

**Course Outline**

**COURSE:** HVAC 203                      **DIVISION:** 50                      **ALSO LISTED AS:**

**TERM EFFECTIVE:** Spring 2018    **CURRICULUM APPROVAL DATE:** 10/23/2017

**SHORT TITLE:** HEATING SYSTEMS

**LONG TITLE:** Heating Systems

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

**STUDENT LEARNING OUTCOMES:**

1. Measure gas pressure with a manometer.

Measure of assessment: demonstration

Year assessed, or planned year of assessment: 2018

Semester: Fall

2. Solve temperature rise and CFM calculations.

Measure of assessment: exam, homework

Year assessed, or planned year of assessment: 2018

Semester: Fall

3. Perform a preventive maintenance on a furnace.

Measure of assessment: demonstration, homework, exam

Year assessed, or planned year of assessment: 2018

Semester: Fall

4. Troubleshoot the electrical portion of a furnace.

Measure of assessment: demonstration, exam

Year assessed, or planned year of assessment: 2018

Semester: Fall

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

Curriculum Approval Date: 10/23/2017

Lecture content:

17 Hours

Content: Gas Heat - Thermocouple Operation, Heat Anticipator Settings, Sequence of Operation for a Gas Fired Furnace, Venting Requirements

Student Performance Objectives: Describe various types of gas valves used on furnaces. Describe various methods used to ignite the fuel in furnaces. List and describe the operation of flame proving devices. Explain the difference between conventional and high efficiency gas furnaces as they apply to their AFUE ratings. Explain the operation of modulating and 2-stage furnaces. Describe the configurations and parts of a gas-fired furnace. Describe the characteristics of various gases used in furnaces. List three things that are required for combustion. Describe the products of combustion that are produced as a result of incomplete and complete combustion.

17 Hours

Content: Electric Heat - Sequencer Operation, Fusible Links, Limit Switches, Heating Elements, Sequence of Operation for Electric Heating Systems

Student Performance Objectives: Discuss the efficiency and relative operating costs of electric heat. List types of electric heaters and state their uses. Describe how sequencers operate in an electric forced-air furnace.

17 Hours

Content: Oil Heat - CAD Cell, Combustion Efficiency, Sequence of Operation for Oil Fired Furnaces

Student Performance Objectives: Describe various types of fuel oil. List and describe the characteristics associated with fuel oil. Describe different methods for storing fuel oil. Explain how oil tanks are sized. Explain the importance of periodic oil tank inspection. Describe how fuel oil and air are prepared and mixed in the oil burner unit for combustion. List products produced as a result of combustion of fuel oil. List the components of gun-type oil burners.

2 Hours

Final

Lab Content:

17 Hours

Content: Gas Heat

Student Performance Objectives: Explain and demonstrate the operation of controls and safeties on a gas furnace. Describe and demonstrate typical preventive maintenance procedures.

17 Hours

Content: Electric Heat

Student Performance Objectives: Trace the circuitry in a diagram of an electric forced-air furnace. Describe and demonstrate typical preventive maintenance procedures used in electric heating units and systems.

17 Hours

Content: Troubleshooting Gas and Electric Heat

Student Performance Objectives: Perform basic tests in troubleshooting the gas components and electrical circuit of a gas furnace. Perform basic tests in troubleshooting electrical problems in an electric forced-air furnace.

2 Hours

### **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

Percent of total grade: 20.00 %

Homework, Lab Reports

Problem-solving assignments

Percent of total grade: 20.00 %

Lab Projects

Skill demonstrations

Percent of total grade: 20.00 %

Lab Projects/Troubleshooting

Objective examinations

Percent of total grade: 40.00 %

Quizzes/Examinations

### **REPRESENTATIVE TEXTBOOKS:**

Required Representative Textbooks

John A. Tomczyk, Eugene Silberstein, William C. Whitman, William M. Johnson. Refrigeration and Air Conditioning Technology, 8th Edition. Boston, MA: Cengage Learning, 2017.

ISBN: 978-1-305-57829-6

Reading Level of Text, Grade: 12th Verified by: MS Word

Tomczyk, Silberstein, Whitman, Johnson. Lab Manual for Refrigeration and Air Conditioning Technology, 8th Edition. Boston, MA: Cengage Learning, 2017.

ISBN: 978-1305578708

**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: 6

Minimum Hours: 6

Course Control Number:

Sports/Physical Education Course: N

Taxonomy of Program: 094600