EEE 59500 Carbon Accounting & Sustainability
Course Syllabus, Spring 2025
Purdue University Environmental and Ecological Engineering

Course Information

Lectures: Tuesday and Thursday, 3:00pm – 4:15pm, WALC 3121
Dates: January 13, 2025 – May 3, 2025

Instructor Contact Information

Instructor: Prof. Heather Liddell
Email: liddellh@purdue.edu
Campus Office: POTR 326B
Office Hours: Fridays 10:00-11:00am, or by appointment

Course Description

This course covers the techniques of corporate carbon accounting, broadly defined as the methods used to estimate the quantities of greenhouse gases (CO_2-equivalent) emitted by corporate entities. The emphasis in this course will be on entities that manufacture physical products. Students will learn process-based and input-output techniques for carbon accounting (at the level of the product, facility, corporation, industry, and national economy) and will gain practical experience applying these techniques in compliance with The Greenhouse Gas Protocol and relevant international standards. Current topics in carbon accounting will be explored through a series of "journal club" discussions, where we will critically and collaboratively discuss perspectives offered in a selection of high-impact recent papers. The course will be divided into three approximately equal units, with about five weeks spent on each topic:

- **Unit 1.** Direct carbon emissions (Scope 1 & 2);
- **Unit 2.** Indirect carbon emissions (Scope 3); and
- **Unit 3.** Global sustainability and broader impacts of carbon accounting.

Learning Outcomes

After completing this course, students should be able to:

1. Define Scope 1, Scope 2, and Scope 3 greenhouse gas emissions and identify major categories of industrial emissions for each scope for a typical manufacturing entity.
2. Demonstrate knowledge of the range of quantitative techniques commonly used in industrial carbon accounting, including process-based, input-output ("spend-based"), and hybrid methods. Identify key advantages and disadvantages of different methods.
3. Apply standard carbon footprinting techniques to calculate CO_2-equivalent emissions for a product, manufacturing facility, corporation, or aggregate industry based on industrial activity data, including the use of appropriate estimation techniques for unknown information. Carefully document methods, data sources, and assumptions.

4. Describe key requirements for compliance with international standards relevant to carbon footprints and environmental product declarations (EPDs), including the Greenhouse Gas Protocol (GHG Protocol) corporate standards.
5. Think critically about current "hot topics" in carbon accounting, such as biogenic emissions; carbon offsets; carbon tunnel vision; and the regulatory environment impacting carbon tracking and reporting.
6. Participate confidently and literately in discussions about carbon tracking, reporting, and accounting that may be encountered in a wide range of professional settings.

Grading Scheme

Achievement of learning outcomes will be assessed through a combination of problem sets, midterm exams, a course project, and engagement in the course journal club. Each assignment will be graded according to a set rubric, which will be provided on Brightspace. Assignments will be weighted as follows to determine grades:

Assessment	Value
Homework (7 problem sets x 5% each)	35%
Midterm #1	15%
Midterm #2	15%
Course Project	20%
Journal Club	15%
Final Course Evaluation Completed (Bonus)	0.5%

Late submission policy: Unless otherwise specified, assignments will be submitted via Brightspace. Any assignment submitted late will incur a 5% penalty for every business day it is late. If an assignment is submitted more than 3 business days after it is due, it will not be accepted. If you plan to submit an assignment after the deadline, please inform me as soon as possible. Any issues with submission of assignments (technical issues, illness, etc.) should be communicated to me as soon as practical, preferably before the deadline. Include in your message the nature of the problem, the steps you have taken to address the issue, and your proposed resolution.

Regrade policy: If you believe a grading error has been made, you must notify me by email within 24 hours of receiving the graded assignment to request a re-grade. Use the subject line "EEE 595 regrade request." Explain in your email which problem(s) you feel were graded in error and why you have requested the re-grade.

Grading Scale

Letter grades will be determined using the following grading scheme:

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
Lower	97.0	93.0	90.0	87.0	83.0	80.0	77.0	73.0	70.0	67.0	63.0	60.0	0.0
Upper	100.0	96.9	92.9	89.9	86.9	82.9	79.9	76.9	72.9	69.9	66.9	62.9	60.0

Grades will not be curved in any considerable way.

Attendance Policy

This course follows the University Academic Regulations regarding class attendance, which state that students are expected to be present for every meeting of the classes in which they are enrolled. When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, you

should inform me of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification is not possible, contact me as soon as possible by email. For absences that do not fall under excused absence regulations (see below), this course follows the following procedures:

1. Do not come to class if you are feeling ill, but please email me at liddellh@purdue.edu with the subject line: EEE 595 class absence. I do not need details about your symptoms. Just let me know you are feeling ill and cannot come to class. If it is an emergency situation, please follow the University regulations on emergent medical care.
2. Unless it falls under the University excused absence regulations, any work due should be submitted on time via our course Brightspace.
3. If the missed class involves assessed work such as an interactive discussion (part of your participation grade), presentation, or exam, you and I will plan if and how you can make up the work. This plan must be confirmed before the next class period, so again, email me immediately when you know that you will miss class.
4. The most important consideration in any absence is how it will affect your achievement of the assignment objectives and the course learning outcomes.

For cases that fall under excused absence regulations, you or your representative should contact or go to the Office of the Dean of Students (ODOS) website to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted by ODOS for cases of grief/bereavement, military service, jury duty, parenting leave, or emergent medical care.

Learning Resources, Technology, and Texts
Required Readings
- This course does not have a textbook. Weekly required readings will include journal articles and excerpts from books and standards. All required readings for the course will be posted to Brightspace.

Software and Web Resources
- You will need the Microsoft Office suite, including MS Word and Excel, to complete problem sets and the course project. Microsoft Office 365 is free for all students. You will also need Adobe Acrobat or an alternative PDF reader to access course materials.
- Links to additional web resources will be provided via Brightspace.

Brightspace Learning Management System
- Access the course via Purdue's Brightspace learning management system. It is strongly suggested that you explore and become familiar not only with the site navigation, but also the content and resources available for this course. See the Student Services widget on the campus homepage for resources such as Technology Help, Academic Help, Campus Resources, and Protect Purdue.

Tentative Course Schedule – Spring 2025

Note that this tentative schedule is subject to change (see Disclaimer).

PURDUE UNIVERSITY | Environmental and Ecological Engineering

EEE 59500: Carbon Accounting & Sustainability - Prof. Heather Liddell

Spring 2025 Lectures: Tues & Thurs 3:00 - 4:15pm, WALC 3121

KEY: Class Meetings | Midterm Exams | Journal Club in-class | Deadlines | Breaks

	Mon	Tues	Weds	Thurs	Fri	Weekly Lecture Topics (Tentative)
Week 1	1/13	1/14 Lecture — First Day of Class	1/15 JC#1 Questions Due	1/16 Lecture — Journal Club #1	1/17	Intro to carbon accounting. Connection to life cycle assessment (LCA). GHG Protocol Corporate Standard. Calculation of GWP from industrial activity data.
Week 2	1/20 MLK Day Holiday	1/21 Lecture	1/22	1/23 Lecture	1/24 HW#1 Due	Direct emissions. Regional impacts on Scope 2. Units of analysis. Environmental product declarations (EPDs) and product category rules (PCRs).
Week 3	1/27	1/28 Lecture	1/29 JC#2 Questions Due	1/30 Lecture — Journal Club #2	1/31 HW#2 Due	Corporate accounting and boundary selection. Allocation in carbon footprinting. Accounting for biogenic emissions.
Week 4	2/3	2/4 Lecture	2/5 JC#3 Questions Due	2/6 Lecture — Journal Club #3	2/7 HW#3 Due	Industry case studies. In-class activity.
Week 5	2/10	2/11 Lecture	2/12	2/13 Midterm Exam #1 (in-class)	2/14	Exam review. MIDTERM EXAM #1 in-class Thurs.
Week 6	2/17	2/18 No Class	2/19 JC#4 Questions Due	2/20 Lecture — Journal Club #4	2/21	Indirect emissions. Background and foreground data. GHG Protocol Scope 3 Standard. Scope 3 categories. Project introduction.
Week 7	2/24	2/25 Lecture	2/26	2/27 Lecture	2/28 HW#4 Due / Project Proposal Due	Scope 3 Category 1: Purchased Goods and Services. Process-based vs. EEIO methods. "Spend-based" (input-output) carbon accounting. Hybrid methods.
Week 8	3/3	3/4 Lecture	3/5 JC#5 Questions Due	3/6 Lecture — Journal Club #5	3/7 HW#5 Due	Rapid carbon accounting methods. Other Scope 3 emissions categories (transport, distribution, commuting, product use, end-of-life, etc.).
Week 9	3/10	3/11 Lecture	3/12 JC#6 Questions Due	3/13 Lecture — Journal Club #6	3/14 HW#6 Due	Uncertainty and sensitivity analysis in carbon accounting. Industry and sector-level carbon accounting. Identification of carbon hotspots and opportunities.
Week 10	3/17	3/18	3/19	3/18	3/21 — SPRING BREAK	
Week 11	3/24 JC#7 Questions Due	3/25 Lecture — Journal Club #7	3/26	3/27 Lecture	3/28 HW#7 Due	Carbon markets, carbon offsets, and carbon pricing. Exam review.
Week 12	3/31	4/1 Midterm Exam #2 (in-class)	4/2 JC#8 Questions Due	4/3 Lecture — Journal Club #8	4/4	MIDTERM EXAM #2 in-class Tues. Carbon footprinting: does it lead to "carbon tunnel vision"?
Week 13	4/7	4/8 Lecture	4/9 JC#9 Questions Due	4/10 *Guest Lecture TBA* — Journal Club #9	4/11 No office hours / Draft Proj Report Due	Emissions and its relationship to commons governance.
Week 14	4/14	4/15 Lecture	4/16 JC#10 Questions Due	4/17 Lecture — Journal Club #10	4/18 Peer Reviews Due	Regulatory Environment in the US; Greenwashing and Green Claims. Product Environmental Footprints. Global contexts. Carbon in international trade.
Week 15	4/21 JC#11 Questions Due	4/22 Lecture — Journal Club #11	4/23	4/24 In-Class Project Presentations	4/25 Final Project Due	Impact of carbon footprints on consumer decisions.
Week 16	4/28 QUIET WEEK	4/29 Make-Up Class (if needed)	4/30 QUIET WEEK	5/1 No Class	5/2 Course evaluations due Sunday 5/4	Make-up class sessions, if needed (to be announced)
Week 17	5/5	5/6	5/7	5/8	5/9 — FINAL EXAMS WEEK (NO EXAM IN THIS COURSE)	

Course Evaluation

Toward the end of the semester, you will be provided with an opportunity to give feedback on this course and your instructor. Purdue uses an online course evaluation system, and I will not have access to this anonymous feedback until after final grades are submitted. You will receive an official email from evaluation administrators with a link to the online evaluation site and will receive a prompt to complete the survey when you login to Brightspace. Your participation is an integral part of this course, and your feedback is vital to improving education at Purdue University. Further, feedback on how I am doing as an instructor is particularly important and valuable to me as a new Assistant Professor. I will review all input carefully to improve future offerings of this course and my teaching approach. I plan to award a 0.5% bonus to all students who complete the course and instructor evaluation for this course. To receive these bonus points, post a screenshot confirming survey completion to the "Course Evaluation" assignment on Brightspace.

Academic Integrity

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information is submitted the greater the opportunity for the university to investigate the concern. More details are available on our course Brightspace under University Policies and Statements.

Copyright

See the University Policies and Statements section of Brightspace for guidance on Use of Copyrighted Materials. Effective learning environments provide opportunities for students to reflect, explore new ideas, post opinions openly, and have the freedom to change those opinions over time. Students and instructors are the authors of the works they create in the learning environment. As authors, they own the copyright in their works subject only to the university's right to use those works for educational purposes. Students may not copy, reproduce, or post to any other outlet (e.g., YouTube, Facebook, or other open media sources or websites) any work in which they are not the sole or joint author or have not obtained the permission of the author(s).

Please note that all materials presented by the instructor are protected by copyright unless the instructor has stated otherwise. Copyrighted materials include lectures, notes, and other material presented in class or part of the course. Students enrolled in, and authorized visitors to, Purdue University courses are permitted to take notes, which they may use for individual/group study or for other non-commercial purposes reasonably arising from enrollment in the course or the University generally. Notes taken in class are, however, generally considered to be "derivative works" of the instructor's presentations and materials, and they are thus subject to the instructor's copyright in such presentations and materials. No individual is permitted to sell or barter notes for a course without the express written permission of the course instructor.

Nondiscrimination Statement

A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies and Statements.

Accessibility

Purdue University strives to make learning experiences accessible to all participants. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone at 765-494-1247.

Mental Health and Wellbeing

If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed: try WellTrack. Sign in and find information and tools at your fingertips, available to you at any time.

If you need support and information about options and resources: please contact or see the Office of the Dean of Students. Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc.: sign up for free one-on-one virtual or in-person sessions with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is free and can be done on BoilerConnect.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours. The CAPS website also offers resources specific to situations such as COVID-19.

Basic Needs Security

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday.

Emergency Preparedness

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. We will review procedures specific to our class location in WALC. You can also review the WALC Building Emergency Plan here (purdue login required): https://www.purdue.edu/ehps/emergency-preparedness/emergency-plans/bep/building-beps/walc-bep.html

Disclaimer

This syllabus is subject to change. You will be notified of any changes as far in advance as possible through Brightspace announcements. It is your responsibility to monitor Brightspace and your Purdue email for course announcements, including schedule changes. You may need to change your notification settings in Brightspace to ensure you receive important updates regarding this course.