

ESYS 012: RESIDENTIAL SOLAR INSTALLATION

Originator

rgalicia

Co-Contributor(s)**Name(s)**

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Justification / Rationale

This entry-level course is for students interested in installing and maintaining photovoltaics (PV) systems and obtain or furthering a career in the solar industry. The installation principles, techniques, and functions of the PV will be presented along with installation and maintenance of all necessary components for a PV system. Discussion and instructions will also serve current solar installers wanting to earn an industry-recognized credential. Installation practices are aligned to help students prepare for the North American Board of Certified Energy Practitioners (NABCEP). Per NABCEP website, "The NABCEP PV Installation Professional certification is a voluntary certification that provides a set of national standards by which PV Installation Professionals with skills and experience can distinguish themselves from their competition." Certification provides a measure of protection to the public by giving them a credential for judging the competency of practitioners This course is developed to meet the goals of the California Energy Efficiency Strategic Plan (CEESP) which mandates that 100 percent of all new homes in California will be Zero Net Energy starting in 2020 and 50 percent of commercial buildings by 2030. Solar technology is the leading technology used to offset electrical demand from the power grid. California has acknowledged the shortage of qualified and available workforce to meet these new mandates. The course is designed to develop the highly trained technical workforce necessary to meet the goals of the California Energy Efficiency Strategic Plan (CEESP).

Effective Term

201930

Credit Status

Credit - Degree Applicable

Subject

ESYS - Energy Systems Technology

Course Number

012

Full Course Title

Residential Solar Installation

Short Title

RES SOLAR INST

Discipline**Disciplines List**

Industrial Technology (Foundry occupations)

Air Conditioning, Refrigeration, Heating (Solar energy technician)

Construction Technology

Modality

Face-to-Face

Catalog Description

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Schedule Description

This course is for students interested in installing and maintaining photovoltaic (PV) systems, and obtain or furthering their career in the solar industry. The installation principles, techniques, and functions of the PV systems will be presented along with installation and maintenance of all necessary components.

Lecture Units

3

Lecture Semester Hours

54

Lab Units

1

Lab Semester Hours

54

In-class Hours

108

Out-of-class Hours

108

Total Course Units

4

Total Semester Hours

216

Required Text and Other Instructional Materials**Resource Type**

Book

Open Educational Resource

No

Formatting Style

MLA

Author

James P. Dunlop

Title

Photovoltaic Systems

Edition

(3rd/e).

City

Orland Park

Publisher

American Tech Publishers

Year

2012

College Level

Yes

Flesch-Kincaid Level

11.0

ISBN #

9781935941057

For Text greater than five years old, list rationale:

This is a state certification approved book and the 3rd edition is the most recent edition available.

Class Size Maximum

25

Course Content

1. Photovoltaic (PV) Markets and Applications
2. Occupational Safety and Health Administration (OSHA)
3. Electricity Fundamentals
4. Solar Energy Fundamentals. Solar radiation, array orientation, and sun-earth orientations.
5. PV Module Fundamentals and Mechanical Components (PV Cells, Modules, Arrays and roof attachment methods for solar panes)
6. PV System Sizing -Surveying work site and collecting existing electrical conditions.
7. Selection of PV System.
8. Electrical Design-Electrical integration, battery storage, and utility interconnection.
9. Coordination process between trades involved to properly design a residential solar system

Lab Content

1. Safety Basics Lab
2. Electricity Basics Lab
 - a. Series and parallel, DC systems
3. Solar Energy Fundamentals Lab
4. PV Module Fundamentals Lab
 - a. Parallel and Series solar panel installation.
5. Identification of System Components Lab
6. PV System Sizing Lab
 - a. Selection of equipment
7. PV System Electrical Design
 - a. Design and build model solar systems

Course Objectives

	Objectives
Objective 1	Describe the dangers, safety and Occupational Safety and Health Administration (OSHA) considerations of electricity.
Objective 2	Explain the application of various mechanical roof attachments and select the roof attachment for a given set of solar panels.
Objective 3	Identify types of Photovoltaic systems and explain the preferred solar selection. (utility-interactive, standalone, direct-coupled, etc.)
Objective 4	Calculate electrical service panel electrical loads to determine safety factors, code compliance, and design of solar systems.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Explain the design clearances required for maintenance access for a PV array and other components including inverter and batteries of a stand-alone system.
Outcome 2	Describe the coordination process between trades involved to properly design a residential solar system.
Outcome 3	Calculate and apply the optimum angle of a solar array during installation.
Outcome 4	Prepare for the North American Board of Certified Energy Practitioners (NABCEP). The NABCEP PV Installation Professional certification

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Activity	Draw control diagrams, check equipment clearance, evaluate battery systems for solar systems
Collaborative/Team	Students will measure home dimensions and bring back to class to develop an energy survey and a solar layout plan.
Demonstration, Repetition/Practice	Role play customer and technician interactions to introduce solar terminology
Lecture	Lecture and class discussion on the process, flow and the coordination in solar design.
Participation	Reading assigned chapters. Complete chapter reviewed questions and discussed next class session in a group setting.

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Tests/Quizzes/Examinations	True/False online and/or written quiz covering chapter material	In Class Only
Mid-term and final evaluations	Written multiple choice examination covering material discussed throughout the course.	In Class Only
Product/project development evaluation	Evaluation of a solar installation equipment selection to meet code compliance.	In and Out of Class
Student participation/contribution	Student will be ask to answer question from the home work or take home projects.	In and Out of Class
Self-paced testing, Student preparation	Present suggested installation solar-type and method base on specific given property parameters	In and Out of Class

Assignments
Other In-class Assignments

1. Practice installing personal protective safety equipment, e.g. gloves, safety eyewear, ladder safety harness.
2. Read and describe the varies mechanical roof attachments currently available.
3. Group interaction and group presentations on the best angle for maximum power found during the laboratory exercise.

Other Out-of-class Assignments

1. Read the assigned text.
2. Assigned worksheets

Grade Methods

Letter Grade Only

MIS Course Data
CIP Code

15.0505 - Solar Energy Technology/Technician.

TOP Code

094610 - Energy Systems Technology

SAM Code

C - Clearly Occupational

Basic Skills Status

Not Basic Skills

Prior College Level

Not applicable

Cooperative Work Experience

Not a Coop Course

Course Classification Status

Credit Course

Approved Special Class

Not special class

Noncredit Category

Not Applicable, Credit Course

Funding Agency Category

Not Applicable

Program Status

Program Applicable

Transfer Status

Not transferable

Allow Audit

No

Repeatability

No

Materials Fee

No

Additional Fees?

No

Files Uploaded**Attach relevant documents (example: Advisory Committee or Department Minutes)**

ZNE Meeting Minutes 031618.docx

ZNE Meeting Minutes 012017.docx

ZNE Meeting Minutes 012216.docx

ESYS 012 Approval Letter.pdf

Approvals**Curriculum Committee Approval Date**

10/02/2018

Academic Senate Approval Date

10/11/2018

Board of Trustees Approval Date

11/14/2018

Chancellor's Office Approval Date

11/26/2018

Course Control Number

CCC000598474

Programs referencing this course

Building Energy Systems Professionals (BESP) AS Degree (<http://catalog.collegeofthedesert.eduundefined?key=202>)

Residential Solar (<http://catalog.collegeofthedesert.eduundefined?key=204>)

Residential Solar Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined?key=205>)

Air Conditioning Refrigeration AS Degree (<http://catalog.collegeofthedesert.eduundefined?key=51>)