Environmental Studies 105, Solar and Renewable Energy, is an upper division elective course for Environmental Studies. The course is also of interest to engineering students and any others interested in renewable energy. A multidisciplinary approach is taken, considering the scientific, policy, economic, and social issues surrounding various aspects of renewable energy. We also bring a number of speakers to the course who can give insight into their own projects and the industry as a whole. It is my hope that this course can give you a strong grounding for understanding this rapidly growing and evolving field.
Course Goals

Throughout the quarter, students will develop an understanding of:
- The strengths and weaknesses of various renewable energy sources and their relation to sustainability
- The physical principles and quantitative aspects that govern renewable energy generation and use
- The hierarchy of solar energy technologies, including direct and indirect
- The role of the laws of thermodynamics in relation to the production and utilization of solar renewable energy
- The bridge between solar and fossil energy generation

Lectures

Life Sciences Building 1001
- Mondays 5:00p-6:50p
- Wednesdays 5:00p-5:50p
Instructor

Quentin Gee, PhD

- Bren 4005 (Floor 4-L in Bren Hall)
- Office Hours Posted on Gauchospace
- gee@ucsb.edu

Put “ES 105” in all emails directed to me

Required Readings

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

- *Renewable Energy*, edited by Godfrey Boyle (Available at UCSB Bookstore)
- *Sustainable Energy without the Hot Air*, by David MacKay (Posted on Gauchospace)
- Recent and important news stories (Posted on Gauchospace)
Grading

This quarter, for an upper division course where students have a better sense of their strengths, I’m going to try a new grading structure: you get to weight your grading (within certain bounds). This will allow you to take some ownership of your education, and emphasize your strengths.

➢ At the beginning of the quarter, you will submit a **Grading Plan and a Syllabus Questionnaire** on Gauchospace. In the assignment you will specify a distribution of 100 percentage points for your final grade assessment, within certain bounds, as well as complete a syllabus questionnaire.

➢ You have from April 2\(^{nd}\) at 10PM until April 13\(^{th}\) at 5PM to complete this GS assignment

At the end of the course, you will submit a short **Course Reflection Assignment** about your personal sense of comprehension about renewable energy.

➢ What do you comprehend very well?

➢ What do you struggle with?
Grading Plan

You can utilize an Excel sheet on GS called “Grading Plan Estimator” that allows you to determine your optimal grading plan. Here is a breakdown of the ranges and items for grading.

<table>
<thead>
<tr>
<th>Graded Item</th>
<th>Range of Customization</th>
<th>Default Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grading Plan/Syllabus Questionnaire</td>
<td>2% (fixed)</td>
<td>2%</td>
</tr>
<tr>
<td>i&gt;Clicker Participation</td>
<td>0-8%</td>
<td>6%</td>
</tr>
<tr>
<td>HW Quizzes</td>
<td>0-12%</td>
<td>10%</td>
</tr>
<tr>
<td>Test 1</td>
<td>30-42%</td>
<td>34%</td>
</tr>
<tr>
<td>Test 2</td>
<td>30-42%</td>
<td>34%</td>
</tr>
<tr>
<td>Short Paper Assignment</td>
<td>12-18%</td>
<td>12%</td>
</tr>
<tr>
<td>Course Reflection Assignment</td>
<td>2% (fixed)</td>
<td>2%</td>
</tr>
</tbody>
</table>
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.

- 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**

*In accordance with the grading policy, you may make i>Clicker participation 0% of your final grade, meaning that you can “opt-out” of i>Clickers altogether. However, this must be compensated by placing additional weight on other graded items.*
Homework problem sets will be posted on Gauchospace. There are two sets of homework problems to be assessed by one homework quiz per set. The first set will relate to content associated with Test 1, while the second set will relate to content associated with Test 2. Homework is not collected. Verification of your homework completion is done by you taking a homework quiz on Gauchospace. There will be a two-day window for you to take your quiz (you cannot “pause” the quiz). Within the window, and after completing all assigned problems in the 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 Gauchospace for more information.

In accordance with the grading policy, you may make homework quizzes 0% of your final grade, meaning that you can “opt-out” of homework altogether. However, this must be compensated by placing additional weight on other graded items.
Tests

Tests will cover lectures, key slides, readings, homework problems and HW quiz questions. There will be two tests (see course schedule on the next page). Test 2 will take place during the final, but will not be comprehensive in a significant way. There will be some expected carryover knowledge, but much of Test 2 will be unique to content covered after Test 1.

Tests will have multiple choice, short written questions, and a free writing section. Short written questions may include simple calculations. I will post some old questions from the previous exams before you take Test 1 to give you a sense of the test structure.

Short Paper Assignment

Shortly after Test 1, we will assign a short paper in which you will review a selected topic. The paper will be approximately 1200 words.
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.

I also expect students to conform to standards of respectful communication with graders, me, and other students in the course.
Academic Integrity Statement

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 ES105 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 collaborate with other students and brainstorm, etc., but when it comes to doing your work, it must be your own. We encourage Students, TAs and Faculty to interact as much as possible on academic subjects of mutual interests.
<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Wednesday</th>
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<tbody>
<tr>
<td>1</td>
<td>Intro</td>
<td>Energy Basics</td>
</tr>
<tr>
<td>2</td>
<td>Energy Economics</td>
<td>Energy Storage</td>
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<td>3</td>
<td>Solar Thermal</td>
<td>Solar Thermal</td>
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<td>4</td>
<td>Solar PV</td>
<td>Solar PV</td>
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<tr>
<td>5</td>
<td>Solar PV</td>
<td>Wrapping Up &amp; Review</td>
</tr>
<tr>
<td>6</td>
<td>Test 1</td>
<td>Bioenergy</td>
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<tr>
<td>7</td>
<td>Hydroelectricity</td>
<td>Hydroelectricity</td>
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<tr>
<td>8</td>
<td>Wind</td>
<td>Wind</td>
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<tr>
<td>9</td>
<td>Wind</td>
<td>Renewable Economy</td>
</tr>
<tr>
<td>10</td>
<td>Renewable Economy</td>
<td>Wrapping Up &amp; Review</td>
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This general course schedule is tentative and subject to change.

The Final Exam (Test 2) will take place on Tuesday 12 June at 7:30-9:00 PM in the lecture hall.