GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: HVAC 203 DIVISION: 50 ALSO LISTED AS:

TERM EFFECTIVE: Spring 2022 CURRICULUM APPROVAL DATE: 05/10/2022

SHORT TITLE: HEATING SYSTEMS

LONG TITLE: Heating Systems

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

COURSE DESCRIPTION:

This course will cover gas furnaces, electric furnaces and oil heat. The students will learn about split system applications and package unit applications. Mechanical and electrical safety will be covered as well as: types of gas and fuels used, function of controls, combustion efficiency tests, gas pressure adjustment, sequence of operation, limit switches, sequencers and proper ventilation. PREREQUISITE: HVAC 201 and HVAC 202 with a grade of "C" or better.

PREREQUISITES:

Completion of HVAC 201, as UG, with a grade of C or better.
AND Completion of HVAC 202, as UG, with a grade of C or better.

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. Measure gas pressure with a manometer.
2. Solve temperature rise and CFM calculations.
3. Perform a preventive maintenance on a furnace.
4. Troubleshoot the electrical portion of a furnace.

COURSE OBJECTIVES:

By the end of this course, a student should:

1. Describe various types of gas valves used on furnaces.
2. Describe various methods used to ignite the fuel in furnaces.
3. Explain the difference between conventional and high efficiency gas furnaces as they apply to their AFUE ratings.
4. Explain the operation of modulating and 2-stage furnaces.
5. Describe the configurations and parts of a gas-fired furnace.
6. Describe the characteristics of various gases used in furnaces.
7. Describe the products of combustion that are produced as a result of incomplete and complete combustion.
8. Explain and demonstrate the operation of controls and safeties on a gas furnace.
9. List types of electric heaters and state their uses.
10. Describe how sequencers operate in an electric forced-air furnace.
11. List various types of fuel oil and describe the characteristics associated with them.
12. Describe how fuel oil and air are prepared and mixed in the oil burner unit for combustion.
13. Perform basic tests in troubleshooting the gas components and electrical circuit of a gas furnace.
14. Perform basic tests in troubleshooting electrical problems in an electric forced-air furnace.

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

Curriculum Approval Date: 05/10/2022

LECTURE CONTENT:

17 Hours

Content: Gas Heat - Thermocouple Operation: How it works. What causes it to fail. Heat Anticipator Settings: What should they be set at. How to know the proper amperage setting. Sequence of Operation for a Gas Fired Furnace: What is a typical operation sequence. What is the first step in the operation sequence. Venting Requirements: Proper procedures and code requirements.

17 Hours

Content: Electric Heat - Sequencer Operation: How it works. What causes it to fail. How to test. Fusible Links: How they work. Their purpose. Why use them. Limit Switches: How it works. How to know if they are bad. How to test them. Heating Elements: How to know if they are bad. Cost. How long do they last. Sequence of Operation for Electric Heating Systems

18 Hours

Content: Oil Heat - CAD Cell: Cleaning and replacement. Combustion Efficiency: How to make them more efficient. Efficiency chart. Sequence of Operation for Oil Fired Furnaces: Step by step operation. How it works.

2 Hours

Final Exam

LAB CONTENT:

17 Hours

Content: Gas Heat: Operation of controls and safeties on a gas furnace. How a Thermocouple operates. How to know if it is bad. Heat Anticipator Settings, its function and how to adjust. Sequence of operation for a gas fired furnace. Venting Requirements: Proper procedures and code requirements. Preventive maintenance procedures.

17 Hours

Content: Electric Heat: Tracing the circuitry in a diagram of an electric forced-air furnace. Sequencer Operation: How it works. What causes it to fail. How to test. Fusible Links: How they work. Their purpose. Why use them. Limit Switches: How it works. How to know if they are bad. How to test them. Heating Elements: How to know if they are bad. Cost. How long do they last. Typical preventive maintenance procedures used in electric heating units and systems.

18 Hours

Content: Troubleshooting Gas and Electric Heat: Basic tests in troubleshooting the gas components and electrical circuit of a gas furnace. Basic tests in troubleshooting electrical problems in an electric forced-air furnace.

2 Hours

Final Exam.

METHODS OF INSTRUCTION:

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

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours: 34

Assignment Description: Read corresponding information in Unit 31 of textbook. Complete Review Questions at end of Unit. Study for quizzes/examinations. Homework: Troubleshoot a gas fired furnace. Complete the Service Technician Calls scenarios.

Required Outside Hours: 34

Assignment Description: Read corresponding information in Unit 30 of textbook. Complete Review Questions at end of Unit. Study for quizzes/examinations. Homework: Complete the Service Technician Calls scenarios.

Required Outside Hours: 34

Assignment Description: Read corresponding information in Unit 32 of textbook. Complete Review Questions at end of Unit. Study for quizzes/examinations. Homework: Complete the Service Technician Calls scenarios.

METHODS OF EVALUATION:

Writing assignments
Evaluation Percent 20
Evaluation Description
10% - 30% Homework, Lab Reports

Problem-solving assignments
Evaluation Percent 20
Evaluation Description
20% - 40% Lab Projects

Skill demonstrations
Evaluation Percent30
Evaluation Description
20% - 50% Lab Projects/Troubleshooting

Objective examinations
Evaluation Percent 30
Evaluation Description
20% - 40% Quizzes/Examinations

REPRESENTATIVE TEXTBOOKS:

Refrigeration and Air Conditioning Technology, 9th Edition, Eugene Silberstein, Jason Obrzut, John Tomczyk, Bill Whitman, Bill Johnson, Cengage Learning, 2021.
ISBN: 9780357122273
12th Grade Verified by: MS Word

Lab Manual for Refrigeration and Air Conditioning Technology, 9th Edition, Silberstein, Obrzut, Cengage Learning, 2021.
ISBN: 9781337399388
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:
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: CCC000587354
Sports/Physical Education Course: N
Taxonomy of Program: 094600