

Course Outline of Record

1. Course Code: ESYS-035
2.
  - a. Long Course Title: Advanced Lighting Controls
  - b. Short Course Title: LIGHTING CONTROLS
3.
  - a. Catalog Course Description:
 

This course will focus on advanced lighting controls with a specific application in the lighting industry and efficiency of: automatic controls, switches and dimmers, sensors and LED lighting sources, outdoor lighting, daylighting and energy efficiency for residential and commercial buildings, and use of data to apply the Title 24 requirements, for Acceptance Test Technician qualification. The certificates will provide a comprehension knowledge base for students pursuing the Acceptance Lighting Controls credential.
  - b. Class Schedule Course Description:
 

This course will focus on advanced lighting controls with a specific application in the lighting industry and efficiency of: automatic controls, switches and dimmers, sensors and LED lighting sources, outdoor lighting, daylighting, and energy efficiency for residential and commercial buildings.
  - c. Semester Cycle (*if applicable*): N/A
  - d. Name of Approved Program(s):
    - NEW CERTIFICATE IN PROGRESS Certificate of Completion
4. Total Units: 3.00      Total Semester Hrs: 90.00  
 Lecture Units: 2      Semester Lecture Hrs: 36.00  
 Lab Units: 1      Semester Lab Hrs: 54.00  
 Class Size Maximum: 24      Allow Audit: No  
 Repeatability 0x  
 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)*

 Advisory: ESYS 002  
 Advisory: ESYS 005
6. Textbooks, Required Reading or Software: (*List in APA or MLA format.*)
  - a. IES, Illuminating engineering society material. CALCTP Title 24 Lighting. IES , 09-02-2013.
7. Entrance Skills: *Before entering the course students must be able:*
  - a.  
Explain the purpose of OSHA and how it promotes safety on the job.
    - ESYS 002 - Explain the purpose of OSHA and how it promotes safety on the job.
  - b.  
Develop a plan and a hazard assessment for a given task and select the appropriate PPE and work methods to safely perform the task.
    - ESYS 002 - Develop a plan and a hazard assessment for a given task and select the appropriate PPE and work methods to safely perform the task.
  - c.  
Define voltage and identify the ways in which it can be produced.
    - ESYS 002 - Define voltage and identify the ways in which it can be produced.
  - d.

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Define the units of measurement that are used to measure the properties of electricity.

- ESYS 002 - Define the units of measurement that are used to measure the properties of electricity.

e.

Describe energy efficient rating systems.

- ESYS 005 - Describe energy efficient rating systems, SEER EER, part load EER and COP.

f.

Describe the proper placement and installation of thermal insulation.

- ESYS 005 - Describe the proper placement and installation of thermal insulation.

g.

Describe the Thermal Transmittance (U-Factor) of glass.

- ESYS 005 - Describe the Thermal Transmittance (U-Factor) of glass.

h.

Explain the importance of sustainable design of buildings.

- ESYS 005 - Explain the importance of site design and building orientation.

## 8. Course Content and Scope:

Lecture:

1. Discussion of light, its nature, light sources and their technology.
2. Traditional light sources VS. LEDs (Light emitting Diodes).
3. Various design options and presentation of new devices from the industry with explanations on how they work and how they may be best applied .
4. Personalization in lighting design, to meet Title 24 requirements and create personal level comfort and efficiency.

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

1. Installation of lighting sources, incandescent, fluorescents, and LEDs fluorescent light sources.
2. Testing the input and output of light sources, wattage comparison, wiring of ballasts and sensors to control light output.
3. Latest in building lighting control hardware and software programming providing the students with the latest education.

## 9. Course Student Learning Outcomes:

1.

Apply California energy lighting code to determine if a design is in compliance.

2.

Demonstrate the ability to calculate energy units (KWHs) and to design efficient lighting systems using traditional and digital sources.

3.

Complete a basic lighting design layout for a small commercial multipurpose used building.

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

- a. Define the lighting spectrum, visible band, and identify the CCT (correlated color temperature) related to all light sources.

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- b. Exhibit the ability to calculate energy units (KWHs) and to design efficient lighting systems using traditional and digital sources
- c. Demonstrate understanding of light source technology, the advantages and disadvantages of each source.

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

- a. Activity
- b. Collaborative/Team
- c. Demonstration, Repetition/Practice
- d. Discussion
- e. Laboratory
- f. Lecture
- g. Observation
- h. Participation
- i. 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: 90.00

Outside Class Hours: 72.00

### a. In-class Assignments

- 1. Reading assignments
- 2. Quizzes
- 3. Tests
- 4. Discussion of lighting control models

### b. Out-of-class Assignments

- 1. Students will read from handouts and have to study on their own the topics of lighting sources technology. They learn how the light sources work, and what makes them efficient or inefficient and understand the energy units and how they can reduce the cost of utility by reducing the number of KWHs.
- 2. Students will select a related topic, do research, and present to the class.
- 3. Students will apply some of the concepts learned in this course in their homes, such as changing light sources to more efficient technology, install room level controls, and practice reducing electrical consumption by turning the light off when not needed.

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

- Laboratory projects
- Group activity participation/observation
- True/false/multiple choice examinations
- Mid-term and final evaluations
- Student participation/contribution
- Student preparation
- Organizational/timelines assessment

## 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.

Apply critical thinking skills to research, evaluate, analyze, and synthesize information.

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

IO - Scientific Inquiry

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Analyze quantitative and qualitative information to make decisions, judgments, and pose questions.

IO - Critical Thinking and Communication

Apply principles of logic to problem solve and reason with a fair and open mind.

IO - Global Citizenship - Scientific & Technological Literacy

Utilize quantitative expression in a variety of contexts. These would include units of measurement, visual representations, and scales and distributions.

Synthesize, interpret, and infer, utilizing information, data, and experience to solve problems, innovate, and explore solutions.

Produce oral and written information in various modes and media, using technology such as computers, the Internet, and library databases.

## 16. Comparable Transfer Course

University System	Campus	Course Number	Course Title	Catalog Year
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## 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:

Advanced Lighting Controls Certificate 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(ZNE)starting in 2020 and 50 percent of commercial buildings by 2030. The ZNE Ready initiative is set to prepare new candidates to enter the green workforce as well as advance the skills of existing tradesmen. These assertive objectives will greatly improve the green workforce, stimulate the overall economy of our region, and thereby propel the energy industry. By training a Zero Net Energy Ready workforce now, we can meet the needs of contractors, home owners, building owners and managers, industry, and government, as well as meet the energy efficiency goals of the 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  
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.)*

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23. Enrollment - Estimate Enrollment

First Year: 18

Third Year: 20

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 03/12/17