Solar Photovoltaic Systems: Course Outline

[Your institution] · [Course code] · [Term]

How to use this outline

This outline organises an introduction to solar photovoltaic (PV) systems around the readings and the seven labs in the Solar PV lab manual in this course on Zelvi. It is a starting point: change the units, hours and assessment to fit your program, and add your own text or lessons for deeper theory.

Text in [square brackets] is for your institution to fill in. Everything else can be changed too.

Course details

- Instructor: [name] · Contact: [how learners reach the instructor]
- Class times and place: [days, times, location]
- Hours: [64 contact hours is a typical semester: 2 hours of lecture and 2 hours of lab a week for 16 weeks]
- Before this course: [any course or skill learners need first, such as basic electricity and meter use]
- Textbook or references: [the text your program uses]
- Code edition: [the National Electrical Code (NEC) edition your state enforces]

What learners will be able to do

1. Measure electrical energy use correctly.
2. Identify the key stages of generating electricity with photovoltaic cells.
3. Measure current and voltage safely on common PV equipment.
4. Choose the most suitable PV system for a given site and set of installation requirements.
5. Find and apply the NEC requirements that govern a PV system, including its labels and markings.

Units

Unit 1: Energy and electricity basics

Energy, power and energy use; reading a utility bill and a meter; unit conversions for PV work.

On Zelvi: Solar PV lab manual, Lab 7 (unit conversions).

Unit 2: How PV cells and modules work

The photovoltaic effect; cells, modules and arrays; open-circuit voltage and short-circuit current; series and parallel connections.

On Zelvi: Solar PV fundamentals; Solar PV lab manual, Lab 1 (your lab station) and Lab 2 (measuring modules in series).

Unit 3: The solar resource and site assessment

Sun path, orientation and tilt; true south and magnetic declination; shading and its effect on output.

On Zelvi: Solar PV fundamentals (the solar resource); Solar PV lab manual, Lab 4 (finding true south).

Unit 4: Predicting a system's output

Estimating energy production for a site with free PV software; comparing fixed-tilt and tracking arrays.

On Zelvi: Solar PV lab manual, Lab 5 (predicting a system's output).

Unit 5: System components and the electrical code

Inverters, racking, conductors, disconnects and overcurrent protection; grounding and bonding; the NEC article for PV systems.

On Zelvi: Solar PV fundamentals (the parts of a PV system).

On Zelvi: Solar PV lab manual, Lab 3 (grounding and bonding) and Lab 6 (labels and markings to code).

Unit 6: Safety, installation and commissioning

Electrical and fall hazards on PV work; safe installation practice; checking and documenting a finished system.

On Zelvi: Fall protection in construction (OSHA), and the safety notes at the start of the Solar PV lab manual. [Add your own lesson on installation practice.]

Unit 7: Working in solar

Roles in the industry and how installers become certified.

On Zelvi: Becoming a certified PV installer.

How learning is checked

A suggested weighting, to change to your own:

- Exams and quizzes: [30%]
- Assignments: [30%]
- Labs: [30%]
- Final project, such as sizing and siting a system for a real building: [10%]

Your institution's policies

- Attendance: [your policy]
- Late work and make-up exams: [your policy]
- Lab safety and clean-up: [your rules for the lab and its equipment]
- Academic honesty: [your policy]
- Accommodations: [who learners contact, and how]