

# APPT 195: HYDRONICS/ STEAM SYSTEMS/PUMPS

## Foothill College Course Outline of Record

Heading	Value
<b>Effective Term:</b>	Summer 2021
<b>Units:</b>	5
<b>Hours:</b>	37 lecture, 86 laboratory per quarter (123 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Plumbing & Pipefitting Apprenticeship Program.
<b>Degree &amp; Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

## Student Learning Outcomes

- A student will be able to identify risks associated with common process gases found in high purity piping installations.
- A student will be able to identify plastics used in high purity piping systems.
- A student will be able to describe water system passivation processes.

## Description

Basic concepts of various heating and cooling systems. Equipment selection, pipe sizing, proper installation methods are taught. One-pipe steam systems will be compared to two-pipe systems. Pump selection and application as well as service and repair.

## Course Objectives

The student will be able to:

- Describe principles of hydronic heating and cooling
- Identify types of hydronic systems
- Identify appropriate equipment and pipe sizes
- Describe the installation of equipment used
- Describe the properties of steam
- Describe how steam works in a heating system
- Compare the operation of the two-pipe system to the one-pipe system
- Identify the different types of heat transfer devices

## Course Content

- Describe principles of hydronic heating and cooling
  - Advantages of hydronic heating and cooling
  - Gravity circulation
  - Forced circulation
- Identify types of systems
  - Series loop
  - One-pipe
  - Two-pipe

C. Identify the appropriate equipment and pipe sizing for hydronic systems

- Equipment layout
- Pipe sizing
- Compression tank sizing
- Air separator sizing
- Triple duty valves
- Suction diffusers

D. Describe the installation of the equipment used

- Pump installation techniques
- Compression tank
- Air separators
- Make-up water lines

E. Describe the properties of steam

- Steam and saturated steam
- Interpret and use the steam table

F. Describe how steam works in a heating system

- Explain how steam works
- Illustrate the use of steam traps

G. Compare the operation of the two-pipe system to the one-pipe system

- Differentiate between the one and two-pipe systems
- Describe the operation of the two-pipe system

H. Identify and compare the different types of heat transfer devices

- Identify common types of heat transfer units, controls and steam trapping
- Determine the appropriate methods for installing convectors and coils
- Identify unit heaters and proper mounting methods

## Lab Content

Students will work individually and in teams on term project related to the operation, testing and repair of hydronic and steam systems.

## Special Facilities and/or Equipment

Laboratory with hydronics and steam equipment.

## Method(s) of Evaluation

Results of written exercises and final examination  
Satisfactory completion of hand on projects  
Maintenance of a student workbook with questions drawn from text  
Group and classroom participation

## Method(s) of Instruction

Lecture  
Lab assignment  
Group discussion  
Demonstration

## Representative Text(s) and Other Materials

International Pipe Trades Joint Training Committee, Inc.. [Hydronics Heating and Cooling for United Association Journeyworkers & Apprentices](#). 2000.

International Pipe Trades Joint Training Committee, Inc.. [Pumps - for United Association Journeyworkers & Apprentices](#). 2000.

International Pipe Trades Joint Training Committee, Inc.. [Steam Systems](#). 2001.

Although one or more of these texts are older than the recommended 5 years they conform to national training standards and are considered seminal works in the discipline.

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

- A. Reading from assigned textbooks
- B. Written assignments given in the laboratory
- 1. Quizzes from workbook lessons

## **Discipline(s)**

Plumbing