

Course Outline of Record

1. Course Code: ESYS-012C
2.
  - a. Long Course Title: Module 3 Residential Solar Installation
  - b. Short Course Title: MOD 3 RES-SOLAR INST
3.
  - a. Catalog Course Description:
 

This entry level course is Module 3 of 3 for students interested in installing and maintaining photovoltaics systems and obtain a career in the solar industry. The installation principles, technics and functions of the photovoltaic will be presented along with installation and maintenance of all necessary components for a photovoltaic system. Discussion and instructions will also serve current solar installers wanting to earn industry recognized credential. Installation practices are aligned to help students prepare for the North American Board of Certified Energy Practitioners (NABCEP).

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.
  - b. Class Schedule Course Description:
 

This entry level course is Module 3 of 3 for students interested in installing and maintaining photovoltaics systems and obtain a career in the solar industry.
  - c. Semester Cycle (*if applicable*): N/A
  - d. Name of Approved Program(s):
    - NEW CERTIFICATE IN PROGRESS Certificate of Completion
4. Total Units: 0.50      Total Semester Hrs: 27.00  
 Lecture Units: 0      Semester Lecture Hrs: 27.00  
 Lab Units: 0.5      Semester Lab Hrs: 0  
 Class Size Maximum: 20      Allow Audit: No  
 Repeatability No Repeats Allowed  
 Justification 0
5. Prerequisite or Corequisite Courses or Advisories:
 

*Course with requisite(s) and/or advisory is required to complete Content Review Matrix (CCForm1-A)*  
 Prerequisite: ESYS 312B
6. Textbooks, Required Reading or Software: (*List in APA or MLA format.*)
  - a. Dunlop, J., P. (2012). Photovoltaic Systems (3rd/e). American Tech Publishers. ISBN: 9781935941057  
 College Level: Yes  
 Flesch-Kincaid reading level: 11.0
7. Entrance Skills: *Before entering the course students must be able:*
  - a.  
 Explain mechanical roof attachments and their load limitations.
    - ESYS 312B - Explain mechanical roof attachments and their load limitations. Satisfy SLO(1)
  - b.  
 Perform calculations on conductor ampacity and conductor derating factors.
    - ESYS 312B - Perform calculations on conductor ampacity and conductor derating factors. SLO(2)
  - c.

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List equipment needed for typical system performance analysis.

- ESYS 312B - List equipment needed for typical system performance analysis SLO(3)

## 8. Course Content and Scope:

Lecture:

**LAB only**

Lab: *(if the "Lab Hours" is greater than zero this is required)*

1. Intro to electrical tools.
2. Build electrical wiring diagrams.
4. Wire types and controls for solar systems.
5. Reading electrical diagrams and plans.
6. Hands-on projects: Installations of solar systems in residential homes.
7. Practice and maintaining electrical safety equipment.
8. Install of service breaker
9. Lock-out-tag-out safety measures

## 9. Course Student Learning Outcomes:

1.  
Demonstrate parallel and series circuit wiring during installations of solar systems.
2.  
Employ test on solar systems to balance electrical loads.
3.  
Calculate current and voltage drop to verify size calculations.
4.  
Apply electrical theory to obtain a passing score on the North American Board of Certified Energy Practitioners (NABCEP) Entry Level exam.

## 10. Course Objectives: *Upon completion of this course, students will be able to:*

- a. Determine series/parallel PV array arrangement based on module and inverter specifications. Satisfy SLO(1)
- b. Select components appropriate for electrical balancing requirements during initial proposals. SLO(2)
- c. Perform calculations to determine and select the size of equipment needed for a simple family resident. LO(3)
- d. NABCEP training material will be introduced. Student will navigate through material and get familiar with calculations and formulas. SLO (4)

## 11. Methods of Instruction: *(Integration: Elements should validate parallel course outline elements)*

- a. Activity

- b. Collaborative/Team
- c. Discussion
- d. Lecture
- e. Participation
- f. Technology-based instruction

12. Assignments: *(List samples of specific activities/assignments students are expected to complete both in and outside of class.)*

In Class Hours: 27.00

Outside Class Hours: 0

a. In-class Assignments

- 1. Draw, explain and set up during lab series and parallel electrical circuits. SLO (1)
- 2. Calculate electrical load balance. SLO (2)
- 3. Calculate single family residence load demand SLO (3)
- Read and perform solar calculations SLO(4)

b. Out-of-class Assignments

- 1. Read assigned text.
- 2. Assigned worksheets.

13. Methods of Evaluating Student Progress: *The student will demonstrate proficiency by:*

- True/false/multiple choice examinations
- Student preparation
- Organizational/timelines assessment

Be in-class on time. Have all assignments organize in 3 ring binder.

14. Methods of Evaluating: Additional Assessment Information:

15. Need/Purpose/Rationale -- *All courses must meet one or more CCC missions.*

PO - Career and Technical Education

Fulfill the requirements for an entry- level position in their field.

Apply critical thinking skills to execute daily duties in their area of employment.

Display the skills and aptitude necessary to pass certification exams in their field.

IO - Scientific Inquiry

Recognize the utility of the scientific method and its application to real life situations and natural phenomena.

16. Comparable Transfer Course

|                          |               |                      |                     |                     |
|--------------------------|---------------|----------------------|---------------------|---------------------|
| <b>University System</b> | <b>Campus</b> | <b>Course Number</b> | <b>Course Title</b> | <b>Catalog Year</b> |
|--------------------------|---------------|----------------------|---------------------|---------------------|

17. Special Materials and/or Equipment Required of Students:

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18. Materials Fees:  Required Material?

**Material or Item**

**Cost Per Unit**

**Total Cost**

19. Provide Reasons for the Substantial Modifications or New Course:

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photovoltaic will be presented along with installation and maintenance of all necessary components for a photovoltaic system. Discussion and instructions will also serve current solar installers wanting to earn industry recognized credential. Installation practices are aligned to help students prepare for the North American Board of Certified Energy Practitioners (NABCEP).

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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 work force 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).

20. a. Cross-Listed Course (*Enter Course Code*): *N/A*  
b. Replacement Course (*Enter original Course Code*): *N/A*

21. Grading Method (*choose one*): Letter Grade Only

22. MIS Course Data Elements

- a. Course Control Number [CB00]: *N/A*  
b. T.O.P. Code [CB03]: 94610.00 - Energy Systems Technology  
c. Credit Status [CB04]: D - Credit - Degree Applicable  
d. Course Transfer Status [CB05]: C = Non-Transferable  
e. Basic Skills Status [CB08]: 2N = Not basic skills course  
f. Vocational Status [CB09]: Clearly Occupational  
g. Course Classification [CB11]: Y - Credit Course  
h. Special Class Status [CB13]: N - Not Special  
i. Course CAN Code [CB14]: *N/A*  
j. Course Prior to College Level [CB21]: Y = Not Applicable

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k. Course Noncredit Category [CB22]: Y - Not Applicable

l. Funding Agency Category [CB23]: Y = Not Applicable

m. Program Status [CB24]: 1 = Program Applicable

Name of Approved Program (if program-applicable): NEW CERTIFICATE IN PROGRESS

*Attach listings of Degree and/or Certificate Programs showing this course as a required or a restricted elective.)*

## 23. Enrollment - Estimate Enrollment

First Year: 20

Third Year: 40

## 24. Resources - Faculty - Discipline and Other Qualifications:

a. Sufficient Faculty Resources: Yes

b. If No, list number of FTE needed to offer this course: N/A

## 25. Additional Equipment and/or Supplies Needed and Source of Funding.

N/A

## 26. Additional Construction or Modification of Existing Classroom Space Needed. (Explain:)

N/A

## 27. FOR NEW OR SUBSTANTIALLY MODIFIED COURSES

Library and/or Learning Resources Present in the Collection are Sufficient to Meet the Need of the Students Enrolled in the Course: Yes

28. Originator Ramiro Galicia Origination Date 09/17/16