# ARCH A008N: SOLAR PANELS FOR SMALL PROJECTS NONCREDIT

| Item | Value |
|---|---|
| Curriculum Committee Approval Date | 12/02/2020 |
| Top Code | 020100 - Architecture and Architectural Technology |
| Units | 0 Total Units |
| Hours | 30 Total Hours (Lecture Hours 20; Lab Hours 10) |
| Total Outside of Class Hours | 0 |
| Course Credit Status | Noncredit (N) |
| Material Fee | No |
| Basic Skills | Not Basic Skills (N) |
| Repeatable | Yes; Repeat Limit 99 |
| Open Entry/Open Exit | No |
| Grading Policy | P/NP/SP Non-Credit (D),<br>• Letter Non-Credit (L) |

## Course Description

Solar Panels for Small Projects is a 5 week course that introduces solar energy basics for small, off-grid photo voltaic installations. The course will cover solar energy fundamentals, electricity and safety basics, PV modules, system components, and system sizing. Students will plan out their own project or a small sample project. A small kit system will be available for hands-on demonstrations. No prior experience needed. Same as CNST A008N. NOT DEGREE APPLICABLE. Not Transferable.

## Course Level Student Learning Outcome(s)

1. Students will be able to calculate electrical loads and select appropriate components for an off-grid solar panel installation for a small project.
2. Students will demonstrate a new or enhanced professional ability to design and price a small PV solution that incorporates knowledge of solar power systems and energy storage.

## Course Objectives

- 1. Demonstrate the basic planning, mounting, and performance considerations needed to select and install a small PV system.
- 2. Calculate the electrical loads and performance needs for a small solar panel system.
- 3. Calculate a preliminary budget and list of components needed for a small project.
- 4. Identify photovoltaic cell and module characteristics as they apply to the design and performance of small installations.
- 5. Demonstrate a basic knowledge of safe installation and operation procedures for a basic PV system.

## Lecture Content

Course Overview Syllabus Course operation and expectations Course schedule Textbook, resources, websites Intro to Photovoltaics Sources of electricity Electricity basics Off-grid and grid-tied systems Types of systems and cells Planning a Small System Load analysis Location and orientation Site and mounting considerations Sizing methodologies and calculation PV System Components Cells, modules, arrays Inverters, AC and DC systems Batteries Charge controllers Mounting system Electrical Integration Codes Wiring, connections Overcurrent protection, disconnects Grounding Safety procedures Installation Procedures Permits inspections Equipment checklist Sequence Performance analysis Troubleshooting a system Maintenance Project Documentation Load Calculations Project summary: location, orientation, use Equipment specs Cost estimate Mounting system Diagrams Power estimates Maintenance Shadows Cleaning Performance drops Optimization Anti-theft

## Lab Content

Designing a system Load calculations Research, vendors Ordering parts Costs Safety and work flow Codes (National Electrical Code) Electricity Integration with structure, shut off  System Kits Components Mounting racks Sequence Voltage checks Battery storage Testing Performance Testing Maintenance Repairs Troubleshooting Adding panels, batteries Demonstration Operation Battery capacity Test voltage, storage

## Method(s) of Instruction

- Enhanced NC Lect (NC1)
- Enhanced NC Lab (NC2)
- Online Enhanced NC Lect (NC5)
- Online Enhanced NC Lab (NC6)
- Live Online Enhanced NC Lect (NC9)
- Live Online Enhanced NC Lab (NCA)

## Instructional Techniques

Instructional methods will include: lecture, demonstrations, class discussions, video demonstrations, tour of facilities and projects on-site, and student presentations.

## Reading Assignments

Review codes and reference materials Read hand outs provided Read text book and other

## Writing Assignments

Students will write their project intentions into a project summary. Student will collect information and summarize

## Out-of-class Assignments

Out of class readings, assignments, and written work will total approximately 6-10 hours per week (or about 40 hours total).  Students will design, research, and source a small project. Students will read assigned materials Students will research systems and collect reference data and specifications Students will collect and assemble reference data

## Demonstration of Critical Thinking

Critical thinking will be engaged in the process of specifying a small solar panel project that demonstrates logical and considered decision making.

## Required Writing, Problem Solving, Skills Demonstration

Students will produce a project notebook or file folder that contains a project brief, system research, and collected reference material.

## Eligible Disciplines

Architecture: Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience. Construction technology: Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience.

## Other Resources

1. California State Building Codes - free public access 2. Reference hand outs prepared by instructor