

APPT 139A: PROCESS PIPING

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2023
Units:	3.5
Hours:	36 lecture, 18 laboratory per quarter (54 total per quarter)
Prerequisite:	Per California Code of Regulations, this course is limited to students admitted to the Plumbing/Steamfitting & Pipefitting Technology Apprenticeship Program.
Advisory:	Not open to students with credit in APPT 139.
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 describe water system passivation processes.
- A student will be able to identify plastics used in high purity piping systems.
- A student will be able to identify risks associated with common process gases found in high purity piping installations.

Description

Process piping and high purity water piping systems (HPW), including covering hazards associated with these installations. Presents water treatment and clean steam parameters for the pharmaceutical and biotech manufacturing industries. Covers pneumatic control systems, including the identification and installation of regulators and valves, pneumatic tubing, and use of air compressors and refrigerated air-dryers. Includes discussion of control systems. Hands-on experience with tube bending.

Course Objectives

The student will be able to:

1. Describe the characteristics of common process gasses used in high purity piping installations
2. Define basic principles of high purity water (HPW) production
3. Describe safe process piping HPW installation procedures
4. Identify basic components of a pneumatic control system
5. Demonstrate proper tube bending and installation techniques

Course Content

1. Describe the characteristics of common process gasses used in high purity piping installations

- a. Hazardous gasses and materials commonly used in high purity piping installations
 - b. Toxic Gas Ordinance (TGO) requirements
 - c. Hazardous material placards
 - d. Piping requirements
2. Define basic principles of high purity water (HPW) production
 - a. Characteristics of high purity water
 - b. Industries using high purity water
 - c. Purification stages
 - d. Reverse osmosis, ion exchange theory
 - e. Materials of construction
 3. Describe safe process piping HPW installation procedures
 - a. Safely working with and monitoring process gases
 - b. Plastics used in high purity piping systems
 - c. Proper handling, installation, and use of plastic piping in high purity water applications
 - d. Proper techniques of making joints of plastic pipe used in HPW applications
 - e. Properties of common metal alloys used in high purity piping systems
 - f. High purity standards for process gases and UPW installations
 - g. Describe validation procedures in a pharmaceutical process
 - h. Discuss regulations and standards related to the bio-pharmaceutical industry
 4. Identify and explain function of basic pneumatic control system components
 - a. Pressure regulating valves, control valves, relief valves
 - b. Compressor, refrigerated air dryers
 - c. Temperature controls
 - d. Pneumatic tubing and fittings
 5. Demonstrate proper tube bending and installation techniques
 - a. Proper fitting installation procedures (Swagelok)
 - b. General tube bending concepts
 - c. Tube bending procedures
 - d. The apprentice will get hands-on experience with tube bending

Lab Content

Students will work individually and in groups to practice various piping processes.

Special Facilities and/or Equipment

1. Laboratory with piping tools and materials.
2. When taught via Foothill Global Access, on-going access to computer with email software and hardware; 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

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

South Bay Piping Industry Labor/Management Trust. TGO-Toxic Gas Ordinance Data Book. 2014.

International Pipe Trades Joint Training Committee, Inc.. Water Supply. 2004.

Although these textbooks are older than 5 years, they conform to national training standards and are considered seminal works in the discipline. 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
2. Writing assignments given in the laboratory
 - a. Essay and exams on the importance of safety rules and regulations governing hazardous materials storage and handling

Discipline(s)

Plumbing