excel.	Computer Assignment 1: Spreadsheet basics, relative & absolute cell referencing, simple functions.	
3 1/22 – 1/26	Quantitative skills and estimation	Knowledge Check 2	Matthews et al., 2015 “Life Cycle Assessment: Quantitative Approaches for Decisions That Matter,” Chapter 2
	Lab: Using Excel as a database.	Computer Assignment 2. Importing data, filtering, sorting, pivot tables.	
4 1/29 – 2/2	LCCA – the economic side	Knowledge Check 3	Matthews et al., 2015 “Life Cycle Assessment: Quantitative Approaches for Decisions That Matter,” Chapter 3
	Lab: Problem solving in Excel.	Computer Assignment 3. Problem solving with functions, formulas, and goal seek.	
5 2/5 – 2/9	LCA and ISO standard and gathering data for LCA	Knowledge Check 4	Matthews et al., 2015 “Life Cycle Assessment: Quantitative Approaches for Decisions That Matter,” Chapters 4 & 5.
	Lab: Reporting and Problem Solving in Excel.	Computer Assignment 4. Bar charts, line graphs, Data Tables.	

6 2/12 – 2/16	LCA: Economic Input-Output models and process matrix-based methods	Knowledge Check 5	Matthews et al., 2015 “Life Cycle Assessment: Quantitative Approaches for Decisions That Matter,” Chapter 8, pages 190-202.
	Lab: EIO-LCA spreadsheet tool	Computer Assignment 5. Vehicle fuel analysis.	
7 2/19 – 2/23	Life Cycle Impact Assessment and LCA in action	Knowledge Check 6	Matthews et al., 2015 “Life Cycle Assessment: Quantitative Approaches for Decisions That Matter,” Chapter 10, pages 285-300. M. Specter, 2008 “Big Foot,” The New Yorker. Read pages 1 -11.
	Lab: Mid-term project.	Mid-Term Project: “How green is my grocery bag?” Includes comparison with published study.	
Module 2: Risk Assessment			
8 2/26 – 3/1	Intro to risk assessment: identifying and measuring risks and decision making	Knowledge Check 7	Johansen, 2010 “Foundations of risk assessment,” pages 1, 5-17 Krysiak, 2009, “Risk Management as a Tool for Sustainability” pages 483-485 only Covaliu, 2001 “Decision Analysis: Concept, Tools, and Promise” pgs 1-11
	NO COMPUTER ASSIGNMENT – Continue working on your mid-term project.		
9 3/4 – 3/8	Methods of risk analysis – decision trees	No Knowledge Check	Middleton, M.D. 2007, <u>Decision Analysis for Microsoft Excel</u> , Chapter 14, “Introduction to Decision Trees.”
	NO COMPUTER ASSIGNMENT		
3/11 – 3/15	Spring Break – No Lecture		
10 3/18 – 3/22	Methods of risk analysis – risk profiles & risk matrices	Knowledge Check 8	Krysiak, 2009, “Risk Management as a Tool for Sustainability” pages 485-488, skim remainder Web article: http://www.cgerisk.com/knowledge-base/risk-assessment/risk-matrices
	Lab: Statistics and Plotting in Excel.	Computer Assignment 6. Summary statistics, histograms, scatter plots, trendlines.	

11 3/25 – 3/29	Dealing with uncertainty & variability - sensitivity analysis.	Knowledge Check 9	Eschenbach, 1992, "Spiderplots versus Tornado Diagrams for Sensitivity Analysis"
	Lab: Changing workbook and chart appearance in Excel	Computer Assignment 7. Conditional formatting, sparklines.	
Module 3: Sustainability Indicators			
13 4/8 – 4/12	Developing indicators. Sustainability in communities. Bellagio principles.	Knowledge Check 10	Hardi & Zdan, 1997 "Assessing Sustainable Development," pages 1-20, 117-128. Holden, M. "Revisiting the Local Impact of Community Indicators Projects: Sustainable Seattle as Prophet in Its Own Land," Applied Research in Quality of Life 1, no. 3–4 (September 1, 2006): 253–277. Center for Rural Communities. 2015. Assets and Amenities Comparison Report – Ashland, Wisconsin. Read pages 1-8, skim remainder.
	Lab: Risk Analysis in Excel	Computer Assignment 8. Standard deviations, normal distributions, probabilities.	
13 4/8 – 4/12	Measuring the sustainability of universities and nations	Knowledge Check 11	K. Galbraith, 2009 "Ranking Universities by 'Greenness,'" New York Times. Yanarella et al., 2009. "Green vs. Sustainability, From Semantics to Enlightenment" Sustainability. Moldan et al. 2004 "Composite Indicators of Environmental Sustainability" Costanza et al., 2014 "Time to leave the GDP behind," Nature.
	Lab: Introduction to final project	Final Project: Pulling it all together: quantifying the environmental sustainability of OSU	
15 4/15 – 4/19	Case Studies in Risk Assessment	Knowledge Check 12	OAS, 1991, "Primer on Natural Hazard Management" Chapter 1 McRae, M. 2015. "Eugene-Springfield Multi-Jurisdictional Natural Hazards Mitigation Plan." Read chapters 1 & 4: skim remainder.
	Lab: Final project	Final Project continued.	
16 4/22	Final Presentations		