

Prof. Raghuveer Parthasarathy
 Dept. of Physics; Univ. of Oregon
 Fall 2010

Physics 161 – Physics of Energy and the Environment

SYLLABUS

INSTRUCTOR	Professor Raghuveer Parthasarathy (Par -tha- sa -ra-thī) Office: 174 Willamette Hall Email: raghu@uoregon.edu
LECTURES	Tu 10-12pm, Th 10-11am, 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. The URL: https://blackboard.uoregon.edu/ There is also a course web page (http://physics.uoregon.edu/~raghu/Physics161Fall2010.html), but I do not anticipate posting anything important there except the syllabus.
OFFICE HOURS	174 Willamette; Tu 9:00-10:00am & Th 11:00am-12:00pm, or by appointment. <i>You’re strongly encouraged to come to my or the teaching assistants’ office hours, either with specific course-related questions, or just to chat about physics, science, and other general topics.</i> Email: You can certainly ask questions of me and the teaching assistants by email (as long as your email doesn’t begin “Hey...”).
TEACHING ASSISTANTS	<u>Maunta Manandhar</u> (maunta@uoregon.edu) – office hours <i>TBA</i> . <u>Kevin Beick</u> (kbeick@uoregon.edu) – office hours <i>TBA</i> . <i>Also note:</i> GTF's regularly staff room 147 Willamette (at the East side of the atrium.) to help students in physics classes. A schedule is posted on the door.
TEXTBOOK	There is no required textbook for the course. The lectures plus 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 brief look*)
6. Nuclear Energy
7. The Science of Climate
8. 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.

COMPUTERS

Some assignments will involve finding and analyzing real-world data. You should be reasonably adept at navigating the internet and making simple graphs.

GRADING

Grade Components

Clicker Participation – 5 %;

Homework – 20% (*see below*);

Quizzes (3) – 15% (*see below*);

Midterm Exam (1) – 25% (tentatively *Tuesday, Nov. 9*);

Final Exam – 35 % (*Wednesday, Dec.8, 8-10am*).

	Scores will be weighted as shown above and added to determine a course score. 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. The grading scale for this course is given below. If the final class average is too low, I may apply a curve for a higher average final grade. (If the average is high, I'll be very happy; I won't adjust grades downward.) Note that this is an absolute, not curved, scale; you are not competing with others in the class for your grade. 86-100=A; 72-85.9=B; 57-71.9=C; 42-56.9=D; <42=F
HOMEWORK	There will be problem sets approximately every week. Feel free to chat with others about the problems, but of course, <i>the work you submit should be your own</i>. Many students find it helpful to discuss the setup or concepts behind problems with classmates or the GTFs, and then tackle the details themselves. You may hand the assignments in at the start of lecture or place them in a drop box (location to be determined). <u>No late homework will be accepted</u>. Some assignments will be on-line, via Blackboard. Solutions to all the problem sets will be posted – study these. <i>Homework grading:</i> (1) Each student's lowest score will be dropped from the overall total. (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.
QUIZZES	There will be three quizzes, approximately 30 min. each, Oct. 19, Nov. 2, and Nov. 23. Part or all of the quizzes will be clicker-based (i.e. you'll submit your answers using your clicker.) To partially allow for absence or a "bad day," the lowest quiz score will count for half as much as the others. (In other words, the 15% of the grade that's from the quiz scores does not consist of 5% from each quiz, but rather 6% + 6% + 3%, where the 3% comes from the lowest quiz grade.)
HOW TO DO WELL IN THE COURSE	• 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 GTFs' office hours with questions! • <i>Another suggestion: Sleep! Numerous studies show that sleeping helps both memory and understanding.</i>
STUDENTS WITH DISABILITIES	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.