

APPT 159: RF 501 START, TEST & BALANCE; HVAC SYSTEMS

Foothill College Course Outline of Record

Heading	Value
Units:	4.5
Hours:	30 lecture, 78 laboratory per quarter (108 total per quarter)
Prerequisite:	Per California Code of Regulations, this course is limited to students admitted to the Air Conditioning & Refrigeration Technology Apprenticeship Program.
Advisory:	Not open to students with credit in APPR 149A.
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 define job specific submittals.
- A student will be able to describe the commissioning process.
- A student will be able to list special tools needed for start-up.

Description

Use of balancing instruments and devices for HVACR systems. The theory and operation of mechanical systems, equipment and testing instruments will be covered. This course stresses the necessity of comprehending the design and intent for the mechanical project, the proper use of testing apparatus and the production of professional reports.

Course Objectives

The student will be able to:

- Perform testing, balancing and adjusting procedures on HVACR systems and components.
- Explain properties of air and the use of psychometric charts.
- Describe air distribution systems and accessories.
- Start-up and perform initial test of air handling systems.
- Balance air distribution systems.
- Describe start-up and balancing procedures for hydronic systems.

Course Content

- Perform testing, balancing and adjusting procedures on HVACR systems and components
 - Procedures for testing pressure and temperature
 - Procedures for balancing air handling system and water pumping systems
 - Procedures for adjusting control equipment and devices
 - Start, test and balance reports

- Commissioning
- Explain properties of air and the use of psychometric charts
 - Properties of air
 - Dry-bulb temperature, wet-bulb temperature, Dew point temperature, relative humidity
 - Sensible heat, latent heat and the enthalpy of air
 - Humidity measuring devices
 - How a psychometric chart is read and used in working with air conditioning systems
- Describe air distribution systems and accessories
 - Dampers, grilles and diffusers
 - Terminal units
 - Velocity control/static pressure
 - Fans: types and theory
- Start-up and perform initial test of air handling systems
 - Applications of instruments for measuring air velocities
 - Plans/specifications/equipment data
 - Initial fan checks
 - Spot checks of air distribution
 - Fan speed adjustment/adjusting sheaves, pulleys and belts
- Balance air distribution systems
 - Measuring air velocities at outlets and terminal units
 - Process of adjusting air flow
 - Multizone units and variable air volume systems
- Describe start-up and balancing procedures for hydronic systems
 - Applications of pressure and flow measuring devices
 - Differential pressure gauges/annular flow indicator
 - Calibrated balancing valves
 - Centrifugal pumps: types and theory

Lab Content

Students will work individually and in teams on measuring and testing air handling and hydronic systems.

Special Facilities and/or Equipment

Laboratory with HVACR testing instruments.

Method(s) of Evaluation

- Results of written quizzes and final exam
- Results of projects and class participation
- Workbook of student's daily activities

Method(s) of Instruction

- Lecture
- Lab Assignment
- Group Discussion
- Demonstration

Representative Text(s) and Other Materials

International Pipe Trades Joint Training Committee. Start, Test & Balance. Upper Marlboro, MD: International Pipe Trades Training Committee Inc., 2014.

Note: 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

A. Weekly readings from textbook:

1. Example: read chapter 3, "Properties of Air and The Psychometric Chart," answer study questions using psychometric chart

B. Writing assignments given in the laboratory:

1. Create Excel spreadsheet and record required test data measurements needed for start-up of an air handling system

2. Write a start-up report for an air conditioning system

Discipline(s)

Air Conditioning, Refrigeration, Heating