Syllabus: CH EN 6158 – Energy and Society

University of Utah

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Semester Spring 2014

Instructors
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Meetings Lecture: Tuesday & Thursday 08:00 – 10:00, WEB L126

Office hours Open door policy or make appointment.

Teaching assistant Bassam Usta
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Office hours: Schedule meetings by email.

Prerequisites Instructor’s consent.


Course description

This course will focus on the relationship of energy (primarily petroleum) to our economy and society. The environmental impacts of energy will cover the production, transportation, processing, and consumption of petroleum including the analysis of air, surface-water and subsurface pollution.

Learning objectives

By the end of this course you will be able to

1. Describe the connection between energy production, energy use, and society.

2. Use material, energy, and entropy balances to characterize energy use and calculate efficiency.

3. Use the equations of growth to project energy production, use, and impact.

4. Summarize the major regulations included in the Clean Air Act and the Clean Water Act.

5. Describe the connection between emissions from the production of oil and gas and PM2.5 and ozone.

6. Make calculations of pollutant concentrations or emission rates for comparison with the standards of the Clean Air Act and the Clean Water Act.

7. Perform lifecycle assessment calculations and assess risk.

8. Compare the different ways of transporting oil in terms of risk, safety, and efficiency.

9. Describe the benefits and risks associated with hydraulic fracturing.

10. Describe the causes and impact of the Gulf Oil Spill. Make calculations of the spread and distribution of spilled oil.

11. Describe the use, treatment and recycle of drilling fluids and water at well sites.

12. Model the transport of subsurface contaminants.

13. Apply meteorology and the Gaussian plume model to predict the transport and concentration of air pollutants.
14. Estimate the emissions from motor vehicle and stationary sources.

15. Describe the causes and effects of global warming using ocean circulation, simple molecular models, and energy balance models.

16. Propose several approaches to stabilizing emissions of greenhouse gases.

17. Discuss ways of minimizing the effect of solid drilling waste and of restoring drilling lands.

18. Outline international, national, and community energy policy.

19. Summarize land use conflicts and how to resolve them.

20. Perform basic economic calculations related to energy.

21. Compose a complete, well organized project report that evaluates the impacts of a petroleum resource or that analyzes alternatives to fossil fuels.

22. Produce solutions to homework problems that are well organized, complete, and use graphs or figures if necessary.

Grading

20% homework, 40% project, 40% final exam.

Homework

Homework solutions will be due on Thursdays by 16:00 Mountain Daylight Time. Late homework will not be accepted unless you have made prior arrangements with one of the instructors.

To receive full credit for your written solutions, you must write out all equations that you use and you must state all values substituted in those equations. You must show all of your work to receive credit.

I encourage you to work with other students on the homework. You are required to turn in individual assignments for grading.

Final Exam

There will be one exam – a comprehensive final. It will be closed book, notes and homework. You may bring one 8.5-by-ll-inch page of hand-written notes to the final. You may write on both sides.

The final exam is scheduled from 08:00 – 12:00 on Thursday, July 31, in our regular classroom.

To receive full credit for your exam solutions, you must write out
all equations that you use and you must state all values substituted in those equations. You must show all of your work to receive credit.

Project

See separate description.

Students with Disabilities

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 801-581-5020. CDS will work with you and Prof. Silcox to make arrangements for accommodations.

All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services.