
ENVIRONMENTAL SCIENCE 61

Introduction to Photovoltaic (PV) Technology

WEDNESDAYS 5:30-8:20 PM

ESCI -061.-01

Call #00640

Instructor: Ridha Hamidi

Spring 2014

3.0 Units

De Anza College, Division of Biological, Health & Environmental Sciences, Environmental Studies Department

Kirsch Center for Environmental Studies

DESCRIPTION

An introduction to the fundamentals of photovoltaic (PV) basics including how solar cells convert sunlight to electricity, solar potential, types of solar systems, system size requirement and design, net metering options, rebate programs, and related topics for your home or business. An emphasis on the benefits of renewable energy technology as well as how to understand and review multiple bids and analyzing the economics of a PV installation. Good introductory course for students considering the North American Board of Certified Energy Practitioners (NABCEP) certification program. Out-of-class field trips may be required for this course

INSTRUCTOR INFORMATION: Ridha Hamidi

Office Hours Held: Wednesdays 4:30-5:20 pm **by appointment only**

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REQUIREMENTS

Be prepared to:

1. **Attend all classes! Students who miss more than 2 sessions will be automatically withdrawn.**
2. *Participate* in team assignments in and outside of class time.
3. Work with a team to design a photovoltaic project.

OBJECTIVES

After completing this course you should be able to:

1. Explore the terminology, science and applications of photovoltaic (PV) technology
2. Examine existing and potential applications of photovoltaic (PV) power systems
3. Assess PV system design strategies
4. Analyze opportunities for buying green power and educating the public, public agencies, elected officials and other stakeholders utilizing energy resources.

COURSE MATERIALS

Textbooks: no textbook is required for this class but students are advised to read the following book

- Photovoltaic Systems by James P. Dunlop, in partnership with NJATC

Students are required to read the following documents:

- A Consumer's Guide: Get Your Power from the Sun, US Department of Energy, Office of Energy Efficiency and Renewable Energy, December 2003 • DOE/GO-102003-1844
- A Guide to PV Design and Installation, California Energy Commission, Energy Technology Development Division, JUNE 2001 500-01-020

COMPLETE THE WRITTEN ASSIGNMENTS

1. **Individual assignment:** Each student will complete three homework assignments
2. **Team assignment:** Students will participate in planning a photovoltaic project.

GRADING

- * Quizzes: 50 points
- * Homework Assignments: 50 points
- * Final Exam: 50 points
- * Final Project: 50 points
- * Attendance: 10 points (extra credits)

Your accumulated total points are compared to 200, and your letter grade is determined as follows:

Grade	Points		% of Total	
	Min	Max	Min	Max
A+	194	NA	97%	NA
A	185	193	93%	97%
A-	178	184	89%	92%
B+	171	177	86%	89%
B	162	170	81%	85%
B-	155	161	78%	81%
C+	148	154	74%	77%
C	139	147	70%	74%
C-	132	138	66%	69%
D+	125	131	63%	66%
D	116	124	58%	62%
D-	109	115	55%	58%
F	NA	108	NA	54%

STUDENT LEARNING OUTCOMES

1. Assess (apply) the criteria necessary to be successful in the Introduction to Photovoltaic Technology class.

2. Investigate and communicate the fundamentals of solar electricity (including conversion of sunlight to electricity, solar potential and types of solar systems) and the role of this form of renewable energy in establishing a sustainable society.

GENERAL INFORMATION

1. This is an intensive **environmental science course!**
2. Class protocol for each day of lecture:
 - Class begins promptly at 5:30 pm
3. **Stewardship Resource Center (SRC) protocol:**
 - Daily activities (ie computer research) may be scheduled at the SRC
 - Computer check-out by team requires one student ID
 - Stay with your computer at all times – do not leave unattended! Someone should always be at your station!
4. **Students are expected to exhibit proper indoor and outdoor classroom etiquette: arrive to class on time, participate in all activities, do not talk during lecture & no cell phones or other such devices on!** Disruptive student behavior will result in an F in the class and the student will be dropped from the class.

CLASS SCHEDULE

Date	Topics	Assignments
Week 1	Introduction to PV Systems	
Week 2	Solar Radiation, Sun-Earth Relationships	Homework #1 assigned
Week 3	PV Cells, Modules, and Arrays	
Week 4	PV System Components and Configurations	Homework #1 due
Week 5	PV Site Surveys	Homework #2 assigned Quiz #1 assigned
Week 6	Basics of Electricity for PV Systems	
Week 7	PV System Sizing	Homework #2 due Homework #3 is assigned
Week 8	Field Trip #1 Review Session	Quiz #2 assigned
Week 9	Mechanical & Electrical Integrations of a PV System	Homework #3 due
Week 10	Economic Analysis of a PV System, Net Metering, Rebate Programs	Quiz #3 assigned
Week 11	Field Trip #2 Review Session	
Week 12	PV Project Presentations	Final Project Report due Final Exam assigned