

**ME433/AUTO 533 Advanced Energy Solutions**  
DEPARTMENT OF MECHANICAL ENGINEERING, THE UNIVERSITY OF MICHIGAN

## SAMPLE SYLLABUS

This course is scheduled to be offered by distance/online.

Course Description: This course provides an introduction to the challenges of power generation for a global society. The course starts with an overview of the current and future demands for energy, the various methods of power generation including fossil fuel, solar, thermal, wind, and nuclear and the detrimental byproducts associated with these methods. Advanced strategies to improve power densities, reduce pollutant emissions and improve thermal efficiencies, such as advanced combustion cycles, batteries and fuel cells for stationary and mobile power generation; synthetic and bio-renewable fuels; and reconfiguring power plants are the primary focus of the second half of the course. The material includes emphasis on specific methods to improve energy efficiencies in the mobile transportation sector such as hybrid vehicles and ultracapacitors. Additional topics include the advantages and technical difficulties associated with a hydrogen economy including production, transport, storage and application. The emphasis is on the application of thermodynamic analysis to understand the basic operating principles and the inherent limitations of the technologies considered.

The course content is targeted to upper-level undergraduate students and new graduate students.

Prerequisites: ME 235 Thermodynamics I

Required Text: Energy Studies, 2nd Edition, Shepherd, W., Shepherd D.W. Imperial College Press, London, 2003, isbn #1-86094-322-5.

Supplemental Text: Introduction to Engineering and the Environment, 1st edition, E.S. Rubin, McGraw Hill, 2001. Note, this text is not required.

Graded Material: Homework 35%

Midterm Exam 30%

Final Project 35%

Homework: Each problem graded 0-1-2.

Final Project: Written report and oral presentation to the class