When we try to pick out anything by itself, we find it hitched to everything else in the Universe.”
– John Muir, 1911 (My First Summer in the Sierra)

“It is only recently that [humans] have begun to consider how they can reconcile human needs for energy with the finiteness of the Earth. Such a reconciliation will engage all the institutions of human society.”

Welcome to Energy and the Environment! This is a required course for all Environmental Studies Students (BA and BS), and a useful and informative course for all others concerned with basic issues surrounding the environment, the global economy, and major social problems. We will learn a number of scientific and quantitative concepts as well as historical and social ones as they relate to energy. A continuing theme throughout the course will be an emphasis on energy efficiency. It is my hope that you will take from this course a deeper understanding of energy and some of the basic laws of thermodynamics, and apply them to your skillset as you venture into this rapidly changing world.
– Quentin
**Course Goals**

Throughout the quarter, students will develop an understanding of and justification for the following claims:

1. The laws of thermodynamics are a central organizing principle for the environment, science, industry, and the overall economy.
2. Energy and entropy provide an integrative capability for addressing environmental problems.
3. The basic and more complex scientific underpinnings of climate change represent serious technical and social challenges for global human society and for the United States.
4. Energy production, distribution, and use are a major contributor to social injustices that are prevalent in today’s societies, including racial, gender, socioeconomic, and geopolitical.

**Lectures**

TR, 8:00 - 9:15  
CHEM 1179  
Attendance is required and recorded

**Instructor**

Quentin Gee, PhD  
gee@ucsb.edu  
Bren 4005  
Tuesday 12:00 - 2:00, or by Appointment
Course Website

All major course Content will be posted on Gauchospace. This includes key slides from lectures, online readings, homework questions, and review guides.
https://gauchospace.ucsb.edu/
Please email me if you need assistance with Gauchospace

Exams

Exams will cover lectures, readings, homework problems and quiz questions. There will be two exams. The final exam is not comprehensive.

i>Clickers

i>Clickers will be used to take attendance as well as enhance student participation and comprehension of key issues. Here are key policies and factors to keep in mind regarding i>Clickers.

• It is your responsibility to have an i>Clicker and use it regularly
• Leaving lecture early or arriving late may affect your i>Clicker score, as there is no guarantee of how many i>Clicker polls there will be, or at what time the polls will occur during lecture
• ONCE (1) during the quarter if you arrived a bit late, forgot your clicker, or otherwise were unable to participate in all of the polls, you may come up to me at the end of class and check-in to earn complete i>Clicker activity for the day
• In addition to your single check-in, I will drop your two (2) lowest days of i>Clicker activity, including zeroes (e.g., absences)
• DO NOT ASK FOR ADDITIONAL EXCEPTIONS
Homework Problems

There will be two (2) homework assignments posted to Gauchospace, one for the first half of the class, and one for the second half of the class. You should complete HW questions as we run into them in lecture and while you’re doing your readings.

We will verify your completion of each assignment by you taking a homework quiz on Gauchospace for each assignment. The quiz times will be announced in lecture at least one week before each quiz opens. After you have completed all problems for the given HW assignment, you can begin the Gauchospace quiz, and will have 30 minutes to answer questions based on the HW questions. See the “Homework Quiz Info” document on Guachospace for more information.

Required Readings

Reading assignments will be made on Mondays and Posted on Gauchospace. There are several sources of your required readings:

1. Course Chapter PDFs (1-5) (Posted on Gauchospace sequentially)
2. [BSM] Beyond Smoke and Mirrors, 2nd Edition by Burton Richter (Available at UCSB Bookstore)
3. [HOP] Hot off the Press – Recent and important news Stories (Posted on Gauchospace)
4. Coal: A Human History by Barbara Freese (Available at UCSB Bookstore)
Grading

Your grade will be evaluated as follows:
- Section/HW Quizzes: 12%
- i>Clicker: 8%
- Midterm Exam: 40%
- Final Exam (not comprehensive): 40%

To pass the class, you must earn at least an average of 50% on your exam scores.

Diversity Statement

This course is designed in part to help you understand broader issues in society that relate to social harms and potential benefits to traditionally disenfranchised or otherwise marginalized groups of people, particularly involving gender and racial issues at the international level, as well as socioeconomic trends in the United States. Addressing these issues requires an open mind to forms of institutional failure and mechanisms for empowerment from both a historical and a future-oriented perspective. It is our hope that you take these problems and their causes to heart, and think about such broader patterns throughout your academic, intellectual, and personal development.
We treat you as adults who are honorable people. If special problems come up, see me ASAP.

Academic dishonesty assaults the basic integrity and meaning of a University. Cheating, plagiarism, and collusion are serious acts that erode the University’s educational role and debase the learning experience not only for perpetrators, but also for the entire community. It is our expectation that students in ES115 will understand and subscribe to the ideal of academic integrity and that they will bear individual responsibility for their work. Materials (written or otherwise) submitted to fulfill academic requirements must represent a student’s own efforts. Any act of academic dishonesty attempted by any UCSB student is unacceptable and will not be tolerated. This does not mean you can’t talk about your work with other students and brainstorm, etc., but when it comes to doing your work, it must be your own. We encourage students and Faculty to interact as much as possible on academic subjects of mutual interests while exercising their own individual efforts for grading assessments.
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<th>Week</th>
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<td>Introduction to the Course</td>
<td>People and Energy</td>
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<td>2</td>
<td>External Costs of Energy, Fossil Fuels 1</td>
<td>Fossil Fuels 2</td>
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<td>3</td>
<td>Energy Terminology, Energy vs. Power, Calculations</td>
<td>Energy Storage, 1st Law of Thermodynamics</td>
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<td>Energy Balance, Greenhouse Effect</td>
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<td>Climate Change Effects, Geoengineering</td>
<td>Review for Exam</td>
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<td>6</td>
<td><strong>Midterm Exam</strong></td>
<td>Nuclear Energy 2</td>
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<td>Nuclear Energy 3</td>
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<td>8</td>
<td>2nd Law Applications</td>
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<td>2nd Law Efficiency</td>
<td>Maxwell’s Demon, Review for Final Exam</td>
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<tr>
<td>Finals</td>
<td>The final exam will take place in the lecture hall on THURSDAY, 22 March 2017, 8:00 am – 9:30 am</td>
<td>This schedule is tentative!</td>
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