ESYS 011: RESIDENTIAL SOLAR SURVEYING AND PLANNING

Originator

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Co-Contributor(s)

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Justification / Rationale

This course is for students engaged or interested in a solar-related field who need to expand their knowledge and skills of solar function and design of solar photovoltaics. The coordination between trades, design limitations, and workflow processes will be explained. The fundamental principles and functions of the photovoltaic industry will be introduced. Students will be prepared to work as site planning technician or solar sales advisers. 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. Residential solar 1, 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

011

Full Course Title

Residential Solar Surveying and Planning

Short Title

RES-SOLAR-PLAN

Discipline

Disciplines List
Industrial Technology (Foundry occupations)
Air Conditioning, Refrigeration, Heating (Solar energy technician)
Construction Technology

Modality

Face-to-Face

Catalog Description

This course is for students engaged or interested in a solar-related field who need to expand their knowledge and skills of solar function and design of solar photovoltaics (PV). The coordination between trades, design limitations, and workflow processes will be explained. The fundamental principles and functions of the photovoltaic industry will be introduced. Students will be prepared to work as site planning technicians or solar sales advisers.

Schedule Description

This course is for students engaged or interested in a career in the solar industry. The coordination between trades, design limitations and workflow processes will be explained.

Lecture Units
3
Lecture Semester Hours
54

Lab Units
0

In-class Hours
54

Out-of-class Hours
108

Total Course Units
3
Total Semester Hours
162

Required Text and Other Instructional Materials

Resource Type
Book
Open Educational Resource
No

Formatting Style
MLA

Author
Dunlop, James P.

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

40

Course Content

1. Photovoltaic (PV) Markets and Applications
2. Safety Basics
3. Solar Energy Fundamentals
3.a. Define basic solar terms (e.g., irradiation, azimuth)
3.b. Explain magnetic declination
4. Solar Ready Roofs
4.a. Solar code requirements
4.b. Orientation and Pitch
5. PV Module Fundamentals
5.a. Explain how a solar cell converts sunlight into electric power
5.b. Have basic knowledge of solar module construction
6. System Components
6.a. Describe common solar module mounting techniques (ground, roof, pole)
6.b. Identify system components (inverter, charge controller, combiner, batteries, etc.)
7. PV System Sizing
7.a. Explain DC system output versus AC production
7.b. Analyze load demand calculation methodologies
8. PV System Mechanical Design
8.a. Describe various roof attachment methods
8.b. Describe the mechanical loads on a PV array (e.g., wind, snow, seismic)
9. Performance Analysis and Troubleshooting
9.a. Describe typical system design errors
9.b. Describe typical system performance problems

Course Objectives

	Objectives
Objective 1	Describe the history of Photovoltaic technology and industry.
Objective 2	Describe markets, applications and coordination between disciplines for Photovoltaic (grid-tie, remote homes, telecom, etc.).
Objective 3	Identify types of Photovoltaic systems (utility-interactive, standalone, direct-coupled, etc.).
Objective 4	Identify safety hazards of Photovoltaic systems and state code equipment requirements.
Objective 5	Define basic electrical units and terminology.
Objective 6	Calculate electrical panels minimum and maximum electrical loads to determine electrical safety factors.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Explain and understand the design clearances required for maintenance access for a Photovoltaic (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	Demonstrate use of solar terminology appropriately when discussing Photovoltaic with industry and solar clients.

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.

Role Playing	Develop soft skill by presenting and performing a client and technician interactions. .
Discussion	Discuss how electrical safety factors may vary and how these can have an effect on one's project budget.

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
Computational/problem-solving evaluations	Evaluation of a solar design or installation to verify electrical code compliance.	In and Out of Class
Student participation/contribution	Evaluation of students depth of knowledge gathered from homework or take home projects. Students will be asked multiple questions during classroom participation. Short quizzes are assigned after every homework	In and Out of Class

Assignments

Other In-class Assignments

1. Continuation of work accomplished in the classroom
2. Draw control diagrams, equipment clearance, battery systems for solar systems.
3. Class discussion on the process, flow and coordination in solar design.
4. Role play customer and technician interactions to introduce solar terminology.

Other Out-of-class Assignments

1. Homework assignments to continued work accomplished in the classroom
2. Reading assigned chapters.
3. Complete chapter reviewed questions and discussed next class session in a group setting.
4. Students will measure home dimensions and bring back to class to develop an energy survey and a solar layout plan.

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 011 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
CCC000598472

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)