

ESYS 022: RESIDENTIAL ENERGY MODELING DESIGN PROJECT

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Originator

zbecker

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Justification / Rationale

Adding distance education modality to provide additional educational opportunities.

Effective Term

Fall 2020

Credit Status

Credit - Degree Applicable

Subject

ESYS - Energy Systems Technology

Course Number

022

Full Course Title

Residential Energy Modeling Design Project

Short Title

ENERGY MODELS

Discipline**Disciplines List**

Air Conditioning, Refrigeration, Heating (Solar energy technician)

Modality

Face-to-Face

100% Online

Hybrid

Catalog Description

This course provides training in applying the principle techniques of energy modeling software to residential buildings. Students with a major or interest in architecture, drafting, landscape design, energy engineering, mechanical engineering, electrical engineering, or environmental engineering will select specialized projects, with the approval of their professor, to model energy usage using Californian Energy Commission approved software.

Schedule Description

This course provides training in applying the principle techniques of energy modeling software to residential building. Prerequisite: ESYS 021

Lecture Units

1

Lecture Semester Hours

18

Lab Units

1

Lab Semester Hours

54

In-class Hours

72

Out-of-class Hours

36

Total Course Units

2

Total Semester Hours

108

Prerequisite Course(s)

ESYS 021

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

Web/Other

Description

[California] Building Energy Efficiency Standards for Residential and Nonresidential Buildings (latest version) <http://energy.ca.gov/2012publications/CEC-400-2012-004/CEC-400-2012-004-CMF-REV2.pdf>

Resource Type

Web/Other

Description

[California] Residential Compliance Manual (latest version) <http://energy.ca.gov/2013publications/CEC-400-2013-001/CEC-400-2013-001-CMF-REV2.pdf>

Resource Type

Web/Other

Description

[California] Reference Appendices: Joint Appendices, Residential Appendices, Nonresidential Appendices (latest version) <http://energy.ca.gov/2012publications/CEC-400-2012-005/CEC-400-2012-005-CMF-REV3.pdf>

Class Size Maximum

22

Entrance Skills

Describe the methods necessary to show compliance with the California Energy Standards.

Requisite Course Objectives

ESYS 021-Describe the technics and methods necessary to show compliance with the California Energy Standards.

Entrance Skills

Describe the energy modeling features of a building, including their characteristics and function.

Requisite Course Objectives

ESYS 021-Describe the energy modeling features of a building, including their characteristics and function.

Entrance Skills

Describe the heat transfer characteristics of building construction assemblies and how they perform.

Requisite Course Objectives

ESYS 021-Describe the heat transfer characteristics of building construction assemblies and how they perform, both individually and as an integrated part of a whole building system.

Entrance Skills

Collect and analyze building and energy efficiency data from plan set take-offs or on-site field inspections.

Requisite Course Objectives

ESYS 021-Collect and analyze building and energy efficiency data from plan set take-offs or on-site field inspections.

Entrance Skills

Describe energy compliance software approved by the California Energy Commission (CEC).

Requisite Course Objectives

ESYS 021-Describe energy compliance software approved by the California Energy Commission (CEC).

Course Content

1. Project type and scope will be determined by the instructor and must be applicable to the student's major course of study.
2. Small group discussions on the lecture items, above, related to energy modeling. This will exercise each student's vocabulary and concepts related to buildings and their energy systems so that they grow in their abilities to explain what they have learned.
3. Interactive demonstrations of real project cases of building energy modeling to give students the feeling for how they actually should work in the field.
4. Students will construct a building energy model from a set of architecture blueprints and applying both performances, and prescriptive approve energy guidelines.
5. Students will evaluate the results of their building models to determine the best rebate measure to synthesize solutions for buildings that over exceed the energy budget and fail the permitting potion.

Lab Content

1. Produce Takeoffs from a full set of building plans.
2. Apply California Energy code.
3. Apply California energy compliance software to specify projects.
4. Presentations of student projects

Course Objectives

	Objectives
Objective 1	Model and document buildings from construction plans using the latest energy compliance software.
Objective 2	The material of study will prepare the student to take industry recognize credentials e.g. Certified Energy Analyst (CEA).
Objective 3	Explain the two common building design methods, prescriptive and performance to comply with California energy code.
Objective 4	Understand the dangers of not back checking and scaling final energy calculation results.
Objective 5	Use energy terminology appropriately when discussing energy trade offs.

Student Learning Outcomes

	Upon satisfactory completion of this course, students will be able to:
Outcome 1	Compare and document buildings from construction plans using the latest energy compliance software.
Outcome 2	Apply the principle of energy modeling software to residential buildings.

Methods of Instruction

Method	Please provide a description or examples of how each instructional method will be used in this course.
Discussion	Class discussion of plan check energy audits and rating results.
Demonstration, Repetition/Practice	Demonstrate the energy modeling skills needed to create a computer generated certified energy analysis report.
Collaborative/Team	Work in teams to collect and analyze building and energy efficiency data from plan set take-offs or on-site field inspections.
Participation	Class evaluation of blue prints and plan sets.
Lecture	Presentation of Energy and Compliance topics in context with representative construction examples.
Laboratory	Develop blue print/plan reading skills and apply to energy construction models as appropriate for the content of the course.

Methods of Evaluation

Method	Please provide a description or examples of how each evaluation method will be used in this course.	Type of Assignment
Laboratory projects	Evaluate plans, write energy audits, create energy models.	In Class Only
Computational/problem-solving evaluations	Computational evaluation of heat transfer and energy efficiency.	Out of Class Only
Self-paced testing	"Out of class readings" and energy problem calculations.	Out of Class Only
Student participation/contribution	Demonstrate the "energy modeling skills" needed to create a "computer generated" certified energy analysis report.	In and Out of Class
Mid-term and final evaluations	Comprehensive exam covering content of course. Exam may be project completed out-of-class or multiple choice in-class exercise.	In and Out of Class
Tests/Quizzes/Examinations	Quizzes completed out-of-class with in-class discussion of correct answers.	In and Out of Class
Group activity participation/observation	Work in teams to collect and analyze building and energy efficiency data from plan set take-offs or on-site field inspections.	In and Out of Class

Assignments
Other In-class Assignments

1. Reading assignments
2. Quizzes
3. Tests
4. Discussion of energy models

Other Out-of-class Assignments

1. Practice tutorial energy models.
2. Read assigned text.
3. Assigned worksheets.
4. Evaluate an energy bill.
5. Evaluate energy rebates and incentives.
6. Prepare for in-class discussions on specific energy topics.

Grade Methods

Letter Grade Only

Distance Education Checklist

Include the percentage of online and on-campus instruction you anticipate.

Online %

75

On-campus %

25

What will you be doing in the face-to-face sections of your course that necessitates a hybrid delivery vs a fully online delivery?

The lab Instructor will provide technical support for students learning the variables involved in energy modeling software. The hybrid section will be used to have on one contact hours with students who may be struggling applying the technics or for students who need to have access to our lab laptops that been geared up with a software license.

Lab Courses

How will the lab component of your course be differentiated from the lecture component of the course?

In lab, students apply the concepts learned in the lecture portion of the course to complete modelling and plan take-off assignments.

From the COR list, what activities are specified as lab, and how will those be monitored by the instructor?

All activities are monitored by the written reports and modelling software results submitted by students. Students use EnergyPro, Energy Plus and Department of Energy compliance software to complete assignments to model a sample building's energy compliance.

How will you assess the online delivery of lab activities?

Students will submit the results from the use of modelling software.
Students will submit written evaluations of plan checks.

Instructional Materials and Resources

If you use any other technologies in addition to the college LMS, what other technologies will you use and how are you ensuring student data security?

Software from the Department of Energy will be used for modelling energy usage in a building. Security is not an issues because no students information is required or stored in the software.

Effective Student/Faculty Contact

Which of the following methods of regular, timely, and effective student/faculty contact will be used in this course?

Within Course Management System:

Timely feedback and return of student work as specified in the syllabus
Discussion forums with substantive instructor participation
Regular virtual office hours
Online quizzes and examinations
Video or audio feedback
Weekly announcements

External to Course Management System:

Direct e-mail
Posted audio/video (including YouTube, 3cm mediasolutions, etc.)

Briefly discuss how the selected strategies above will be used to maintain Regular Effective Contact in the course.

Timely feedback and return of student work with comments as specified in the syllabus.
Discussion forums with substantive instructor participation.
Online quizzes and examinations with correct answers provided as study tools.
Weekly announcements.

Other Information

Provide any other relevant information that will help the Curriculum Committee assess the viability of offering this course in an online or hybrid modality.

Energy audit materials and modelling software are all available online and students will be required to use these online materials regularly when working in the field. Learning online is very appropriate and will provide additional career readiness.

MIS Course Data

CIP Code

15.0503 - Energy Management and Systems 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

General Education Status

Not applicable

Support Course Status

Course is not a support course

Allow Audit

Yes

Repeatability

No

Materials Fee

No

Additional Fees?

No

Approvals

Curriculum Committee Approval Date

12/03/2019

Academic Senate Approval Date

12/12/2019

Board of Trustees Approval Date

1/17/2020

Chancellor's Office Approval Date

6/12/2020

Course Control Number

CCC000587605

Programs referencing this courseBuilding Energy Consultant Certificate of Achievement (<http://catalog.collegeofthedesert.eduundefined?key=137/>)Building Energy Systems Professionals (BESP) AS Degree (<http://catalog.collegeofthedesert.eduundefined?key=202/>)Air Conditioning Refrigeration AS Degree (<http://catalog.collegeofthedesert.eduundefined?key=51/>)