

Energy Modules

College of Engineering

Spring 2019



CHEME 6670, Fossil Energy

Classes held for 2 weeks, January 22 - February 1

MWF 10:10-11:00 am and TR 8:40-9:55 am

2154 Snee Hall

**Lead instructor: Michael Weill with Jeff Tester
(jwt54@cornell.edu)**

This module will present an overview of fossil fuels in the overall energy supply. Particular emphasis will be on the exploration and production sector of oil and gas. Oil and gas after transportation and refining is a major contributor to the transportation, industrial, and residential sectors of the economy. The module will highlight where oil and gas fit in the energy picture and then take the student through the overall life cycle of E&P with particular emphasis on the risk and economic components involved, in addition to some technical components. Although coal is a fossil fuel and significant contributor to US electrical supply, it will not be covered in detail. (1 credit)



CHEME 6662, Solar Energy

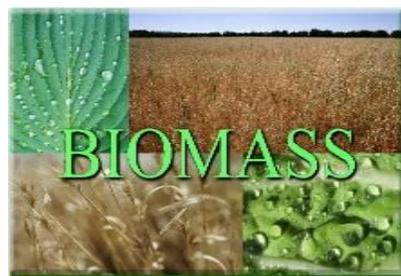
Classes held for 4 weeks, February 4 - March 1

MWF 10:10-11:00 am

2154 Snee Hall

Lead instructor: Tobias Hanrath (th358@cornell.edu)

This module provides a comprehensive overview of solar energy conversion technologies. Major themes range from fundamental (nuts and bolts) solid-state concepts and operating principles of photovoltaics to manufacturing of cells and modules, balance of system aspects, life-cycle assessment and perspectives on second- and third-generation photovoltaic technologies. Beyond technoeconomic aspects, we also discuss societal and legal aspects of solar energy deployment. The module also summarizes solar thermal power technologies including passive and active solar heating, concentrated solar power plants. (1 credit)



CHEME 6661, Bioenergy and Biofuels

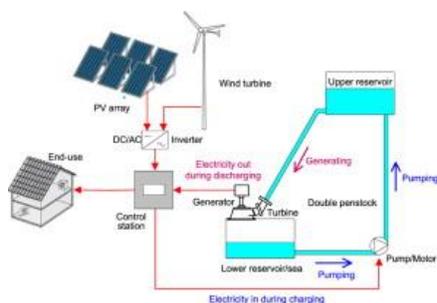
Classes held for 4 weeks, February 5 – March 5

TR 8:40-9:55 am

2154 Snee Hall

Lead instructor: Jeff Tester (jwt54@cornell.edu)

This module will introduce students to issues and challenges in utilizing biomass feedstocks to produce bioenergy, biofuels and/or other products. The focus this semester will be on converting biomass feedstocks to bioenergy using a variety of anaerobic and thermochemical processes. Material covered will include feedstock logistics for recovering and transporting agricultural and food waste biomass, processing and conversion technologies, co-products, and environmental and economic impacts over their full life cycle. The course will culminate in a final project in which students will use Life Cycle Assessment to measure the energetic viability and environmental performance. (1 credit)



CHEME 6650, Energy Engineering
Meets all semester, MW 2:55-4:10 pm
B11 Kimball Hall
Lead instructor: Muqtadar Quraishi
(maq22@cornell.edu)

This course focuses on carrying out a technical and commercial analyses of diverse and complex energy projects (renewable and non-renewable) using a task and team-based approach. It considers and analyzes all possible factors and assumptions which can determine and affect the value of a project both positively and negatively. It centers on project and process optimization, risk analysis and its management. It attempts to balance time against accuracy. It has 5 back-to-back tasks. Task examples: i) a *waste-to-energy project in a major city in either Europe, North America, or Asia*; ii) a *wind farm in India -- engineering, economics and policy*. (3 credits)



CHEME 5880 / ECE 5880 / MAE 5469, Energy Seminar II
Thursdays 12:20-1:10 pm, all semester
165 Olin Hall
Lead instructors: Lynden Archer (laa25@cornell.edu), David
Hammer (dah5@cornell.edu), and Max Zhang
(kz33@cornell.edu)

Energy resources, their conversion to electricity or mechanical work, and the environmental consequences of the energy cycle are discussed by faculty members from several departments in the university and by outside experts. Topics include energy resources and economics, coal-based electricity generation, nuclear reactors, solar power, energy conservation by users, and air pollution control. (1 credit)