EEL 4930 Renewable Energy Systems

Credits : 3

Text book, title, author, and year: Renewable and Efficient Electric Power Systems, Gilbert M. Masters, John Wiley, 2013 [Second Edition]
Supplemental materials: Solar module information from Internet

Specific course information

a. brief description of the content of the course: Solar positions, Shading analysis, clear sky solar insolation, photovoltaic systems under off-grid and grid-tie conditions. Wind turbine technologies, Bentz limit and average power in the wind.
b. prerequisite: EEL 3112 – Circuits 2 corequisite: EEE 4361- Electronics 2
c. Required, elective, or selected elective: Elective

Specific goals for the course
Specific outcomes of instruction:

The student will understand the relative position between the Earth and Sun.
The student will be introduced to technology relating to PV, Wind and Ocean.
The student will be able to team design basic off-grid and grid-tie solar systems for residential and small scale PV systems.
The student will learn about an economic impact of renewable energy.
The student will be able to effectively communicate in writing answers to qualitative questions on tests.

Brief list of topics to be covered

Basic Electric and magnetic circuits
Power triangle and power factor correction techniques
Balanced three phase systems, delta and wye –connected
Power quality and harmonic distortion
Solar resource: Day-time solar position, Clear-sky insolation
Photovoltaic (PV) characteristics and PV models
PV systems: Net metering, Off-grid and Grid-tie PV systems
PV systems economics: Cost analysis
Wind power systems: Turbine technologies, Bentz limitation, Power in the wind
Power from the ocean: Hydroelectric power and ocean current energy
Smart grid and smart meters