

APPT 146: SF 302 STEAM TECHNOLOGY

Foothill College Course Outline of Record

| Heading | Value |
|------------------------------------|--|
| Effective Term: | Summer 2023 |
| Units: | 7 |
| Hours: | 72 lecture, 36 laboratory per quarter (108 total per quarter) |
| Prerequisite: | Per California Code of Regulations, this course is limited to students admitted to the Steamfitting & Pipefitting Technology Apprenticeship Program. |
| Advisory: | Not open to students with credit in APPR 127. |
| Degree & Credit Status: | Degree-Applicable Credit Course |
| Foothill GE: | Non-GE |
| Transferable: | None |
| Grade Type: | Letter Grade (Request for Pass/No Pass) |
| Repeatability: | Not Repeatable |

Student Learning Outcomes

- A student will be able to differentiate between water tube and fire tube boiler.
- A student will be able to define relative humidity.
- A student will be able to define thermal efficiency.

Description

Basic properties and concepts of steam. Instruction on steam traps, installation techniques, and general operation. One-pipe systems are compared to two-pipe systems. Importance of steam piping, proper pipe sizing, expansion joints, and connections. Heat transfer devices and steam boilers are also discussed, with focus on types and proper installation and connection methods.

Course Objectives

The student will be able to:

1. Describe the properties of steam
2. Describe how steam works in a heating system
3. Review the use of the one-pipe heating system
4. Compare the operation of the two-pipe system to the one-pipe system
5. Distinguish between condensate pumps and boiler pumps
6. Describe the function of the pressuretrol
7. Explain the types and operation of steam traps in the heating system
8. Describe the importance of steam piping layout and pipe sizing and demonstrate the different types of expansion joints
9. Identify and compare the different types of heat transfer devices
10. Identify and differentiate among various types of steam boilers

Course Content

1. Describe the properties of steam
 - a. Describe steam and saturated steam
 - b. Interpret and use the steam table
2. Describe how steam works in a heating system
 - a. Explain how steam works
 - b. Illustrate the use of steam traps
3. Review the use of the one-pipe heating system
 - a. Recognize the different layouts of one-pipe heating systems
 - b. Identify the types of one-pipe heating systems
4. Compare the operation of the two-pipe system to the one-pipe system
 - a. Differentiate between the one-pipe and two-pipe system
 - b. Describe the operation of the two-pipe system
5. Distinguish between condensate pumps and boiler pumps
 - a. Demonstrate the function of condensate pumps
 - b. Explain the importance of boiler pumps
6. Describe the function of the pressuretrol
 - a. Explain the function of pressuretrols
 - b. Describe the relationship of pressuretrols to boiler operation
7. Explain the types and operation of steam traps in the heating system
 - a. Describe the types and functions of steam traps
 - b. Perform the installation of steam traps
8. Describe the importance of steam piping layout and pipe sizing and demonstrate the different types of expansion joints
 - a. Describe the importance of pipe size and distribution
 - b. Demonstrate proper pipe installation
 - c. Differentiate between types of expansion joints
9. Identify and compare the different types of heat transfer devices
 - a. Identify common types of heat transfer units, controls and steam trapping
 - b. Determine the appropriate methods for installing convectors and coils
 - c. Identify unit heaters and proper mounting methods
10. Identify and differentiate among various types of steam boilers
 - a. Identify various types of steam boilers
 - b. Describe ASME code standards
 - c. Describe package boilers
 - d. Describe field-erected boilers

Lab Content

Students will work individually and in teams on a term project related to steam systems.

Special Facilities and/or Equipment

1. Laboratory with steam equipment and various electrical controls
2. When taught via Foothill Global Access, on-going access to computer with software and hardware capable of accessing email, learning management system, and video conferencing; email address

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

- Results of written exercises and final examination
- Satisfactory completion of hands-on projects

Maintenance of a student's workbook with questions drawn from text
Group and classroom participation

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture
Lab assignment
Group discussion
Demonstration

Representative Text(s) and Other Materials

International Pipe Trades Joint Training Committee, Inc.. Steam Systems. 2015.

Spriax Sarco. Design of Fluid Systems, Hook-ups. 2012.

Spriax Sarco. Design of Fluid Systems, Steam Utilization. 2006.

Although these textbooks are older than 5 years, are the most current books used when teaching this course. We will adopt the next edition of each text, as it is published.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

1. Readings from assigned textbook Steam Systems: Chapter 9
 - a. Unit 3 workbook lessons, Steam Piping
2. Writing assignments given in the laboratory
 - a. Quizzes from Steam Systems workbook lessons
 - b. Detail typical steam trap assembly write paper identifying each component

Discipline(s)

Steamfitting