Basic Course Information

Energy and Global Environment
CEE 340
Fall 2025
Tuesday & Thursday 10-11:20am
In-person
Rm. 1017 Civil and Environmental Engineering Building (CEEB/Hydro)
3 credits

Instructor Information

Megan L. Matthews
mlmatth2@illinois.edu
Office hours: TBD
Rm. 3024 Civil and Environmental Engineering Building (CEEB/Hydro)

Teaching Assistant Information

Teaching Assistants:
TA emails:
TA office hours: TBD
Location: TBD

Learning Outcomes

- Understand how engineering decisions fit in a larger societal context.
- Understand the pros and cons of different energy systems and sources.
- Become familiar with collecting and analyzing data to draw conclusions on impacts from different energy systems.
- Assess the current state of energy in the global environment, identifying areas that need to be addressed including potential methods for addressing them and associated challenges.
- Improve technical writing skills and communication of results and conclusions to different audiences.

Absence Policy

Students are expected to attend class in person. Late or make-up exams or quizzes are not allowed, except under extreme circumstances approved by the instructor in advance.

Prerequisites

PHYS211; PHYS213 or ME200; CEE201 or IE310; CEE202 or IE300 or STAT200

Course Description

This course is an introduction to evaluating multiple impacts of engineering decisions. Topics include mass and chemical balances; effects of engineered systems on local and global environment, health, and risk; economic, consumer, and social considerations; provision of conventional and renewable energy; and future projections. Design projects emphasize making appropriate decisions by quantifying total impact and evaluating social environment.

General Education Categories

This course satisfies General Education criteria for Advanced Composition.

Course Schedule

Week	Date(s)	Topic	Assignment Due
1	Aug 26	Class introduction	
	Aug 28	Mass and Energy Balance – Pt 1	
2	Sept 2	Mass and Energy Balance – Pt 2	
	Sept 3	Analyzing Power Plant Data in R – Pt 1	
3	Sept 9	Energy Sources 1: How we get energy	Q1, HW 1
	Sept 11	Analyzing Power Plant Data in R – Pt 2	
4	Sept 16	Societal Context 1: Air pollution and health	HW 2
	Sept 18	Societal Context 2: Global climate change	
5	Sept 23	Uncertainty	
	Sept 25	Societal Context 3: Fresh water and wastewater	HW 3
6	Sept 30	Societal Context 4: Transportation and risk	
	Oct 2	Energy Sources 2: Natural Gas, Hydropower	Q2, HW 4
7	Oct 7	Societal Context 5: Governance	
	Oct 9	**Midterm Exam**	
8	Oct 14	Embodied energy and embedded water	
	Oct 16	Entropy and fuel cycles	Technical Report
9	Oct 21	Energy Sources 3: Nuclear, Biomass	
	Oct 23	Project brainstorming / pitch	
10	Oct 28	Energy sources 4: Solar, Wind	Pol. Memo – v1
	Oct 30	Energy storage	Q3, Peer rev. of PM
11	Nov 4	Time value of money; operating and capital costs	HW 5, Project Proposal
	Nov 6	Electrical Grids	PM – final
12	Nov 11	Societal Context 6: Global risk factors	Q4
	Nov 13	Societal Context 7: Technology acceptance and Valuation	OpEd – v1
13	Nov 18	Historical trends and future projections	Peer rev. of OpEd
	Nov 20	Societal context evaluation of different energy sources	OpEd – final

Week	Date(s)	Topic	Assignment Due
14	Nov 25	NO CLASS – FALL BREAK	
	Nov 27	NO CLASS – FALL BREAK	
15	Dec 2	Project presentations	
	Dec 4	Project presentations	
16	Dec 9	Future of energy and the environment	Group Project
Dec 18, 1:30pm	Final exam		

Learning Management Systems

This course uses Canvas, Gradescope, and PrairieLearn.

Required and Recommended Course Readings

There is no textbook for this course. Reading materials required for the course will be available online and on the class Canvas site. The reading list is posted on the Canvas site and may be updated throughout the semester as needed. Example readings include:
- Bond, T.C. Engineering in the Global Environment
- Ashby, M. Materials and the Environment, 2nd edition
- Intergovernmental Panel on Climate Change Assessment reports

Required and Recommended Materials

You should bring a calculator with scientific capabilities to class. You will need access to a computer.

Microsoft Office: https://webstore.illinois.edu/shop/product.aspx?zpid=2816
R: https://www.r-project.org/ (Free)
RStudio (recommended): https://posit.co/downloads/ (Free)

Late Assignment Policy

There are series of nested assignments in this course which don't give a lot of wiggle room in due dates. However, I understand that life happens. Late assignments will be accepted up to 24 hours after the due date without penalty*. In extreme circumstances, an extension greater than 24 hours may be granted with prior approval from the instructor.

* This applies to homework assignments, the technical report, the group project report, and the final versions of the policy memo and op-ed, **only**. This does not apply to quizzes, exams, presentations, or the draft versions of the policy memo and op-ed which late assignments will not be accepted. For the policy for reading quizzes see description in the next section.

Assignments

Homework
- Five homeworks will be assigned throughout the semester. Elements of HWs 1- 4 will help prepare you for your technical report:

  Writing components of HWs 1-4 preparing for Technical Report:
  HW 1 – Students will write a summary of their assigned power plant and surrounding area. TA/Instructor will provide feedback on written summary which will be returned 1 week after the assignment is due.

  HW 2 – Students will visualize data from their power plant and a written analysis of that data. TAs/Instructors will also provide feedback on visualization and analysis which will be returned 1 week after the assignment is due.

  HW 3 – Students will revise their summary draft from HW1 based on TA/Instructor feedback. Students will peer review their data visualizations from HW2. HW 3 will incorporate additional data visualization and analysis of the outputs from their power plants. TAs/Instructors will also provide feedback on visualization and analysis which will be returned 1 week after the assignment is due.

  HW 4 – Students will submit their revised data visualizations and analyses from HW2. TA/Instructor feedback will be returned 1 week after the assignment is due.

- All assignments are due at the time stated on the assignment and should be submitted via Canvas.
- Show your work. A correct answer with no work shown may receive no credit. Partial credit may be given on some problems.
- Collaboration and group work on problem sets is OK. Each person must turn in their own document unless stated in the assignment.
- Written documents, including code and spreadsheets, should look nice and not scattered. Code must include comments. Reports should be single-spaced with double spacing between paragraphs. If turned in by a group, each person's name should be included.

Exams
One midterm and a final will be given. Exams will examine whether you know which principles to use and how to implement them quickly. Exams may also include multiple-choice, fill-in-the-blank, short answer, or multiple-part calculations (designing or evaluating a system). Exams will be timed (80 minutes for midterm; 3 hours for final exam).

Quizzes
4 Quizzes will take place throughout the semester. These quizzes will include short calculations and/or short written responses to course topics.

<u>Pre-Class Reading Quizzes</u>
Reading assignments are posted on Canvas. You are expected to do the reading before class. Pre-class reading quizzes will be assigned on canvas before most classes. These quizzes will contain questions based on the reading and will be discussion topics in-class.

Reading quizzes will be graded as complete/not-complete. No late reading quizzes will be accepted, but you can miss <u>up to 3 reading quizzes</u> without penalty. Any quizzes submitted where a good faith effort to answer any of the questions was not made will receive a 0.

<u>Writing assignments</u>: Technical report, policy memo, op-ed
Students will be responsible for data gathering, analysis, and synthesis to come to a recommendation for an assigned topic. Results and conclusions will be communicated through three writing assignments aimed for different audiences: Technical report (12 pages), Policy memo (2 pages), OpEd (600-750 words).

<u>Group Project</u>
Teams will work on different problems of their own choosing. Your goal is to evaluate overall impacts and risks in addressing the same problem in two ways. Deliverables include both a written report (12 pages) and a short oral presentation. Each student should participate in the oral presentation. Grading rubrics for the project will be posted at the time they are assigned.

<u>Informal presentation</u>
Students are responsible for giving a 1-2 minute briefing at the start of class on a recent energy and global environment topic in the news. Students can use 1 slide for this briefing, but it should only contain graphics (photos, figures, etc.) and no words other than a title.

Grading Breakdown

Homework (includes revisions and peer-review assignments)	20%
Quizzes	10%
Pre-Class Reading Quizzes	5%
Technical Report	10%
Policy Memo	5%
OpEd	5%
Group Project (report and presentation)	15%
Midterm exam	10%
Final exam	15%
Informal presentation	5%

Final Letter Grades

Letter grades will be assigned using a plus/minus system, as below:

A	93.0-100.0%	B-	80.0-82.9%	D+	67.0-69.9%
A-	90.0-92.9%	C+	77.0-79.9%	D	63.0-66.9%
B+	87.0-89.9%	C	73.0-76.9%	D-	60.0-62.9%
B	83.0-86.9%	C-	70.0-72.9%	F	59.9% and below

ChatGPT and other LLMs and AI tools

For this class, keep the following three principles in mind: (1) An AI cannot pass this course. (2) AI contributions must be attributed and true. (3) AI use should be open and documented.

ChatGPT and other LLMs can be useful tools but should not be used to replace critical thinking or learning of the material. As engineers, it is important that you can stand behind your work. You are taking full responsibility for your assignments and the results and conclusions that you present. All ideas must be accurately attributed, and facts must be true. If you decide to use AI tools to help with your assignments, you must include a section describing how you used AI, including the prompts used.

This statement is developed, in part, with help from The Sentient Syllabus Project (2022) http://sentientsyllabus.org

Academic Integrity

The University of Illinois Urbana-Champaign *Student Code* should also be considered as a part of the syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL: http://studentcode.illinois.edu/.

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy: https://studentcode.illinois.edu/article1/part4/1-401/. Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Family Educational Rights and Privacy Act (FERPA)

Any student who has suppressed their directory information pursuant to *Family Educational Rights and Privacy Act* (FERPA) should self-identify to the instructor to ensure protection of the privacy of their attendance in this course. See http://registrar.illinois.edu/ferpa for more information on FERPA.

Mental Health

Significant stress, mood changes, excessive worry, substance/alcohol misuse or interferences in eating or sleep can have an impact on academic performance, social development, and emotional wellbeing. The University of Illinois offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services, and specialized screenings which are covered through the Student Health Fee. If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of the University's resources provided below. Getting help is a smart and courageous thing to do for yourself and for those who care about you.

- Counseling Center (217) 333-3704
- McKinley Health Center (217) 333-2700
- National Suicide Prevention Lifeline (800) 273-8255
- Rosecrance Crisis Line (217) 359-4141 (available 24/7, 365 days a year)

    If you are in immediate danger, call 911.

    *This statement is approved by the University of Illinois Counseling Center

Community of Care

As members of the Illinois community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether in regards to their well-being or yours, we encourage you to refer this behavior to the Student Assistance Center (217-333-0050 or http://odos.illinois.edu/community-of-care/referral/). Based on your report, the staff in the Student Assistance Center reaches out to students to make sure they have the support they need to be healthy and safe.

Further, as a Community of Care, we want to support you in your overall wellness. We know that students sometimes face challenges that can impact academic performance (examples include mental health concerns, food insecurity, homelessness, personal emergencies). Should you find that you are managing such a challenge and that it is interfering with your coursework, you are encouraged to contact the Student Assistance Center (SAC) in the Office of the Dean of Students for support and referrals to campus and/or community resources.

Students with Disabilities

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor as soon as possible and provide the instructor with a Letter of Academic Accommodations from Disability Resources and Educational Services (DRES). To ensure that disability-related concerns are properly addressed from the beginning, students with disabilities who require assistance to participate in this class should apply for services with DRES and see the instructor as soon as possible. If you need accommodations for any sort of

disability, please speak to me after class, or make an appointment to see me or see me during my office hours. DRES provides students with academic accommodations, access, and support services. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217-333-1970, e-mail disability@illinois.edu or visit the DRES website at https://dres.illinois.edu/.   Here is the link for information to apply for services at DRES, https://dres.illinois.edu/information-before-you-apply/application-process/ .

Disruptive Behavior

Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office for Student Conflict Resolution (https://conflictresolution.illinois.edu; conflictresolution@illinois.edu; 333-3680) for disciplinary action.

Emergency Response Recommendations

Emergency response recommendations and campus building floor plans can be found at the following website: https://police.illinois.edu/em/run-hide-fight/. I encourage you to review this website within the first 10 days of class.

Religious Observances

Illinois law requires the University to reasonably accommodate its students' religious beliefs, observances, and practices in regard to admissions, class attendance, and the scheduling of examinations and work requirements. Students should complete the Request for Accommodation for Religious Observances form should any instructors require an absence letter in order to manage the absence. In order to best facilitate planning and communication between students and faculty, students should make requests for absence letters as early as possible in the semester in which the request applies.

Sexual Misconduct Reporting Obligation

The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: wecare.illinois.edu/resources/students/#confidential.

Other information about resources and reporting is available here: wecare.illinois.edu.