

Prof. Raghuv​eer Parthasarathy
 Dept. of Physics; Univ. of Oregon
 Fall 2011

Physics 161 – Physics of Energy and the Environment
SYLLABUS

INSTRUCTOR	Professor Raghuv​eer Parthasarathy (Par -tha- sa -ra-thī) Office: 174 Willamette Hall Office hours: Tu 9:00-10:00am, Th 12-1pm. Email: raghu@uoregon.edu
CLASS TIMES	[<i>Lecture</i>] Tu 10.00-11.50am, Th 10.00-10.50am, 100 Willamette Hall [<i>Discussion</i>] Th. 11.00-11.50, 100 Willamette Hall <i>Attendance is not required, but is strongly recommended. Note that there is a “clicker-based” participation grade as well as in-class quizzes – see the Grading and Quizzes sections, below.</i>
BLACKBOARD	We will be using Blackboard in this course to distribute course materials, and also for on-line assignments. URL: https://blackboard.uoregon.edu/
TEACHING ASSISTANTS	<u>Sue Dockstader</u> (Graduate student, Environmental Sciences) – office hours Th 9-10am, Fr 2-3pm, Science Library room 15A, sue.dockstader@gmail.com <u>David Grych</u> (Graduate student, Physics) – office hours W 11-12, Fr 2-3pm, Willamette 215 dgrych@uoregon.edu <u>Jenna Boss</u> (Undergraduate, Physics) – office hours Th 12-1pm, Science Library room 15A, bossjenna@gmail.com
OFFICE HOURS	Listed above. <i>You’re encouraged to come to my or the teaching assistants’ office hours, either with specific course-related questions, or just to chat about science or other general topics.</i>
EMAIL	Email: You can certainly ask questions of me and the teaching assistants by email. I usually respond within 24 hours; I rarely respond to emails that begin “Hey...” or are otherwise poorly constructed.
TEXTBOOK	There is no required textbook for the course. The lectures plus some supplemental readings supplied via Blackboard will be sufficient. The book <i>Energy, Environment, and Climate</i> by Richard Wolfson is recommended – it’s a very good, recent book on these topics. I’ve placed a few copies on reserve at the Science Library. We’ll also use parts of <i>Sustainable Energy – Without the Hot Air</i> by David MacKay, a remarkable book that quantifies a lot of energy-related issues. The book is available free on-line, at http://www.withouthotair.com/ .
TOPICS AND AIMS	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 use and generation? We’ll explore these issues, and will do so quantitatively, investigating the physics behind

energy use and putting “real numbers” into our characterization of energy use. Why? It’s easy to have good intentions about energy usage and the environment, but without quantitative analysis, good intentions alone can’t guide important decisions and can often do real harm.

Who are you? By enrolling in this course, I’m assuming it’s likely that you care about issues regarding energy and the environment. By being university students, I’m assuming 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.

We’ll examine a variety of topics:

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

* We’ll only take a brief look at renewable energy sources (wind, solar power, etc.), not because they are unimportant, but rather the opposite: they are important enough to warrant their own course, Physics 162 (Winter 2011). Historically, many people who take 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!

LAPTOPS IN CLASS

The use of laptop computers in class is not allowed. Why? Several studies, plus past experience, show that students using laptops in class spend a great deal of time on non-class-related activities (surfing the web, playing games, ...) and that these distractions negatively impact both learning and grades. This alone isn’t a reason to ban laptops – you’re responsible for your own performance in class. *In addition*, however, studies have shown that non-class-related laptop use distracts and impacts the learning of *other students nearby*. (E.g. Fried, C. B. *Computers & Education* **50**, 906-914 (2008).) Plus, *students* have complained to me about the environment created by their classmates laptop use.

Taking notes by hand, by the way, is more effective in cementing concepts in your mind. (Note, by the way, that lecture slides are posted on-line, so you don’t have to frantically transcribe everything anyway.)

In summary, laptops are not allowed in class. The only exceptions will be for people with documented medical needs; please see me if this is the case.

MATERIALS	<ul style="list-style-type: none"> • We’ll use “clickers,” personal response systems that allow real-time polling and assessment in class. Each enrolled student needs one clicker. Clickers can be purchased at the bookstore. If you know someone <i>not</i> enrolled in this course, borrowing their clicker for this class will work fine. • Some assignments will involve finding and analyzing data. You should be able to navigate the internet and make simple graphs (e.g. with Excel).
HOMEWORK	<p>There will be homework assignments approximately every week. Feel free to discuss the questions with others, but of course, <i>the work you submit should be your</i></p>

	<p><i>own</i>. Assignments will mainly be submitted on-line, via Blackboard. Paper parts can be handed in at the start of lecture or placed in a box (location to be determined). Solutions to all the problem sets will be posted – study these.</p> <p><u>No late homework will be accepted.</u></p> <p><i>Homework grading:</i></p> <p>(1) Each student’s lowest score will be dropped from the overall total.</p> <p>(2) Due to the large size of the class, we will not be able to comment in detail on your homework when grading it. Because of this, it is especially important to study the problem set solutions.</p>
QUIZZES	<p>There will be three quizzes, approximately 30 min. each, at dates to be determined. Part or all of the quizzes will be clicker-based (i.e. you’ll submit your answers using your clicker.)</p>
GRADING	<p>In general, vibrant class participation enhances all students’ learning experiences – one of the motivations for “clicker” usage. However, I consider it overly paternalistic to require attendance. Therefore there will be two possible weightings of the various grade components:</p> <ul style="list-style-type: none"> • <i>Participation (P)</i>: In-class “clicker” questions related to the present topic, scored by participation only, not the accuracy of the response. • <i>Homework Assignments (HW)</i> • <i>Quizzes (Q)</i> • <i>Midterm Exam</i> (tentatively Tuesday, Oct. 25) • <i>Final Exam</i> (Thursday, Dec.8, 2011 8-10am). <p>Grading option 1: Q / P / HW / Midterm / Final = 10/10/30/20/30 % Grading option 2: Q / P / HW / Midterm / Final = 0/0/30/30/40 % I’ll grade each student using both options, keeping the higher overall score. Final Grade: A=88-100%; B=76-87.9%; C=64-75.9%; D=52-63.9%; F<52%.</p> <p>Absences. If there is a serious (e.g. involving illness) and well-documented (e.g. with a doctor’s note) reason for missing quizzes or the midterm, the final exam score will count extra, in place of the missed tests.</p>
HOW TO DO WELL IN THE COURSE	<ul style="list-style-type: none"> • Attend class. • Do the homework, and study the solutions. • Work on understanding all the concepts and example questions discussed in the lectures and the homework. “Understanding” does <i>not</i> mean “it sounds like it makes sense to me,” but more deeply, “I could explain this concept to one of my classmates.” • Come to my or the teaching assistants’ office hours with questions! • <i>Another suggestion: Sleep! Numerous studies show that sleeping helps both memory and understanding.</i>
STUDENTS WITH DISABILITIES	<p>If there are aspects of the instruction or design of this course that result in barriers to your inclusion, please notify me as soon as possible. You are also welcome to contact Disability Services in 164 Oregon Hall, 346-1155.</p>