EEL 4281 Photovoltaic Power Systems

Credits: 3

Text book, title, author, and year: Photovoltaic Systems Engineering, Second Edition, by R. Messenger and J. Ventre, CRC Press, 2004
Supplemental materials: Handouts, notes and Renewable and Efficient Electric Power Systems, by Gilbert Masters, John Wiley, 2004

Specific course information

a. **Brief description of the content of the course:** Sun parameters; PV system components; PV system design, including environmental and economic considerations; PV cell technologies and device theory.
b. **Prerequisites:** EEE 3300 – Electronics 1
c. **Required, elective, or selected elective:** Elective

Specific goals for the course
Specific outcomes of instruction:

The student will understand the relationship of the insolation, orbit and rotation of the Earth
The student will learn the concepts of PV cells, module and array
The student will be able to design PV systems for simple PV-powered fan, pump, lighting systems and with load constraint
The student will learn how to design realistic PV projects such as PV-powered cabin, residential, small to medium grid-tied PV systems
The student will be able to effectively communicate in writing answers to qualitative questions on tests.

Brief list of topics to be covered

Background on current world energy use
Solar spectrum, insolation, sun tracking techniques
Shading effects
PV orientation considerations
Introduction to PV systems
Energy storage
PV system loads and availability
Maximum Power Trackers and Linear current boosters
PV Systems Examples
Cost considerations, life cycle costing
Stand-alone PV systems design; residential and cabin considerations
Battery sizing considerations
Utility interactive PV systems; small to medium sizes
Present and Proposed PV cells