

HONR 238w: Physics for Decision Makers: The Global Energy Crisis

Fall 2007

Lecture: **MW 3:00-4:30, MTH 0407**

Profs. William Dorland & Steven Rolston

<https://wiki.physics.umd.edu/wiki/bin/viewauth/Courses/Honr238W/WebHome>

Professor Dorland Office: **Room 4117** in the **Computer Science Instructional Center**. I will be available to meet with you **11–Noon, 1-3:00 PM Tuesdays and Thursdays**. To ensure that I will be there, or to arrange a meeting at another time, please arrange by email: bdorland@umd.edu. My phone number is 405-1647.

Professor Rolston Office: **Room 2125** in the **John S. Toll Physics Building**.
Email address: rolston@umd.edu. Phone: 405-7189.

Prerequisites There are no prerequisites for this course.

Course Description The aim of this course is to teach you how physics attacks societal issues. Specific objectives are:

1. To understand the fundamental science of energy and energy usage in the world, including the fundamentals of the work energy relationship, the basic laws of thermodynamics, and energy conservation.
2. To learn, through the process of discovery, how science formulates questions and addresses them with reasoning, evidence, and argumentation.
3. To address specific questions which must be asked and answered in order to understand the important societal questions of energy usage and environmental impact.

Texts **Gordon Aubrecht**, Energy: Physical, Environmental and Social Impact

K. S. Deffeyes, Hubbert's Peak: The Impending World Oil Shortage

Spencer Weart, The Discovery of Global Warming

Important dates

First meeting	Wednesday, Aug. 29
Deadline for drop without "W"	Wednesday, Sept. 12
Complete Energy Audit	Wednesday, Oct. 10
Complete Wiki Project	Wednesday, Nov. 7
Complete Congressional Project	Monday, Dec. 10
Final examination	Saturday, Dec. 15, 1:30-3:30 PM

Grading

Homework	20%
Energy Audit	25%
Wiki Project	15%
Congressional Project	20%
Final Exam/Paper	20%

Note:

Final grades may also be affected by participation in discussions during class meetings. There will be no extra credit opportunities.

Target Schedule

Week	Topic
1	Demographics, free lunches, and the Tragedy of the Commons
2	Physics and energy: Work, power and electricity
3	The limits of efficiency: Laws of thermodynamics
4	Energy production, usage and loss
5	Conservation of energy <i>vs</i> energy conservation
6	Fossil fuel resources, Peak Oil
7	Waste, heat, pollution and transportation
8	Weather <i>vs</i> climate; anthropogenic change
9	Global warming: Treaties, regulations, responses
10	Solar energy: Wind and photovoltaics
11	Biomass: ethanol, sugar cane, <i>etc</i> ; Energy costs of agriculture
12	Nuclear: Fission and fusion
13	Energy storage and load management
14	The view from Congress, the White House and the Courthouse

Disabilities

Students with a specific disability (permanent or temporary, physical or learning) needing special accommodation during the semester should make an appointment to meet with the professor as soon as possible.

Homework

Homework will be assigned and turned in online. Homework assignments will be available at least one week in advance of due dates, which will be posted online.

There will be approximately 7 homework assignments, and your lowest homework grade will be dropped. No late homework will be accepted.

You may collaborate on homework assignments, but you will be responsible for producing your own wiki content in response to the assignments.

Projects

There will be three major projects assigned during this course: a campus Energy Audit, the Maryland Energy Wiki, and Congressional interviews. Participation in these projects is essential and will hopefully be enjoyable. Students will work together in groups for each project.

Examination

The final exam will be closed book, and will cover material from lectures, discussion sections, and class projects.

If you have a reason why you cannot attend class (religious holiday, official University business), see the instructor **before** the exam! Only medical emergencies will be considered as excuses after the exams. If you miss an exam with a valid excuse, a makeup exam will be given. Makeup exams may be oral.

Honor Code Along with certain rights, students also have the responsibility to behave honorably in an academic environment. Academic dishonesty, including cheating, fabrication, facilitating academic dishonesty, and plagiarism will not be tolerated. Any abridgement of academic integrity standards will be referred directly to the Assistant Dean and forwarded to the University's Office of Judicial Affairs. Confirmation of such incidents can result in expulsion from the University. Students who are uncertain as to what constitutes academic dishonesty should consult the University publication entitled Academic Dishonesty.

Tips

1. Ask questions and chime in freely during seminar. There is no need to raise your hand.
2. Turn off your cell phone in class. I really don't like them.

Web Blurb **HONR 238w: Physics for Decision Makers: The Global Energy Crisis**
<http://www.honors.umd.edu/COURSES/0708/238w0708.html>
Dr. William Dorland, Department of Physics

Human society requires energy. Industrial societies require large amounts of energy. Three easily discernible trends related to energy production and use are coming together to make the decisions that tomorrow's leaders will face very challenging:

1. Fossil fuels are abundant and easily utilized, and remain the energy source of choice around the world.
2. The world's most populous nations are rapidly growing and industrializing.
3. Burning fossil fuels contributes strongly to long-term global warming, and is changing the Earth's climate.

In this course, we will examine each of these trends, study how they interact, and seek to learn to what they may imply for humanity. Our perspective will be neither adversarial, as in the legal profession, nor aloof, as a journalist might aim to be. Our perspective will be scientific. We will ask questions which have answers, and discuss how scientists go about finding these answers. What is energy? What are the basic laws of thermodynamics, and how do they constrain our understanding of energy production? How is electricity produced and distributed? What is a greenhouse gas? With this understanding of the facts, we will then address more difficult questions. What options exist for addressing global warming? What are the best alternatives to the expanded use of carbon-releasing energy sources? Solar? Nuclear? Conservation? Recycling? How do the economics of energy supply and demand affect national security? One answer is already clear: your generation will be grappling with these questions for decades. This course will give tomorrow's decision makers the basic tools needed to make informed, rational choices about energy.

During the semester, there will be three major course projects. We will measure the energy used (and wasted) on the campus of the University of Maryland. We will work together to produce an Energy Wiki – a web-based resource with links and original answers to questions about energy use and climate change. Finally, we will go directly to the United States Congress to find out where today's legislators stand on critical aspects of energy and climate policy.