

PHYS 3150: Energy and Sustainability

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Fall 2023

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Office Hours: W, 12:00-14:00

Office: 201 INSCC Building

Web: [Canvas](#)

Class Hours: Tu & Th, 10:45-12:05

Class Room: JFB 325

Course description and goals

An introduction to the global issues of environment and sustainability for students in science and engineering. This course addresses the relationship between energy use and the environment through the fundamental laws of physics. This quantitative course is meant to provide a scientific foundation for understanding the energetic and environmental issues facing our country and world so that students can make informed contributions to the ever-evolving debate surrounding this important global issue.

Energy and sustainability is a complex subject lying at the intersection of physics, chemistry, environmental studies, economics, and politics. Passionate debate, misconceptions, and in the worst cases misinformation, abound. So it's important that you get some skills navigating a sometimes messy landscape of confusing and contradictory information. My goals are that you

- can figure out "what's true" when consuming science-related media or engaging in science-related discussions;
- are comfortable while doing it;
- understand fundamental, physical constraints on energy use;
- understand the environmental impact of energy use and consumption; and
- can do basic economic and physical estimations pertaining to your own energy use.

Course materials and resources

The course textbook is *Energy, Environment, and Climate* by Richard Wolfson, third edition. You will need this book for reading assignments before class, and some of the homework problems will come from it. Let me know if you're facing some difficulties getting it—I'll help you out!

Grading

In this course you'll be evaluated by short quizzes on readings before class, homework, tests, and a project. They will be weighted using one of the following two schemes, whichever results in a higher grade for you:

Pre-class reading	10%	OR	Pre-class reading	10%
Homework	50%		Homework	50%
Project	10%		Project	10%
Midterm	10%			
Final exam	20%		Final exam	30%

Pre-class reading

Before each class I'll have you read something, usually from the textbook. There will be a short quiz on the reading, due midnight the day before each class. *Starting Week 2, every week, there will be a quiz due Monday at midnight and on Wednesday at midnight. No late quizzes will be accepted, but I will drop your lowest five quiz grades.* The quizzes consist of a few short-response questions, and I will grade somewhat leniently. Their purpose is to get you in the mood for the upcoming class discussion and for me to see what you know before class starts.

Homework

Each week there will be a homework assignment. It will consist of a handful of quantitative questions. Some of them will come from the book. *Starting Week 2, every Tuesday, there will be a homework assignment due at class time. Each homework is graded out of ten points. Late homework will be accepted at a three-point penalty, but no homework will be dropped.*

Research project

There will be a project due the last week of class. I will give more details about the project part way through the year, but the idea will be to have you examine a few methods of making a house more energy efficient. You will estimate the impact each method have on the environment and see whether the house can save any money in the process.

Midterms and final

There will be a midterm and a final exam. These will be conceptual and quantitative exams to ensure you have met the course goals. You can find the university's final exam schedule [here](#). We will have our tests on these dates:

Midterm	Tue, 17 Oct. 2023	10:45-12:05
Final	Tue, 12 Dec. 2023	10:30-12:30

Tentative schedule

Week 01, 08/21 - 08/25: Thinking like a scientist

Week 02, 08/28 - 09/01: Importance of energy

Week 03, 09/04 - 09/08: Math and physics (Guest lecturer Ben Sheff)

Week 04, 09/11 - 09/15: Math and physics

Week 05, 09/18 - 09/22: Generating and distributing energy

Week 06, 09/25 - 09/29: Climate change

Week 07, 10/02 - 10/06: Climate change

Week 08, 10/09 - 10/13: FALL BREAK

Week 09, 10/16 - 10/20: Fossil fuels

Week 10, 10/23 - 10/27: Fossil fuels

Week 11, 10/30 - 11/03: Batteries

Week 12, 11/06 - 11/10: Nuclear power

Week 13, 11/13 - 11/17: Nuclear power

Week 14, 11/20 - 11/24: Solar power

Week 15, 11/27 - 12/01: Water, wind, and biomass

Week 16, 12/04 - 12/08: Wrap up

University policies and resources

The University of Utah has put a lot of effort into making college safe, accessible, and ultimately successful for everyone. What follows is a long list of possible resources; if you're not sure where to begin, reach out to the [Student Success Coaches](#) for assistance! The mission of the Student Success Coaches is to support students in making the most of their University of Utah experience. They will work closely with you to learn about your particular needs, aspirations, and goals.

Campus safety

The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.

Addressing sexual misconduct

Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status, or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the [Office of Equal Opportunity and Affirmative Action](#), 135 Park Building, 801-581-8365, or the [Office of the Dean of Students](#), 270 Union Building, 801-581-7066. For support and confidential consultation, contact the [Center for Student Wellness](#), 426 SSB, 801-581-7776. To report to the police, contact the [Department of Public Safety](#), 801-585-2677 (COPS). I will listen and believe you if someone is threatening you and help you connect with the appropriate help and resources. As a university employee, I am a mandatory reporter.

Violence prevention

If you are experiencing violence or threatening behavior, including but not limited to domestic violence, interpersonal violence, and stalking, I encourage you to tell someone and seek help from the resources listed below. You can also talk to me.

Campus resources	
Safe U	safeu.utah.edu
Advocacy/Mental Health	advocate@sa.utah.edu
University Police	801-585-2677
Area resources	
Utah's Domestic Violence Coalition	www.udvc.org
YWCA of Utah	www.ywcautah.org
Utah Coalition Against Sexual Assault	www.ucasa.org
Rape Recovery Center Crisis Line	901-467-7273
Love is Respect	www.loveisrespect.org

The Americans with Disabilities Act

The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the [Center for Disability and Access](#), 162 Olpin Union Building,

(801) 581-5020. The CDA will work with you and the instructor to make arrangements for accommodations. Please come and talk to me about your necessary accommodations within the first two weeks of the semester.

Support for veterans

If you are a student veteran, the University of Utah has a [Veterans Support Center](#) located in the Olpin Union Building. There is also a national [Veterans Crisis Line](#): Veterans call 1-800-273-8255 and Press 1, chat online at www.veteranscrisisline.net/ChatTermsOfService.aspx, or send a text message to 838255 to receive confidential support 24 hours a day, 7 days a week, 365 days a year.

Wellness statement

Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources, contact the [Center for Student Wellness](#); 801-581-7776.

Counseling

The [University Counseling Center](#) (UCC) provides developmental, preventive, and therapeutic services and programs that promote the intellectual, emotional, cultural, and social development of University of Utah students. They advocate a philosophy of acceptance, compassion, and support for those they serve, as well as for each other. They aspire to respect cultural, individual and role differences as they continually work toward creating a safe and affirming climate for individuals of all ages, cultures, ethnicities, genders, gender identities, languages, mental and physical abilities, national origins, races, religions, sexual orientations, sizes and socioeconomic statuses.

Names and personal pronouns

Canvas allows students to change the name that is displayed and allows them to add their pronouns to their Canvas name. This is possible on Zoom as well through the "Rename" tool. I will refer to you with the name and pronoun that feels best for you. Please let me know about any name or pronoun changes (and update CIS, Canvas and Zoom) to help me maintain an environment in which you feel respected. If you need assistance getting your preferred name on your uID card, please visit the [LGBT Resource Center](#).

Learners of English as an additional language

If you are an English language learner, please be aware of several resources on campus that will support you with your language and writing development. These resources include: the [Writing Center](#); the [Writing Program](#); and the [English Language Institute](#). Please let me know if there is any additional support you would like to discuss for this class.

Undocumented student support

If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-status families. To learn more, please contact the Dream Center at 801.213.3697 or visit <https://dream.utah.edu/>.

Acknowledgements

I guess it's a bit strange to have acknowledgements in a Syllabus. On the other hand, several people have helped me get this course started, and I think their hard work and time spent teaching, mentoring, and organizing should be credited somewhere. I thank Orest Symko for showing me how he ran this course in the past, and especially for his many valuable literature recommendations. Special thanks to Claudia DeGrandi for her help and support with teaching. Her syllabuses are quite complete, especially with regard to available university resources, so I have used her examples. Finally I would like to thank Carleton DeTar and Ben Bromley for helping me get started teaching.