

AC R020L: ELECTRICAL SYSTEMS I LAB

Originator
aainsworth

College

Oxnard College

Discipline (CB01A)

AC - AirConditioning&Refrigeration

Course Number (CB01B)

R020L

Course Title (CB02)

Electrical Systems I Lab

Banner/Short Title

Electrical Systems I Lab

Credit Type

Credit

Start Term

Fall 2021

Formerly

ENVT R020L

Catalog Course Description

This course develops competency in the theoretical troubleshooting of mechanical problems in air conditioning and refrigeration systems through an understanding of the operating principles for electrical wiring systems used in air conditioning and refrigeration installations. It is recommended for persons who want to develop or improve job skills in the air conditioning, heating and refrigeration industry. Together with the lab course (AC R020), this course targets the service technician who wishes to develop skills in reading wiring diagrams, identifying electrical components, and electrical troubleshooting and repair skills. It is also applicable for students wishing to enter the industry in the capacity of installer, sales representative, maintenance technician, or designer.

Taxonomy of Programs (TOP) Code (CB03)

0946.00 - *Environmental Control Technology (HVAC)

Course Credit Status (CB04)

D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)

C (Not transferable)

Course Basic Skills Status (CB08)

N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)

C - Clearly Occupational

Course Cooperative Work Experience Education Status (CB10)

N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)

Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)

N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)

Y - Not Applicable

Course Noncredit Category (CB22)

Y - Credit Course

Funding Agency Category (CB23)

Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)

1 - Program Applicable

General Education Status (CB25)

Y - Not Applicable

Support Course Status (CB26)

N - Course is not a support course

Field trips

May be required

Grading method

Letter Graded

Alternate grading methods

Credit by exam, license, etc.

Does this course require an instructional materials fee?

No

Repeatable for Credit

No

Is this course part of a family?

No

Units and Hours

Carnegie Unit Override

No

In-Class

Lecture

Minimum Contact/In-Class Lecture Hours

17.5

Maximum Contact/In-Class Lecture Hours

17.5

Activity

Laboratory

Minimum Contact/In-Class Laboratory Hours

52.5

Maximum Contact/In-Class Laboratory Hours

52.5

Total in-Class**Total in-Class****Total Minimum Contact/In-Class Hours**

70

Total Maximum Contact/In-Class Hours

70

Outside-of-Class**Internship/Cooperative Work Experience**

Paid

Unpaid

Total Outside-of-Class**Total Outside-of-Class****Minimum Outside-of-Class Hours**

35

Maximum Outside-of-Class Hours

35

Total Student Learning**Total Student Learning****Total Minimum Student Learning Hours**

105

Total Maximum Student Learning Hours

105

Minimum Units (CB07)

2

Maximum Units (CB06)

2

Student Learning Outcomes (CSLOs)**Upon satisfactory completion of the course, students will be able to:**

- | | |
|---|---|
| 1 | Use a Volt-Ohm meter to isolate electrical faults on a refrigeration or air conditioning system. |
| 2 | Repair an electrical fault on a refrigeration or air conditioning system, once it has been discovered, by following a structured troubleshooting model. |
| 3 | Draw a wiring diagram for a basic air conditioning, heating or refrigeration system. |

Course Objectives**Upon satisfactory completion of the course, students will be able to:**

- | | |
|---|---|
| 1 | Use a volt-ohm meter to locate and repair electrical failures on all types of refrigeration and air conditioning systems. |
| 2 | Analyze, identify and resolve potential electrical malfunctions based on a given description of a failed sequence of operations for various air conditioning or refrigeration systems. Verify the fault using a volt- ohm meter or other electrical tester. |
| 3 | Draw a wiring diagram for a basic air conditioning or refrigeration system. |

Course Content

Lecture/Course Content

1. Applied Electricity
 - a. Circuits
 - b. Measurement of voltage, resistance, current, capacitance
 - c. Reading, drafting and interpreting various wiring diagrams
2. Circuits
 - a. On-off compressor control
 - b. Line voltage and control voltage thermostats
 - c. Pump-down controls
 - d. Defrost controls
 - e. Fan cycling
 - f. Oil protection controls
 - g. Pumps and cooling tower controls
3. VOM and Ammeter
 - a. Testing for open circuits
 - b. Testing for short circuits
 - c. Testing for grounding conditions
 - d. Testing components

Laboratory or Activity Content

This lab course affords students an opportunity to get "hands on" experience/ training in the following.

1. Applied Electricity
 - 1.Circuits
 - 2.Measurement of voltage, resistance, current, capacitance
 - 3.Reading, drafting and interpreting various wiring diagrams
2. Circuits
 - 1.On-off compressor control
 - 2.Line voltage and control voltage thermostats
 - 3.Pump-down controls
 - 4.Defrost controls
 - 5.Fan cycling
 - 6.Oil protection controls
 - 7.Pumps and cooling tower controls
3. VOM and Ammeter
 - 1.Testing for open circuits
 - 2.Testing for short circuits
 - 3.Testing for grounding conditions
 - 4.Testing components

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises
Skills demonstrations

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Laboratory activities
Objective exams
Other (specify)
Projects
Problem-Solving Assignments
Quizzes

Other

Textbook Assignments
Discussion Participation

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Class discussions
 Demonstrations
 Lecture

Describe specific examples of the methods the instructor will use:

- Classroom lecture: including equipment demonstrations followed by the student actually performing these procedures and electrical troubleshooting, for air conditioning and refrigeration systems, in the lab.
- Frequent quizzes and practice problems, pertaining to electrical concepts and systems for air conditioning and refrigeration systems, are used to stimulate student discussion.
- Reading and answering questions from chapters in the textbook provides students with information pertaining to various electrical concepts, equipment and service procedures, used in the air conditioning and refrigeration field, and a means to check their comprehension of the information.
- Class discussions, including electrical problems encountered by students working in the air conditioning and refrigeration field and those doing projects in the lab, are encouraged.

Representative Course Assignments

Writing Assignments

Students complete written homework that consists of end-of-chapter questions and solving electrical problems, related to the air conditioning and refrigeration field, presented during the class.

Critical Thinking Assignments

Students will be assigned problems describing specific electrical conditions for various types of systems with the expectation of using logic and reasoning to identify if a fault exists and if one exists, formulate a plan to correct the fault.

Reading Assignments

Students are assigned chapters in the text and handouts provided by the instructor.

Electrical wiring diagrams, specific to certain air conditioning and refrigeration systems, are made available for students to acclimate them to actual field service work conditions.

Skills Demonstrations

Use a Volt-Ohm meter to isolate electrical faults on a refrigeration or air conditioning system.

Repair an electrical fault on a refrigeration or air conditioning system, once it has been discovered, by following a structured troubleshooting model.

Draw a wiring diagram for a basic air conditioning, heating or refrigeration system.

Outside Assignments

Representative Outside Assignments

Reading: Students are assigned chapters in the text and handouts provided by the instructor.

Electrical wiring diagrams, specific to certain air conditioning and refrigeration systems, are made available for students to acclimate them to actual field service work conditions.

Writing: Students complete written homework that consists of end-of-chapter questions and solving electrical problems, related to the air conditioning and refrigeration field, presented during the class.

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type

Textbook

Description

Carter Stanfield and David Skaves (2017). *AHRI Fundamentals of HVACR* (3rd). Saddle River Pearson. 9780134016

Primary Minimum Qualification

AIR COND/REFRIG/HEATING

Review and Approval Dates

Department Chair

09/04/2020

Dean

09/06/2020

Technical Review

10/14/2020

Curriculum Committee

10/14/2020

Curriculum Committee

12/09/2020

CCCCO

MM/DD/YYYY

Control Number

CCC000166657

DOE/accreditation approval date

MM/DD/YYYY