



# MANUFACTURING PRE-APPRENTICESHIP



## The Pennsylvania College of Technology Advanced Manufacturing Pre-Apprenticeship (AMP) program

is designed to increase awareness of employment opportunities in manufacturing and expand the number of students choosing manufacturing-related career pathways. The program, which runs four months during the school year and targets students in grades 10-12, prepares individuals with the foundational skills required to enter a variety of manufacturing occupations. With its alignment to multiple registered apprenticeship programs, this model provides benefits to both the Pre-Apprentices and companies who may ultimately employ them. Pre-Apprentices who successfully complete the program will earn an industry-recognized certification in addition to a certificate of completion from the College.

### Foundation for Career Exploration

The Pre-Apprenticeship program is specifically designed to integrate with every school's career development or technical curriculum. For schools providing little to no instruction in manufacturing technology, AMP can provide the foundation for students to explore the technical topics in manufacturing. For schools offering technical or career pathways education that include manufacturing or engineering, AMP enhances the existing curriculum. The foundational principles taught create opportunities for any school with either curricular focus to participate in the AMP program.



## The Pennsylvania College of Technology Pre-Apprenticeship Model



Self-paced online learning modules



Industry-recognized MT1 Certification



Industry-provided project templates



Multiple on-campus lab and assessment days



Project showcase and industry networking event

## 1. Shop Essentials (Applied Mathematics)

- 1.1 Mathematics
  - ◇ Perform calculations involving addition
  - ◇ Perform calculations involving subtraction
  - ◇ Perform calculations involving multiplication
  - ◇ Perform calculations involving division
- 1.2 System of Measurement
  - ◇ Perform calculations involving common English units
  - ◇ Perform calculations involving metric units
  - ◇ Perform conversions between the two systems
- 1.3 Fractions and Decimals
  - ◇ Perform calculations involving fractions
  - ◇ Perform calculations involving decimals
  - ◇ Perform conversions between the two types

## 2. Safety

- 2.1 Safely assembling components
  - ◇ Describe best practices for safely assembling components
  - ◇ Describe proper ergonomics and use of personal protective equipment
- 2.2 Intro to OSHA
  - ◇ A basic awareness of standards, rights, and responsibilities for workplace safety and keeping the workplace legally compliant
- 2.3 OSHA Regulations (PPE)
  - ◇ Regulations for personal protective equipment (PPE)
  - ◇ Impact on day-to-day operations in the workplace
- 2.4 OSHA Regulations (Lockout/Tagout)
  - ◇ Describe OSHA regulations regarding lockout/tagout procedures
  - ◇ Describe OSHA regulations regarding energy isolation
  - ◇ Describe the impact on day-to-day operations in the workplace
- 2.5 OSHA Regulations (Hazardous Materials)
  - ◇ Describe OSHA regulations regarding hazardous materials
  - ◇ Describe Safety Data Sheets (SDS) and how they impact day-to-day operations in the workplace
- 2.6 Fires and Safety
  - ◇ Describe OSHA regulations regarding fire safety and how they impact day-to-day operations in the workplace
- 2.7 Bloodborne Pathogens

- ◇ Describe OSHA regulations regarding bloodborne pathogens and how they impact day-to-day operations in the workplace
- 2.8 Hand and Power Tools
  - ◇ Describe the safe use of hand and power tools used on the job

## 3. Quality

- 3.1 Quality Overview
  - ◇ Describe the importance of quality throughout different departments of an organization
  - ◇ Describe the use of different quality management systems and tools in manufacturing processes and products

## 4. Lean

- 4.1 5S Principles (Sort, Set in Order, Sweep, Standardize, Sustain)
  - ◇ Restate terms associated with 5S principles
  - ◇ Restate examples for each term specific to the person's working environment
- 4.2 Lean Manufacturing Overview
  - ◇ Understand the principles and terminology of lean
  - ◇ Describe the seven forms of waste, value-added, push and pull systems, and the importance of continuous improvement

## 5. Inspection

- 5.1 Inspection Instruments and Gages
  - ◇ Describe the use and care of common inspection instruments and gages used in the shop
- 5.2 Part Tolerancing
  - ◇ Describe common methods used for part tolerancing
  - ◇ Describe the impact that tolerances have on part production and quality
- 5.3 Assembly Print
  - ◇ Read an assembly print with an exploded view describe how key assemblies of the component are joined
- 5.4 Troubleshooting
  - ◇ Understand various methods and tools used to troubleshoot problems
  - ◇ Describe tools that are used to collect and interpret data including check sheets, fishbone diagrams, and Pareto charts
  - ◇ Understand the 5 Why technique, brainstorming, documentation, and troubleshooting teams which are common methods of gathering troubleshooting data

## 6. Fasteners

- 6.1 Identify common assembly and late-stage processes that take place in industrial facilities
- 6.2 Assembling Components
  - ◇ Describe best practices for safely assembling components, including proper ergonomics and use of personal protective equipment
- 6.3 Tools for threaded fasteners
  - ◇ Identify different types of tools used with threaded fasteners
  - ◇ Identify the advantages and disadvantages of the different types of tools
  - ◇ Identify factors that go into selecting a tool for a threaded fastener application

## 7. CNC

- 7.1 CNC machine tools and controls
  - ◇ Describe common components of CNC machine tools and controls

## 8. Robotics

- 8.1 Industrial robots
  - ◇ Describe the basics of industrial robotics, including types, applications, and programming methods and safety protocols.
  - ◇ Identify different ways to prevent robot accidents
  - ◇ Describe the different kinds of safeguarding systems that protect employees from injury when working with robots

## 9. Additive Manufacturing

- 9.1 Overview of AM
  - ◇ Identify the basic steps, methods, processes, and materials
  - ◇ Identify the advantages and disadvantages of AM
  - ◇ Identify uses of AM

In addition to studying technical concepts related to manufacturing, pre-apprentices will attend in-person, hands-on labs. The labs will give pre-apprentices the opportunity to practice the following skills:

- ◇ Blueprint Reading
- ◇ Measurement
- ◇ Basic Electricity
- ◇ Simple Machines
- ◇ Mechanical Processes
- ◇ Robotics

[pct.edu/workforce](http://pct.edu/workforce)

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*Penn College operates on a nondiscriminatory basis.*

**Penn College is approved by the PA Department of Labor & Industry as a sponsor of apprenticeship programs.**