

ME112 – Energy – Fall 2018 - UCSB
Prof. E. Matthys

Class announcement

Class description

This class will address the issue of how energy is produced and utilized. It will first include a brief review of energy sources and their utilization throughout history, examining how society has benefited from profound changes in the availability and nature of energy flow, and how the environment has been affected by these changes. We will also look at the developing patterns in energy usage by various countries and types of societies. The US national energy flow and the related economics for both modern times and future projections will then be discussed in quantitative terms. Some aspects of Global energy use and supplies will also be investigated. We will then conduct a review of some current types of energy production, ranging from fossil fuels and nuclear plants to renewable sources such as solar, geothermal, wind, hydroelectric, biofuels, etc; analyzing the technical engineering aspects and constraints, economics, future viability, cost, and environmental impact of the different technologies. Energy conservation and its benefits will also be addressed. Solar Energy may be looked at in greater depth as time allows. We will also keep track of and discuss current Energy trends and events in the news, and address the issues of how various technologies have the potential –or not- to address the possible Energy and Environmental crises our planet and country could face in the near future.

This class is intended to be a broad introduction to the field of Energetics, and will cover a wide range of topics. The goal is to enable the students to develop a broad yet quantitatively sound knowledge of the various technologies and their challenges, encompassing a variety of aspects ranging from economics to environmental impact and technological limitations. The lectures will not be highly-detailed mathematical treatments and are intended to be accessible to students with a variety of backgrounds. A more in-depth technical study component will be achieved separately through student research projects as described below.

This class is expected to consist of 2 main components: a set of lectures (2 / week) that will address the issues described above and will be primarily of a seminar / discussion format; and also –assuming final class size will allow it- extensive research projects conducted in small student teams throughout the quarter outside of the lectures but with extensive interactions with the Instructor. These projects will likely be based on suitable topics proposed by each team within a theme (e.g. Solar Energy), and are intended to be an in-depth study of a particular aspect of an energy-related issue of current interest. It is expected that the projects will all cover scientific, engineering, economics, and environmental quantitative aspects. These projects will involve a significant creative contribution beyond the collection of existing information, and will progress from proposals to interim and final reports and include also a final oral presentation if time allows. The projects will require extensive work outside of the lectures. Some limited homework may also be assigned in support of the lectures or related concepts. There are no sit-

down standard examinations planned, as we will have instead technical written reports and likely an oral presentation of the research projects results.

Course Prerequisites

Senior Undergraduate or Graduate Student status in the College of Engineering; or consent of Instructor by petition.

Text

Handouts or electronic documents may be provided. No required textbook will be assigned.

Course Objectives

The objective of this course is to develop an overall understanding of Energetics. Students will be familiarized with energy sources and patterns of utilization. Technical discussions and analyses of various types of energy production will also be conducted to enable the students to develop a good understanding of these technologies and their advantages and disadvantages. Design and engineering practice considerations will be emphasized throughout the class to familiarize the students with practical Engineering concepts. Research skills and creative analysis will be developed through a technical research project. Additional practice in technical report writing and technical presentation skills are an important objective of this class as well.

Note: We will form student groups for the research projects as soon as possible so that you have more time to work on your project. It is therefore important that you be present at the first class meeting if you want to take the class. Additional logistics information may be provided via Gauchospace, check for updates there. If you cannot sign up for the class on Gold, but are seriously interested in taking it, send me an email early on with information on your background and I may be able to let you in or put you on a waiting list. You will then want to attend the first meeting as well.

I look forward to seeing you in class. Energy is a fascinating topic that strongly affects our daily lives. Let's have some fun learning about it!

E. Matthys 4/24/18

(the above is subject to changes based on evolving class activities and logistics)