*UC Berkeley* *3 Units*
*Spring, 2013* *Monday/Wednesday 4-5:30 pm*
*CHEM 234, ESPM 234, SPH 234* *127 Dwinelle Hall*

# Green Chemistry: An Interdisciplinary Approach to Sustainability

## Introduction

Meeting the challenge of global sustainability will require interdisciplinary approaches to research and education, as well as the integration of this new knowledge into society, policymaking, and business. This course presents an interdisciplinary intellectual framework for understanding the challenges presented by shifting our vast energy resources toward renewable technologies. Students will gain an understanding of the numerous social and technical factors that can promote or impede the adoption of green energy solutions.

This 3 unit class will introduce Green Chemistry and examine the impact that chemicals have on society from the viewpoint of several disciplines. This class is being developed and taught by a team of experts that represent the traditional academic disciplines of Public Health, Chemistry, Toxicology, Environmental Science, Public Policy, Business, and Law. The course material will be presented within the context of chemical case studies.

## Learning Goals

1. Learn an interdisciplinary approach to the scientific and societal issues arising from industrial energy and chemical production, including the facets of chemistry, public policy, law, business, and environmental health sciences that can be integrated to promote green chemistry and design of new energy technologies.

2. Understand the basic principles of toxicology, including hazard, exposure, vulnerability and risk, as they are applied to assessing the impact of chemicals on humans and the environment, setting priorities in public health decision-making and identifying opportunities for informing the transition to renewable energy sources.

3. Understand and identify structure/function relationships with respect to chemical properties, biological activity, and product performance. Be able to evaluate competing technologies using the twelve principles of Green Chemistry along with other technical metrics.

4. Understand the role of law and economics in shaping industrial activity, and be able to identify different legal approaches to chemical regulation, including the cost-benefit analysis paradigm and the precautionary approach.

5. Be familiar with energy and chemicals regulation in the US, as well as efforts to reform the regulation of new technology including, the California Green Chemistry Initiative and the European Union's REACH regulation.

6. Understand and be able to critically assess methods for identifying and evaluating the environmental, social, and health impacts of emerging technologies within the context of life-cycle thinking.

7. Be able to evaluate the key business models, drivers, markets, supply chains, and decision-making criteria that business managers employ in investing in green chemistry and bringing safer products to market at a profit. Be able to make a business case for and against new technologies.

8. Understand the use of alternatives assessments and other decision-making tools that integrate environmental health, regulatory, and business considerations to the evaluation of alternatives.

## Intended Audience

Graduate students in the College of Chemistry, Haas School of Business, College of Natural Resources, the School of Public Health, Bolt Law School and Goldman School of Public Policy.

## Prerequisites

Graduate standing, or undergraduates with instructor approval. Organic chemistry or equivalent knowledge.

## Course Readings

**Links to course reading can be found on the 'Resources' section of our B-Space site organized by class day.**

## Affiliated Faculty and Staff

Sasha Harris-Lovett, GSI, sharrislovett@berkeley.edu
Martin Mulvihill, Chemistry, marty_m@berkeley.edu
Alastair Iles, Environmental Science, Policy and Management, alastair.iles@gmail.com
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Tom McKone, Energy Systems and Life Cycle Analysis, temckone@lbl.gov
Chris Rosen, Business, crosen@berkeley.edu
Joseph Guth, Law & Policy, jguth@berkeley.edu

## Office Hours

You will be meeting with the GSI on a weekly basis and with faculty by appointment.

## Student Assignments

(1) Class Participation: You will be expected to attend class and participate in class discussion. Course readings are an essential part of this course and will be integral for the successful completion of your term paper and final project. Shorter reading response papers (1 page) may be required during the semester to reinforce particularly important topics. (20% of the course grade)

(2) Final Report: This 10,000 word review paper will address the key advantages and barriers to the adoption of a particular alternative fuel strategy (ie. you will consider both a particular fuel as well as a production methodology). You will need to discuss the history, current production, current use, relevant regulation, end-of-life management, and future prospects for this fuel. (80% of student grade: 10% for each of the 5 sections of the paper, 15% poster/presentation, 15% other benchmarks). This project will be submitted as a group. Student contributions to the group work will be evaluated at the end of the semester with anonymous surveys.

**NOTE: All course readings, discussion questions and assignments will be found under the 'resources' section of the B-Space site. They will be organized by class and reminders and/or additional instructions will be posted through the announcement feature of b-space.**

## Course Expectations

**Respect:**
Our goal is to create an interdisciplinary class where ideas can be freely exchanged. This will only be possible in an atmosphere of respect where everyone is free to express ideas and ask questions. With so many different disciplines being discussed, your instructors will strive to avoid discipline specific jargon, and will gladly explain unfamiliar terms and concepts. We expect the same from all of the students.

**Plagiarism:**
Official university policy states that "students who submit plagiarized work will be subject to consequences ranging from a grade of F on the assignment to suspension from the university." The Campus Office of Student Judicial Affairs has produced a comprehensive guide to academic honesty. Please see
http://uga.berkeley.edu/sas/rtf/guide_student.rtf

**Other Campus Policies:**
Accommodations for Religious Creed:
http://registrar.berkeley.edu/DisplayMedia.aspx?ID=Religious%20Creed%20Policy.pdf
Extracurricular Course Conflicts:

http://academic-senate.berkeley.edu/sites/default/files/committees/cep/guidelines_acadschedconflicts_july2006.pdf