GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: HVAC 202 DIVISION: 50 ALSO LISTED AS:

TERM EFFECTIVE: Fall 2023 CURRICULUM APPROVAL DATE: 11/14/2023

SHORT TITLE: BASIC REFRIGERATION

LONG TITLE: Basic Refrigeration

Units	Number of Weeks	Type	Contact Hours/Week	Total Contact Hours
4	18	Lecture:	3	54
		Lab:	3	54
		Other:	0	0
		Total:	6	108

Out of Class Hrs: 108.00
Total Learning Hrs: 216.00

COURSE DESCRIPTION:

Students will study concepts of the vapor compression refrigeration system. The course includes both the theory and practice applicable to the mechanical function of air conditioning and refrigeration systems. The student will learn the major components and accessories of the sealed system including metering devices, evaporators, compressors and condensers. The practices for oxy-acetylene torch safety are emphasized along with different techniques for connecting tubing such as brazing and soldering copper refrigerant lines and the proper procedures for cutting, bending, swaging and flaring.

PREREQUISITES:

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES
L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion
03 - Lecture/Laboratory
04 - Laboratory/Studio/Activity
04A - Laboratory - LEH 0.65
05 - Hybrid
71 - Dist. Ed Internet Simultaneous
72 - Dist. Ed Internet Delayed
73 - Dist. Ed Internet Delayed LAB
73A - Dist. Ed Internet LAB-LEH 0.65

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Demonstrate proper torch safety.
2. Evaluate, troubleshoot and repair a mechanical refrigeration system.
3. Select and install safety and control switches to a mechanical refrigeration system.
4. Evacuate, charge and test refrigerant.

COURSE OBJECTIVES:

By the end of this course, a student should:

1. Describe proper procedures for working with pressurized systems and vessels, electrical energy, heat, cold, rotating machinery, and chemicals; for moving heavy objects; and for utilizing proper ventilation.
2. Demonstrate the proper use of equipment used to install and service air-conditioning, heating, and refrigeration systems.
3. State two forms of energy important to the air-conditioning (heating and cooling) and refrigeration industry.
4. Identify and demonstrate the use of the two common gauges used in the air-conditioning, heating, and refrigeration industry.
5. List the different types of tubing used in heating, air-conditioning, and refrigeration applications.
6. Perform common ways of cutting, bending, soldering and brazing copper tubing.
7. Describe the basic refrigeration cycle.
8. Appraise refrigeration plant running conditions.
9. List and demonstrate some of the proper evacuation practices.
10. Choose a leak detector for a particular type of leak and demonstrate its use.

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 11/14/2023

LECTURE CONTENT:

6 Hours

Content: Hand Tools, Equipment and Safety

9 Hours

Content: Principles of Heat, Measurement of Heat, Measurement of Temperature, Measurement of Pressure, Measurement of Vacuum

12 Hours

Content: Brazing, Soldering, Pipe and Tube Fitting, Measurement of ACR Pipes and Tubing, Practical Use of Oxygen/Acetylene Torch, Pipe Bending, Flaring, Swaging

15 Hours

Content: Relationship between Temperature and Pressure, Mechanical Refrigeration Circuit, Compressors, Condensers, Evaporators, Metering Devices, Sight Glasses, Refrigerants, Safe Handling of Refrigerants, Types and Use of Refrigerants, Recovering and Recycling Refrigerants, Refrigeration Systems, Air Conditioning Systems, Medium Temperature Systems, Low Temperature Systems

10 Hours

Content: Controls and Safeties, Adjustment of Controls and Safety Switches, Calibration of Pressure Switches, Troubleshooting and Refrigerant Charging Procedures, Measurement of Super Heat, Measurement of Sub Cooling, Evaporator Temperature Splits, Condenser Temperature Splits

2 Hours

Final Exam

LAB CONTENT:

6 Hours

Content: Use of Hand Tools, Equipment and Safety

9 Hours

Content: Principles of Heat, Measurement of Heat, Measurement of Temperature, Measurement of Pressure, Measurement of Vacuum

12 Hours

Content: Brazing, Soldering, Pipe and Tube Fitting, Measurement of ACR Pipes and Tubing, Practical Use of Oxygen/Acetylene Torch, Pipe Bending, Flaring, Swaging

15 Hours

Content: Effects of Low Air Flow, Refrigeration Plant Running Conditions, Common Refrigeration Problems, Blockages, Overcharged Systems, Undercharged Systems, Troubleshooting

10 Hours

Content: Troubleshooting and Refrigerant Charging Procedures, Adjustment of Metering Devices for Acceptable Super Heat and Sub Cooling Measurements

2 Hours

Final Exam

METHODS OF INSTRUCTION:

Lecture, discussion, multi-media presentation, demonstration, guided practice.

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours 12

Assignment Description

Read corresponding information in Units 4 and 5 of textbook. Complete Review Questions at end of Units. Study for quizzes/examinations.

Required Outside Hours 18

Assignment Description

Read corresponding information in Units 1 and 2 of textbook. Complete Review Questions at end of Units. Study for quizzes/examinations. Homework: Worksheet on conversion calculations.

Required Outside Hours 24

Assignment Description

Read corresponding information in Units 7 and 8 of textbook. Complete Review Questions at end of Units. Study for quizzes/examinations.

Required Outside Hours 30

Assignment Description

Out of Class Assignments: Read corresponding information in Units 3 and 9 of textbook. Complete Review Questions at end of Units. Study for quizzes/examinations. Homework: Design, build, and test a refrigeration system. Perform various troubleshooting exercises.

Required Outside Hours 24

Assignment Description

Out of Class Assignments: Read corresponding information in Unit 8 of textbook. Complete Review Questions at end of Unit. Study for quizzes/examinations. Homework: Perform various troubleshooting exercises.

METHODS OF EVALUATION:

Writing assignments

Evaluation Percent 20

Evaluation Description

10% - 30% Homework, Lab Reports

Problem-solving assignments

Evaluation Percent 20

Evaluation Description

10% - 30% Lab Projects

Skill demonstrations

Evaluation Percent 20

Evaluation Description

20% - 40% Lab Projects/Troubleshooting

Objective examinations

Evaluation Percent 40

Evaluation Description

30% - 50% Quizzes/Examinations

REPRESENTATIVE TEXTBOOKS:

Refrigeration and Air Conditioning Technology, 9th Edition, Eugene Silberstein, Jason Obrzut, John Tomczyk, Bill Whitman, Bill Johnson, Cengage Learning, 2021 or a comparable textbook/material.

ISBN: 9780357702635

12th Grade Verified by: MS Word

Lab Manual for Refrigeration and Air Conditioning Technology, 9th Edition, Silberstein, Obrzut, Tomczyk, Whitman, Johnson, Cengage Learning, 2021 or a comparable textbook/material.

ISBN: 978-1305578708

12th Grade Verified by: MS Word

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Not Transferable

UC TRANSFER:

Not Transferable

SUPPLEMENTAL DATA:

Basic Skills: N

Classification: Y

Noncredit Category: Y

Cooperative Education:

Program Status: 1 Program Applicable

Special Class Status: N

CAN:

CAN Sequence:

CSU Crosswalk Course Department:

CSU Crosswalk Course Number:

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y

In-Service: N

Occupational Course: C

Maximum Hours:

Minimum Hours:

Course Control Number: CCC000587351

Sports/Physical Education Course: N

Taxonomy of Program: 094600