ME 599-001: Fundamentals of Energy Conversion

Professor Angela Violi

Department of Mechanical, Chemical and Biomedical Engineering

Monday/Wednesday 8:30AM – 10:00AM – Room EECS 1303

Course description:

This class is a journey on energy. The goal is to provide information and analysis tools on the development of energy technology, energy resources and energy technologies available today.

After an overview of the broader aspects of energy use from viewpoints of sustainability, resource availability, environmental effects and economics, a review of the fundamentals of the main energy sources that are likely to be part of a future energy portfolio (fossil fuels, solar, ocean waves, tide, wind and biomass) will be presented. A major module of the class is on Fossil Fuels (about 85% of all commercial energy is derived from them) including the engineering fundamentals of thermodynamics and chemical kinetics as applied to combustion and fuel cells.

The issues surrounding the future role of energy extend beyond technology since energy use is integral to many activities, including quality of life, commerce, and stability of our social institutions. Thus sustainable energy must be concerned not only with energy and environmental technologies, but also with the social and political factors that impact human lifestyles. These themes will also be discussed in class.

Guest lectures are brought in to cover environmental and societal issues. People from Ford Motor Company, EPA and Alternative Energy program at the Lawrence Technological University will be the guests for this semester.

Sustainable energy is a state of global being yet to be realized and there is no unique roadmap to get there but rather a series of pathways that will be dominated by gradual transformations of institutions and individuals. It is assumed that each traveler of this journey will wish to select her or his own major routes and to make her or his own decision on what to explore. This will be an exam-free course. Grading will be largely based on a term-long project, proposed by the students themselves.