**Foothill College**

**Credit Program Narrative**

**Associate in Science in Test, Adjust and Balancing (TAB) Technician**

**Item 1. Program Goals and Objectives**

Test, Adjust and Balancing (TAB) Technician is a registered apprenticeship program offered in partnership with Sheet Metal Local 104 and Bay Area Training Fund. It provides students with both in-class instruction and paid on-the-job training with the technical aspects of heating, ventilating and air conditioning (HVAC) systems and duct systems for energy efficiency in the construction industry. The program also prepares students to take the Test and Balance Certification from International Certification Board (ICB). The program goals and objectives are to offer a solid career opportunity with livable wages along with retirement and health benefits and provide a highly trained and skilled workforce for students/apprentices in the HVAC industry.

Program Learning Outcomes:

* Students will be able to read plans and equipment performance data to determine the system design.
* Students will be able to measure airflow in HVAC systems using various instruments.
* Students will be able to adjust airflow values to achieve specified pressure differentials.
* Students will be able to make adjustment to system component for optimum efficient performance.
* Students will be able to prepare an IAQ report.
* Students will be able to perform room pressure differential readings.
* Students will be able to perform HEPA filter changes to industry standards.

**Item 2. Catalog Description**

Test, Adjust and Balancing (TAB) Technician is a registered apprenticeship program offered in partnership with Sheet Metal Local 104 and Bay Area Training Fund. It provides students with both in-class instruction and paid on-the-job training with the technical aspects of heating, ventilating and air conditioning (HVAC) systems and duct systems for energy efficiency in the construction industry. The program also prepares students to take the Test and Balance Certification from International Certification Board (ICB). The program goals and objectives are to offer a solid career opportunity with livable wages along with retirement and health benefits and provide a highly trained and skilled workforce for students/apprentices in the HVAC industry.

Program Learning Outcomes:

* Students will be able to read plans and equipment performance data to determine the system design.
* Students will be able to measure airflow in HVAC systems using various instruments.
* Students will be able to adjust airflow values to achieve specified pressure differentials.
* Students will be able to make adjustment to system component for optimum efficient performance.
* Students will be able to prepare an IAQ report.
* Students will be able to perform room pressure differential readings.
* Students will be able to perform HEPA filter changes to industry standards.

Per California Code of Regulations, this program is limited to students admitted to the Sheet Metal Local 104 & Bay Area Industry Training Fund’s Test, Adjust, and Balancing (TAB) Technician program.

Upon completion of the program, students will be eligible to receive a Certificate of Achievement in Test, Adjust and Balancing (TAB) Technician from Foothill College, an Apprenticeship Completion Certificate from the California Division of Apprenticeship Standards (DAS), and a Test and Balance Certification from International Certification Board (ICB). Career opportunities include, but are not limited to: Test, Adjust and Air Balancing technician; TABB certified supervisor; service technician; Leadership in Energy and Environmental Design (LEED) inspector; sheet metal fabricator; compliance tester; entrepreneur; HVAC educator; business agent; and training coordinator.

**Item 3. Program Requirements**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirements** | **Course #** | **Title** | **Units** | **Sequence** |
| Core Courses (70 units) | APSM 155B | Air Distribution & Efficient Duct Design | 2.5 | Year 5, Spring |
| APSM 157B | HVAC Energy Codes & Standards | 2.5 | Year 5, Fall |
| APSM 158A  | Introduction to Direct Digital HVAC Controls | 2 | Year 5, Fall  |
| APSM 171A | HVAC Trade History & Introduction to Testing, Adjusting & Balancing | 3 | Year 1, Fall |
| APSM 171B | Basics of Airflow, Heat Energy & Heat Transfer | 2.5 | Year 1, Winter |
| APSM 171C | Safety Training for TAB Apprenticeship | 2.5 | Year 1, Fall  |
| APSM 172A | Basic HVAC Systems, Psychrometrics, Air Pressures & Measurements of Air | 2.5 | Year 1, Winter |
| APSM 172B | Proportional Balancing | 2 | Year 1, Spring |
| APSM 172C | Duct Leakage Testing | 2 | Year 3, Winter |
| APSM 173A | Electrical Fundamentals, Electric Motors & Rotational Measurements | 2.5 | Year 1, Spring |
| APSM 173B | Temperature Measurements, Duct Systems & Basic Controls | 2.5 | Year 2, Fall |
| APSM 173C | HVAC Fans, Fan Laws & V-Belt Drives | 2.5 | Year 2, Fall  |
| APSM 174A | Hydronic Systems, Pumps & Hydronic Balancing | 2.5 | Year 2, Winter |
| APSM 174B | Balancing Documentation, Cooling Towers & TAB Related Skills | 2 | Year 2, Winter |
| APSM 174C | Fire Life Safety Level 1 | 2.5 | Year 2, Spring |
| APSM 175A | TABB Technician Certification | 2 | Year 2, Spring |
| APSM 175B | DDC Controls & Programs | 2 | Year 3, Spring |
| APSM 175C | Fire Life Safety Level 2 | 2.5 | Year 3, Winter |
| APSM 176A | Plans & Specifications, Codes & Standards | 2.5 | Year 3, Fall  |
| APSM 176B | Basic Refrigeration & Brazing/Soldering | 2.5 | Year 3, Fall |
| APSM 176C | Clean Rooms & HEPA Filter Testing | 2 | Year 3, Spring |
| APSM 177A | Title 24 Mechanical Acceptance Testing | 2.5 | Year 4, Fall  |
| APSM 177B | Advanced DDC Controls/Commissioning of HVAC Systems | 2 | Year 4, Fall |
| APSM 177C | Energy Auditing | 2.5 | Year 4, Winter |
| APSM 178A | Indoor Air Quality | 2 | Year 4, Winter |
| APSM 178B | Green Construction & LEED Certification for HVAC | 2.5 | Year 4, Spring |
| APSM 178C | Foreman Training/Project Management for HVAC | 2.5 | Year 4, Spring |
| APSM 179A | Building & Cascading Pressures/Air Change Testing | 2 | Year 5, Winter |
| APSM 179B | Sound & Vibration in HVAC Systems | 2.5 | Year 5, Winter |
| APSM 179C | Biological Safety Cabinets/Laboratory Fume Hoods | 2 | Year 5, Spring |

**TOTAL UNITS: 70 units**

**Proposed Sequence:**

Year 1, Fall = 5.5                                                          Year 2, Fall = 5 - 10

Year 1, Winter = 5                                                        Year 2, Winter = 4.5

Year 1, Spring = 4.5                                                      Year 2, Spring = 4.5

Year 3, Fall = 5                                                              Year 4, Fall = 4.5

Year 3, Winter = 4.5                                                      Year 4, Winter = 4.5

Year 3, Spring = 4

Year 5, Fall = 4.5

Year 5, Winter = 4.5

Year 5, Spring = 4.5

**TOTAL UNITS: 70**

* English proficiency: ENGL 1A, 1AH, 1S & 1T, or equivalent.
* Mathematics proficiency: MATH 105, 180, or any MATH course approved for Foothill GE Area V.
* Communication & Analytical Thinking

A minimum of 90 units is required\*to include:

* Completion of one of the following general education patterns: Foothill General Education, CSU General Education Breadth Requirements or the Intersegmental General Education Transfer Curriculum (IGETC)
* Core courses (70 units)

\*Additional elective work may be necessary to meet the 90-unit minimum requirement for the associate degree.

**Note:** All courses pertaining to the major must be taken for a letter grade. In addition, a grade of “C” or better is required for all core courses used for the degree.

**Item 4. Master Planning**

The Certificate of Achievement in Test, Adjust and Balancing (TAB) Technician aligns with the Foothill College Mission statement well. As part of an approved Division of Apprenticeship Standards apprenticeship program, it serves 14 counties in Northern California and provides high level technical training to diverse students with different socio-economic backgrounds and ethnicities. The program provides students with livable wages along with retirement and health benefits for them and their families in the most prosperous state.

**Item 5. Enrollment and Completer Projections**

Currently, there are 80 students enrolled in the program. The retention rate for this program is between 90 to 95 percent because it offers students with employment opportunities. 9 students are projected to graduate in 2020-21. 70 students are project to graduate in 2025-2026.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Year 1 (FY 2018-19)** | **Year 2 (FY 2019-20)** |
| **Course #** | **Title** | **Annual Sections** | **Annual Enrollment** | **Annual Sections** | **Annual Enrollment** |
| APSM 155B | Air Distribution & Efficient Duct Design | 0 | 0 | 0 | 0 |
| APSM 157B | HVAC Energy Codes & Standards | 1 | 10 | 2 | 20 |
| APSM 158A | Introduction to Direct Digital HVAC Controls | 0 | 0 | 1 | 6 |
| APSM 171A | HVAC Trade History & Introduction to Testing, Adjusting & Balancing | 1 | 8 | 2 | 13 |
| APSM 171B | Basics of Airflow, Heat Energy & Heat Transfer | 1 | 10 | 1 | 11 |
| APSM 171C | Safety Training for TAB Apprenticeship | 0 | 0 | 3 | 26 |
| APSM 172A | Basic HVAC Systems, Psychrometrics, Air Pressures & Measurements of Air | 3 | 42 | 2 | 21 |
| APSM 172B | Proportional Balancing | 6 | 68 | 2 | 21 |
| APSM 172C | Duct Leakage Testing | 0 | 0 | 0 | 0 |
| APSM 173A | Electrical Fundamentals, Electric Motors & Rotational Measurements | 1 | 13 | 1 | 9 |
| APSM 173B | Temperature Measurements, Duct Systems & Basic Controls | 0 | 0 | 1 | 13 |
| APSM 173C | HVAC Fans, Fan Laws & V-Belt Drives | 0 | 0 | 2 | 22 |
| APSM 174A | Hydronic Systems, Pumps & Hydronic Balancing | 1 | 5 | 1 | 13 |
| APSM 174B | Balancing Documentation, Cooling Towers & TAB Related Skills | 1 | 5 | 0 | 0 |
| APSM 174C | Fire Life Safety Level 1 | 1 | 5 | 1 | 13 |
| APSM 175A | TABB Technician Certification | 10 | 130 | 10 | 130 |
| APSM 175B | DDC Controls & Programs | 1 | 10 | 1 | 13 |
| APSM 175C | Fire Life Safety Level 2 | 1 | 10 | 1 | 5 |
| APSM 176A | Plans & Specifications, Codes & Standards | 1 | 7 | 1 | 10 |
| APSM 176B | Basic Refrigeration & Brazing/Soldering | 1 | 7 | 1 | 10 |
| APSM 176C | Clean Room & HEPA Filter Testing | 1 | 7 | 1 | 10 |

**Item 6. Place of Program in Curriculum/Similar Programs**

The Certificate of Achievement in Test, Adjust and Balancing (TAB) Technician is an addition to our existing CTE programs and registered apprenticeship programs.

**Item 7. Similar Programs at Other Colleges in Service Area**

According to the labor market report provided by SF Center of Excellence, five colleges in the Bay Region issued 17 awards on TOP Code 0946.10 - Energy Systems Technology, with nine of these in the Silicon Valley Sub-Region. However, our program is unique because it provides comprehensive in-class instruction and paid on-the-job training. In addition, Test, Adjust and Balancing (TAB) Technician is a registered apprenticeship program that is offered in partnership with Sheet Metal Local 104 and Bay Area Training Fund.

**Additional Information Required for State Submission:**

**TOP Code:** 0946.10- Energy Systems Technology

**Annual Completers:**12-18

**Net Annual Labor Demand:** 1039

**Faculty Workload:** 3 full-time and 6 part-time for 5th year students

**New Faculty Positions:** 0

**New Equipment:** 0

**New/Remodeled Facilities*:*** 0

**Library Acquisitions:** 0

**Gainful Employment:** *Yes*

**Program Review Date:**December 2023

**Distance Education:** 0%

**ATTACH THE FOLLOWING** (Apprenticeship only)**:**

1. **Labor Market Information and Analysis**
2. **Approval Letter from the California Division of Apprenticeship Standards (DAS)**