

THE PHYSICS OF ENERGY AND THE ENVIRONMENT (PHYSICS 161)	
WINTER 2026	PROFESSOR RAGHUVeer PARTHASARATHY DEPARTMENT OF PHYSICS THE UNIVERSITY OF OREGON

SYLLABUS

Welcome to “The Physics of Energy and the Environment!” This syllabus contains a lot of information, especially about different components of the course. I’m fond of having a variety of assignments and activities, which makes the class livelier and also helps people learn. This has gone well in the past – students like it, as do I – but it requires a good amount of organization on everyone’s part. – *Prof. Parthasarathy*

Please note that aspects of the syllabus may change. If so, I’ll inform everyone in class and through Canvas.

Time and Place

Tuesday and Thursday 2:00 - 3:50 pm, Gerlinger Hall Room 248

The Tuesday period and the most of Thursday will be “normal” classes – lecture, activities, etc. I’ll leave the end of the Thursday period open for questions, similar to office hours. Also, we’ll have to end Thursdays at 3:40 pm because of a seminar I need to attend in another building at 4:00 pm.

Instructors and Contact Information

Professor Raghuveer Parthasarathy (pronounced **Par**-tha-sa-ra-thē)

Email: raghu@uoregon.edu

Office: Willamette 362

Office hours: W 2:00-2:50 pm, Th 12:30-1:20 pm, Willamette 362

Graduate Teaching Assistant: Hudson Lazzara

Email: hlazzara@uoregon.edu

Office hours: Wednesday 12:00-12:50 pm and Friday 1:00-1:50 pm, Willamette 215 (Binney Lounge)
And at the Physics Drop-in Center in the Science Library Friday 12:00-12:50 pm.

Make use of office hours! Even if you don't have specific questions, feel free to drop by. *Office hour times may change*, both by request (if particular times are not good for many students) and due to scheduling conflicts that arise.

Communication / Email: The preferred method of communication is through Canvas, using the Canvas Inbox to send mail to all instructors (the professor and graduate teaching assistant). If you must send a “normal” email, please send it to Professor Parthasarathy, Cc'ing the teaching assistant. Address your message to “Prof. Parthasarathy.” We may not reply to emails that begin “Hey” or that are incoherent.

Course Description and Learning Goals

Modern civilization uses vast amounts of energy. What do we use it for? Is our present rate of energy consumption sustainable? What are its consequences for the environment? How can we intelligently make decisions about energy issues?

We'll explore these questions *quantitatively*, investigating the science behind energy use and putting “real numbers” into our characterization of it. Why? It's easy to have good intentions about energy and the environment, but without quantitative analysis, good intentions alone can't guide important decisions and can often do real harm.

Who are you? Being in this course, it's likely that you care about issues regarding energy and the environment. Being university students, it's likely that you'll be the decision-makers of the future – businesspeople, policy makers, or at least voters – who will be faced with complex choices having to do with energy and society. The course is designed for **non-science majors**, and we'll develop the ability to make deep insights with simple math.

We'll examine a variety of topics:

1. Energy: What is it?
2. Transportation
3. Energy, Heat, and Thermodynamics
4. Fossil Fuels and their Environmental Impacts
5. Renewable energy sources (a very brief look*)
6. The Science of Climate, and Climate Change

* Renewable energy (wind, solar, etc.) is important enough to warrant its own course, Physics 162. Many students who take Physics 161 also take 162.

Other goals: We will develop our abilities to think critically and quantitatively about scientific issues. Science, contrary to what you may have been mis-taught in the past, is not about “learning facts” but rather about learning how to investigate and draw logical conclusions. We’ll practice this!

Students completing the course will have improved their abilities to:

- Understand how physical principles influence energy use.
- Understand the process by which science generates knowledge.
- Construct and interpret graphs and quantitative data.
- Explain quantitative and scientific concepts to others.

Prerequisites. There are no scientific prerequisites, and mathematics will be at the level of basic algebra.

Course Platform: Canvas

All course communication will be done through Canvas. Here, you may also view announcements, course materials, homework assignments, and your grades. Please regularly check your email / Canvas notifications for course information.

If you have questions about accessing and using Canvas, visit the [Canvas support page](#). Canvas and Technology Support also is available by phone or live chat: [541-346-4357](tel:541-346-4357) | livehelp.uoregon.edu

Textbook

There is no required textbook. The lectures plus readings and videos that will be assigned throughout the term will be sufficient. (See also “Reading Quizzes.”) Possibly useful:

- We’ll use parts of *Sustainable Energy – Without the Hot Air* by David MacKay, a remarkable book that quantifies a lot of energy-related issues. It’s available **free** online at <http://www.withouthotair.com/>.
- *Energy and Human Ambitions on a Finite Planet*. Tom Murphy. eScholarship, University of California, 2021. Free online: <https://escholarship.org/uc/item/9js5291m>. *Note:* This is a remarkable and recent book on understanding energy. Part I isn’t necessary and has several parts that many people (including me) would disagree with; I recommend this review of the book: <https://aapt.scitation.org/doi/full/10.1119/5.0062183>.
- *Energy, Environment, and Climate* by Richard Wolfson – a very good book on these topics. Please email if you’d like me to place a copy on reserve at the Science Library.

In class

I'll lecture, but not exhaustively. We'll spend quite a bit of time in class on discussions and problem-solving. To have fruitful discussions, it is important for people to have read the pre-class readings and be ready to participate. (See also "Class participation," in "Course structure and grade components.")

Powerpoint slides will be posted after each class on Canvas. As will be discussed, the slides are rather minimal and aren't a substitute for taking notes in class.

Technology

In some classes we'll look at, and construct, graphs – part of our goal of data literacy. It will be useful, though not necessary, to have a laptop or tablet. Some homework assignments will require computers, for example for graphing. Note that UO Libraries have computers for student use, as well as laptops for brief checkout (<https://library.uoregon.edu/computers-libraries>).

Absences

This course follows the university's policies on absences, described at <https://provost.uoregon.edu/course-attendance-and-engagement-policy>. Please note the "reason neutral" policy: **instructors "shall not ask for reasons for absences and shall not distinguish between 'excused' and 'unexcused' absences."** Attendance is not mandatory but succeeding in the class without consistent attendance will be very difficult. **Please contact me through Canvas if you will miss class due to extended illness or other issues.** Some university policies are included at the end of this document.

I realize that it is unavoidable that people will have to miss a few classes, for example due to illness. I will therefore **drop certain scores and rescale various grade components** as described below in "Course Components."

There will be no makeup assessments (quizzes or exams). You may not miss an assessment except for reasons beyond your control.

Please let me know by the end of week 2 of the term if you need a testing-related accommodation so we can make the appropriate arrangements.

In case of instructor illness, lectures or office hours may be held via Zoom (see link below) or a lecture recording may be provided.

Course structure and grade components

I'm fond of having a variety of tools for fostering and assessing student learning, rather than just high-stakes exams. (There's a lot of educational research literature that supports this approach.) There are

therefore a lot of components to the coursework. These are listed below along with their weight toward the overall course grade.

Reading Assignments and Reading Quizzes. Reading assignments will precede most classes and will usually have “reading quizzes” associated with them, administered through Canvas and due 30 minutes before the start of class. The reading quizzes are intended to be straightforward, with the aim of providing a bit of feedback to facilitate your reading. More comprehensive questions will appear on regular quizzes and exams. No late submission of reading quizzes is allowed. *Your lowest two pre-lecture assignment scores will be automatically dropped; see “Absences.”*

Post-class notes. Briefly reviewing what one learned from a class session helps cement one’s understanding. Within 24 hours of the end of each class, submit a short (less than 300 words) summary of what the key points of that day’s class were. You can also describe things that were unclear or that need further explanation. These will be submitted on-line, via Canvas. The notes will be graded on content (i.e. that they capture something important about the day’s lessons) and clarity. We’ll give examples of good and bad notes. *Your lowest three post-class assignment scores will be automatically dropped; see “Absences.”*

In class participation. Being able to explain one’s reasoning is an increasingly important skill. We’ll practice this using activities in which, for example, students will explain homework solutions or data analyses to their classmates. I’ll assess these explanations, and the scores will contribute to the overall grade. The format of these participation activities will vary, and not every student will be assessed every time, but averaged over the term the contributions will be similar.

Homework. There will be homework assignments approximately every week. Feel free to discuss the questions with others, but of course, the work you submit should be your own. Assignments will be submitted online, via Canvas. Solutions will be posted; **study these.** Late homework will be accepted for one day only and will have a 50% point deduction. We will not comment in detail on your homework when grading it. It is therefore important to study the homework solutions. *Each student’s lowest homework score will be dropped from the overall total.*

Quizzes. There will be several short in-class quizzes. They won’t be surprises; you’ll get advance notice of at least one class. We’ll use these to assess understanding of key points without the heavy weight of an exam. *Each student’s lowest quiz score will be dropped from the total. There won’t be any make-up quizzes; if you miss one, this will be the dropped quiz.*

Exams. There will be one midterm exam, scheduled for Tuesday, February 10, and a final exam on Wednesday, March 18, 2026, 12:30-2:30 p.m. (Final exam times are set by the Registrar’s office; see <https://registrar.uoregon.edu/calendars/examinations>.) Exams will have a combination of multiple-choice and short-answer questions

Overall Grade

The weights of the components are:

- Reading Assignments and Reading Quizzes: 6%
- Post-class notes: 6%

- Quizzes: 22%
- Homework: 11%
- Participation: 11%
- Midterm Exam: 22%
- Final Exam: 22%

OVERALL LETTER GRADE:

A 90% to 100%

B 80% to 90%

C 70% to 80%

D 60% to 70%

F lower than 60%

The lower boundaries of the overall course grade ranges may be adjusted downward at the end of the term to account for variations in the difficulty of exams; plusses and minuses will be assigned within these ranges. The exact ranges will be determined after the final assessment, though they will never be moved up compared to these ranges. **It is possible for every student in the class to earn an A grade.**

Generative Artificial Intelligence (GenAI) Use

Students in this class can use GenAI tools such as ChatGPT to help with certain aspects of course work. This includes asking GenAI tools for explanations of terms or concepts, keeping in mind that the explanations might be incorrect. GenAI will probably be able to answer reading quiz questions or possibly homework questions correctly, and you can use this to assess your answers, but you should **not** use this as a substitute for answering questions yourself – the aim of these tasks is to develop your own skills, and you will be assessed on this in-class quizzes and exams. For assignments that involve writing, you might find it useful to bounce ideas off of GenAI tools. However, you cannot use content such as text or graphics created by GenAI tools in your work; rather, you must be the author/creator of your work submissions. Be advised, in accordance with UO policy, if I believe you've handed in work created whole or in part by GenAI tools, I may submit a report of suspected academic misconduct to the Office of Student Conduct and Community Standards for that office to make a determination of responsibility and, if warranted, assess a grade penalty. So, if you are in doubt or have questions about a particular GenAI tool and if its use is okay, check in with me and let's discuss!

How to do well in the course

Plan ahead and start early! This applies to everything in the course – homework, reading assignments, and general studying. It will be crucial to keep up with the course and not fall behind; later topics build on earlier ones.

Workload. This is a 4-credit hour course, so the University's expectation is that you'll spend about 120 hours on course-related work over the term, or 12 hours per week on average, which includes time in class ¹.

Make use of resources. If you have questions about anything, come to office hours! Make use of tutorials and teaching assistants as well!

Sleep! Many studies show that sleeping helps memory and understanding. More broadly: physics is a subject that rewards **spaced learning** – a concept may seem unclear at first glance. Then, remarkably, thinking about it again a day later it may suddenly make sense, and a day after that may seem obvious!

University Policies

There are many university policies that are important and useful, focused in many cases on helping students deal with adversity. Please see <https://teaching.uoregon.edu/university-course-policies>

¹ <https://blogs.uoregon.edu/uocc/files/2016/10/Credit-Hour-and-Student-Workload-Policies-2af13yr.pdf>