ECE 4378: Solar Energy

Credit / Contact hours: 3 / 3 per week

Course coordinator: Tim Dallas

Textbook(s) and/or other required material: None

Catalog description: Provides an overview of photovoltaic materials, devices, and systems. Students learn to analyze performance based on available solar light. Design projects provide practical experience.

Pre-requisite(s): Senior or graduate status in engineering or physical science, or consent of instructor.

Co-requisites (if any): None

Designation: Elective

Course learning outcomes: Upon completion of this course, students should be able to

1. explain the various concepts to convert solar energy in to electricity, heat, and solar fuels
2. explain the physical principles of photovoltaic conversion in solar cells
3. recognize and describe the various solar cell technologies, their current status, and future technological challenges
4. analyze the performance of solar cells and modules
5. describe solar system solutions for a particular application.

ABET Student Outcomes addressed in course: a, b, c, d, e, g, h, j, and k.

Topics covered:

PV materials and device physics – 4 weeks
Available sunlight – 2 weeks
PV device, panel, and system design, analysis, and operation – 5 weeks
Concentrator optics – 1 week
PV energy storage – 1 week
Advanced PV device designs – 1 week
Tests and quizzes – 1 week