

# APSM 159C: TESTING ADJUSTING & BALANCING OF HVAC SYSTEMS

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2022
Units:	2
Hours:	28 lecture, 12 laboratory per quarter (40 total per quarter)
Prerequisite:	Per California Code of Regulations, this course is limited to students admitted to the Sheet Metal Apprenticeship Program.
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 successful student will be able to define common HVAC proportional balancing terms.
- A successful student will be able to perform a proportion balance on a single zone constant volume HVAC system.

## Description

Students will continue to explore methods of testing, adjusting and balancing HVAC systems. More complex systems will be explored, using applicable measuring equipment. Written reports will be produced.

## Course Objectives

The student will be able to:

- Define common proportion balancing terms
- Calculate ratio of tolerance
- Calculate percentage of design
- Determine the key outlet
- Perform a proportion balance on classroom simulator
- Perform a proportion balance on a single zone constant volume HVAC system
- Perform a proportion balance on a VAV zone branch
- Perform a proportion balance on a hydronics water board

## Course Content

- Define common proportion balancing terms
  - Define design flow rates from a mechanical drawing and schedule (Lec)
  - Define actual flow rate (Lec)
  - Define design tolerance (Lec)
- Calculate ratio of tolerance (Lec and Lab)

- Calculate percentage of design
  - Calculate percentage of design for system totals (Lec and Lab)
  - Calculate percentage of design for individual outlets (Lec and Lab)
- Determine the key outlet
  - Determine key outlet using percentage of design
- Perform a proportion balance on classroom simulator (Lec and Lab)
- Perform a proportion balance on a single zone constant volume HVAC system (Lec and Lab)
- Perform a proportion balance on a VAV zone branch (Lec and Lab)
- Perform a proportion balance on a hydronics water board
  - Determine flow through a calibrated balance valve (Lec and Lab)
  - Perform a proportion balance on a hydronics water board in lab (Lec and Lab)

## Lab Content

- In the TAB lab, demonstrate the proper use of a flow hood to proportion the supply air outlets on the low pressure air handler

## Special Facilities and/or Equipment

- Laboratory with sheet metal service tools
- Personal protective equipment
- 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 quizzes and tests
- Responses in class discussions
- Comprehensive written final examination
- Comprehensive final project
- Demonstration of assigned skills to acceptable level per instructor

## Method(s) of Instruction

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

- Lecture
- Discussion
- Demonstration
- Lab assignments followed by discussion

## Representative Text(s) and Other Materials

International Training Institute for the Sheet Metal and Air Conditioning Industry. Testing, Adjusting & Balancing of Environment Systems. 2003.

Auvil, Ronnie J.. HVAC Controls Systems, 4th ed.. 2017.

These are the standard sheet metal textbooks/workbooks used for this course. Although one or more may not be within five years of the required published date, they are the most current books used when teaching this course.

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

- a. Sample reading assignment: From the Testing, Adjusting & Balancing of Environment Systems textbook, Unit 19, "Methods of Balancing"
- b. Sample writing assignment: Provide written definitions for the following terms: proportional balancing, tolerance, ratio of tolerance

## **Discipline(s)**

Sheet Metal or Air Conditioning, Refrigeration, Heating