Student Project Framework GC 234 Spring 2013

Overview:
Every new technology must overcome a series of challenges before it will gain widespread adoption. Key challenges may be technical, social, economic, political or a combination of this factors. New biofuel technologies have broad implications for society and the environment, and will therefor need to respond to challenges in all of these areas. The goal of this semester's course and course project is to understand and outline the impact of these challenges on the adoption of various emerging biofuel technologies.

By the end of the semester we you will produce a critical review of a biofuel technology and outline the barriers to broad adoption of the technology. To get a better idea for the scope of this sort of paper you can see Tom McKone's recent ES&T article, "Grand Challenges for Life-Cycle Assessment of Biofuels," which addresses the multi-dimensional nature of this project. http://pubs.acs.org/doi/pdfplus/10.1021/es103579c

You will work in interdisciplinary teams to apply your disciplinary knowledge in new contexts and learn from your peers. This project will be the primary method for student assessment (80% of student grade: 10% for each of the 5 sections of the paper, 15% poster/presentation, 15% final report). To assess the balance of contributions from each group member you will be asked to evaluate each other at the end of the semester.

Group Formation:

- 3-5 students representing 2-3 different disciplines
- Group formation will take place during the 2nd week of the course.
- Groups will be created based on reported interests or at the request of students.
- Student groups will meet for at least an hour outside of class every week. You will also schedule 30 min team meetings with the course GSI each week who will be able to answer questions and guide your research process.

Topics:
Every group will be assessing a different bio-based energy source. Each proposed project should be narrow enough that the technology and impacts can be assessed, but broad enough so that there are demonstrable economic and social impacts. You may choose from the examples below or suggest your own project.

- Ethanol from cellulosic biomass
- Biodiesel from plant oils (FAME diesel)
- Biodiesel from algae (isoprinoid diesel *Amyris* or FAME like from extracted oils)
- Other Algae Biofuels (Butanol, Methanol, Ethanol (seawater and cyanobacteria), BioGasoline (Hexane through dodecane)
- Biomass gasification to Methane
- Syngas (H2 + CO) from biomass
- gamma-valerolactone from biomass as liquid fuel and feedstock
- Biomass to Electricity by burning or co-burning with coal

Structure and evaluation:

- After each section of the class (Introduction [classes 1-7], Technical performance and impact assessment [classes 8-15], Law and Policy [16-19], Business [classes 20-23], Conclusion/Integration) the students will turn in key questions, bibliography and an outline of the section to help them prepare to write their review article.
- During reading week the students will present their findings to the class.
- By the end of the semester they will finalize their review article. The final paper will include between 75-125 references and be <10,000 words.
- Well written papers will be submitted for publication.