

APSM 176C: CLEAN ROOMS & HEPA FILTER TESTING

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 describe the function and design components to make a "Clean Room".
- A successful student will be able to properly perform a HEPA filter challenge to industry standards.

Description

Students will describe the purpose of a cleanroom and the function of HEPA and ULPA filters. Students will perform HEPA filter challenge and cleanroom performance testing to industry standards.

Course Objectives

The student will be able to:

1. Describe the history of clean room development
2. Describe the function and design components to make a "clean room"
3. Define HEPA and ULPA filters
4. Describe clean room classifications
5. Describe equipment needed to perform clean room performance testing
6. Properly perform a clean room performance test to industry standards
7. Describe equipment needed to perform HEPA filter challenge testing
8. Properly perform a HEPA filter challenge to industry standards

Course Content

1. Describe the history of clean room development
 - a. Define the purpose and uses of clean rooms and clean environments (Lec)
 - b. Describe the components required in a clean room (Lec)
 - c. Discuss the history of clean room development from the Manhattan Project to Silicon Valley (Lec)

2. Describe the function and design components to make a "clean room" (Lec)
3. Define HEPA and ULPA filters
 - a. Describe what is measured by HEPA and ULPA filter specifications (Lec)
4. Describe clean room classifications
 - a. Describe the Federal Standard 209E clean room classifications (Lec)
 - b. Describe the ISO 14644 clean room classifications (Lec)
5. Describe what is measured in clean room performance testing
 - a. Identify testing equipment needed to perform clean room performance testing (Lec and Lab)
 - b. Demonstrate the use of a laser particle counter (Lec and Lab)
6. Properly perform a clean room performance test to industry standards
 - a. Perform a clean room performance test to FS209E standards (Lab)
 - b. Perform a clean room performance test to ISO14644 standards (Lab)
7. Describe equipment needed to perform HEPA filter challenge testing
 - a. Identify the testing equipment needed to perform a HEPA filter challenge (Lec and Lab)
 - b. Describe the operation of an aerosol generator (Lec and Lab)
 - c. Describe the operation of a photometer (Lec and Lab)
8. Properly perform a HEPA filter challenge to industry standards
 - a. Perform an upstream filter integrity challenge (Lab)
 - b. Perform a downstream filter integrity challenge (Lab)

Lab Content

1. Demonstrate the use of a laser particle counter
2. Perform a clean room performance test to ISO14644 standards
3. Perform a downstream filter integrity challenge

Special Facilities and/or Equipment

1. Laboratory with sheet metal test and balance tools and sample system components
2. Personal protective equipment
3. 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
 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

United States General Services Agency. Federal Standard 209E Airborne Particulate Cleanliness Classes in Cleanrooms and Clean Zones. 1992.

International Organization for Standardization (ISO) Standards. International Standards for Cleanrooms and Associated Controlled Environments. ISO 14644-1 Part 1: Classification of Air Cleanliness; and ISO 14644-2 Part 2: Specifications for Testing and Monitoring to Prove Continued Compliance with ISO 14644-1. 2015.

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

1. Sample reading assignment: From the textbook, assigned sections regarding clean rooms
2. Sample writing assignment: Define HEPA and ULPA filter specifications

Discipline(s)

Sheet Metal