ME 417
Design of Alternative Energy Systems

Course Learning Objectives

1. Concepts of Analytical Design
   a. Students recognize the value of using predictive models in the design process
   b. Students are able to conduct parametric studies
   c. Students are able to determine an appropriate objective or cost function
   d. Students are able to perform a simple optimization

2. Wind Power Systems
   a. Students are able to understand the nature of wind as an energy source
   b. Students are able to understand and evaluate different types of wind turbines
   c. Students are able to calculate the performance of wind turbines
   d. Students are able to design a wind power system

3. Ocean Power Systems
   a. Students are able to understand the nature of the ocean as an energy source
   b. Students are able to understand and evaluate different types of ocean energy sources, such as ocean thermal energy conversion, wave energy, and tidal energy
   c. Students are able to calculate the performance of ocean power systems
   d. Students are able to design an ocean power system

4. Solar Energy Systems
   a. Students are able to understand the nature of the sun as an energy source
   b. Students are able to understand and evaluate different uses of solar energy, such as direct conversion to electricity (photovoltaic), active space heating, and passive heating and cooling
   c. Students are able to calculate the performance of solar energy systems
   d. Students are able to design a solar energy system

5. Nuclear Power Systems
   a. Students are able to understand the nature of nuclear fission and fusion as energy sources
   b. Students are able to understand and evaluate different types of nuclear power systems
   c. Students are able to calculate the performance of fission based nuclear power systems
   d. Students are able to design a fission based nuclear power system

6. Fuel Cells
   a. Students are able to understand the nature of the fuel cells as an energy source
   b. Students are able to understand and evaluate different type of fuel cells
   c. Students are able to calculate the performance of fuel cells
   d. Students are able to design a fuel cell energy system
7. Geothermal Energy Systems
   a. Students are able to understand the nature of the earth as an energy source or sink
   b. Students are able to understand and evaluate different types of geothermal energy systems
   c. Students are able to calculate the performance of geothermal energy systems
   d. Students are able to design a geothermal energy system

8. Biomass Energy
   a. Students are able to understand the nature of the biomass as an energy source
   b. Students are able to understand and evaluate different biomass fuels
   c. Students are able to calculate the performance of biomass fuels
   d. Students are able to design a biomass energy system

8. Batteries, Electrical Storage and Control
   a. Students are able to understand the nature of electrical storage and control
   b. Students are able to understand and evaluate different types of batteries
   c. Students are able to calculate the performance of batteries
   d. Students are able to design an electrical storage and control system

10. Engineering Project Skills
    a. Students are able to communicate ideas, methods, results, and decisions effectively in a written technical memo
    b. Students are able to work effectively with a partner to equitably distribute and carry out the tasks associated with a design project.
    c. Students are able to evaluate their performance on a project team