Main References

The main reference is titled 'Sustainable Energy, Choosing Among Options' by Tester, Drake, Driscoll, Golay, and Peters, 2nd Ed. MIT press.

Lectures will be supplemented with research and news articles on specific topics. Some topics from 'Sustainable Development in Chemical Engineering' by Piemonte, De Falco, and Basile will be covered but relevant material will be provided.

Course Outline

The following topics will be covered

1. Global energy utilization and the need for sustainable energy
2. Operational definitions and measuring sustainability
3. Choosing from options - fossil fuels, solar, biomass, wind, and water
4. Energy policy
5. Sustainable development in chemical engineering

Grading Policy

Homework .......................................................... 15%
Midterm (2nd week of October) ........................................ 35%
Course Project ........................................................ 50%

Important Dates

Holidays .......................................................... Sep 3, Nov 21
No class .......................................................... Oct 29
Midterm (TBA) .................................................. 2nd week of October
Course Project .................................................... 50%

Office Hours

Wednesdays, 11am – noon, in VHE516.
Students are strongly encouraged to fully utilize instructor office hours. Adequate response to email queries cannot be guaranteed and are almost always ineffective.
Submission

All homework and project-related submissions will be online (Blackboard). The first homework will be assigned on Wednesday, Aug 29th and will be due one week from the day of assignment, i.e. Wednesday, Sep 5th. Homework submitted one day late will incur a 20% penalty, and the submission window closes after that. No homework will be assigned in the week when a project-related submission is due.

The filename for submission must follow this specific format – e.g. if John Doe is submitting homework 2, the filename will be CHE450Homework2_JohnDoe.pdf

Course Project

Overview

The objective of the project is to apply the concepts in sustainability discussed in the course to address a specific technology/problem. Students are expected to identify a topic, review the state of the art, and do some independent analysis and assessment that add insight to the topic. The abstract and plan of work (1 page) should contain the following information:

1. What is the technology/problem?
2. Why is the answer to this problem important?
3. What are the key features constituting this technology/problem
4. How much information is available on this topic? (cite at least 4 references)

The instructor will provide feedback on the topics chosen and resolve any overlap between group topics. An interim report (5 pages), consisting of an abstract, introduction to the problem, relevant research, data analysis, and conclusions will be due after the midterm. Feedback will be provided. The final report (10 pages) will build on the interim report, identify gaps and uncertainties in the information available, and their implications on the conclusions from a sustainability point of view. The final week of instruction will be dedicated to group presentations. Each presentation will span 15 min of which 10 min is for the group to present, and 5 for general discussion.

(General formatting guidelines for reports at all three stages: 11-12pt font size, single-spaced, 1” margins)

One of the primary roadblocks to establishing sustainable practices is limited public awareness. To emphasize the importance of these topics to the general public, one component of the course project is to create a short Youtube video (duration between 3 and 4 min). Be creative in how you choose to present your findings in the video, but ensure that it can be easily understood by an audience consisting primarily of high school students. The videos created by this class will be shared on multiple platforms, including the instructor’s website.

Sample topics

- Sustainability of hybrid vehicles
- Residential solar panels
- Carbon capture and sequestration
- Economics of biodiesel
Project timelines and weights

1. Identify team members (teams of 3) and topic (title) ................................................................. Sep 7
2. Submit abstract and plan of work (10%)* ......................................................................................... Sep 12
3. Interim reports due (20%)* ................................................................................................................ Oct 17
4. Project reports due (30%)* .................................................................................................................. Nov 21
5. Project presentations (20%)* .............................................................................................................. Nov 26, 28
6. Project videos due (20%) .................................................................................................................... Dec 1

* indicates that there will be no homework due that week

Grading will be on an individual basis for steps 3, 4, and 5, and collectively for the group for steps 2 and 6. For step 2, submit the abstract and plan of work as a group. For steps 3 and 4, individual reports are expected. Split the presentation time equally between group members for step 5.

Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. – 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Academic Conduct and Support Systems

Academic Conduct: Plagiarism - presenting someone else’s ideas as your own, either verbatim or recast in your own words - is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards: https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity (http://equity.usc.edu/) or to the Department of Public Safety (http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us). This is important for the safety whole USC community. Another member of the university community - such as a friend, classmate, advisor, or faculty member - can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men (http://www.usc.edu/student-affairs/cwm) provides 24/7 confidential support, and the sexual assault resource center webpage (http://sarc.usc.edu/) describes reporting options and other resources.

Support Systems: A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute (http://dornsife.usc.edu/ali), which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs (http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared
emergency makes travel to campus infeasible, USC Emergency Information (http://emergency.usc.edu) will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.