

Manufacturing Career Cluster

The Manufacturing career cluster focuses on planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and process engineering. This career cluster includes occupations ranging from Welder and Machinist to Industrial Engineering Technician, and Semi-Conductor Processing Technician.

Statewide Program of Study: Industrial Maintenance

The Industrial Maintenance program of study focuses on occupational and educational opportunities associated with maintaining and repairing manufacturing equipment and facilities. This program of study includes exploration of facility systems including electrical, welding, hydraulic, plumbing, heating, and air conditioning.



Secondary Courses for High School Credit

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| Level 1 | <ul style="list-style-type: none"> • Introduction to Welding • Principles of Manufacturing • Small Engine Technology I |
| Level 2 | <ul style="list-style-type: none"> • Construction Technology I • Electrical Technology I • Heating, Ventilation, and Air Conditioning (HVAC) and Refrigeration Technology I • Industrial Maintenance (TBD) |
| Level 3 | <ul style="list-style-type: none"> • Basic Fluid Power • Mechanical Maintenance (TBD) |
| Level 4 | <ul style="list-style-type: none"> • Practicum in Manufacturing • Practicum in Manufacturing + Extended Practicum in Manufacturing • Career Preparation for Programs of Study • Career Preparation for Programs of Study + Extended Career Preparation |

Aligned Advanced Academic Courses

Dual Credit	Dual credit offerings will vary by Local Education Agency.
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Students should be advised to consider these course opportunities to enrich their preparation. AP or IB courses not listed under the Secondary Courses for High School Credit section of this framework document do not count toward Completer status for this program of study.

Work-Based Learning and Expanded Learning Opportunities

Work-Based Learning Activities	<ul style="list-style-type: none"> • Shadow an equipment inspector at a power plant • Intern at a local manufacturing company that makes hydraulics or automobiles
Expanded Learning Opportunities	<ul style="list-style-type: none"> • Tour a manufacturing facility • Participate in SkillsUSA

Industry-Based Certifications

- C-200 Certified Industry 4.0 Automation Systems Specialist I - 201 Electrical Systems I
- C-200 Certified Industry 4.0 Automation Systems Specialist I - 202 Electric Motor Control Systems I
- C-200 Certified Industry 4.0 Automation Systems Specialist I - 204 Motor Control Troubleshooting I
- Certified Technician-Supply Chain Automation (CT-SCA)
- Industrial Technology Maintenance (ITM) - Basic Mechanical Systems
- Industrial Technology Maintenance (ITM) - Basic Pneumatic Systems
- Industrial Technology Maintenance (ITM) - Electrical Systems
- Industrial Technology Maintenance (ITM) - Maintenance Operations
- NCCER Core
- NCCER Industrial Maintenance Mechanic Level I
- NCCER Industrial Maintenance Support Mechanic
- NCCER Industrial Millwright
- NCCER Millwright Level I
- NCCER Millwright Level II
- Refrigerant Handling (EPA 608)
- Certified Logistics Technician (CLT)
- Certified Production Technician (CPT) 4.0
- Employment Ready Certification - Air Conditioning
- Employment Ready Certification - Electrical
- Employment Ready Certification - Gas Heat
- Employment Ready Certification - Heat Pumps
- Employment Ready Certification - Light Commercial Air Conditioning
- HBI Pre-Apprenticeship Certificate Training (PACT), Core
- HBI Pre-Apprenticeship Certificate Training (PACT), Heating, Ventilation, and Air Conditioning
- Heating, Electrical, and Air Conditioning Technology (H.E.A.T.)
- NCCER Construction Technology Certification Level I
- NCCER Heating, Ventilation, Air Conditioning Level I
- NCCER Sheet Metal Level I
- NCCER Carpentry Level I
- NCCER Electrical Level I
- NCCER Electrical Level II
- NCCER Electronic System Technician Level I
- NCCER Electronic System Technician Level II



Postsecondary Opportunities



Apprenticeships

- Millwright Apprentice

Associate Degrees

- Industrial Technology
- Instrumentation Technology
- Industrial Mechanics and Maintenance Technology
- Building/Property Maintenance

Bachelor's Degrees

- Engineering/Industrial Management
- Industrial Engineering
- Industrial Technology
- Industrial Mechanics and Maintenance Technology

Master's, Doctoral, and Professional Degrees

- Engineering/Industrial Management
- Industrial Engineering
- Materials Engineering
- Manufacturing Engineering



Example Aligned Occupations

Electrician's Helpers

Median Wage: \$38,140
Annual Openings: 1,632
10-Year Growth: 20%

Millwrights

Median Wage: \$54,940
Annual Openings: 506
10-Year Growth: 17%

Industrial Engineers

Median Wage: \$100,000
Annual Openings: 1,898
10-Year Growth: 26%

Data Source: TexasWages, Texas Workforce Commission. Retrieved 3/8/2024.



For more information visit:

<https://tea.texas.gov/academics/college-career-and-military-prep/career-and-technical-education/programs-of-study-additional-resources>








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Statewide Program of Study: Industrial Maintenance

Course Information


Level 1

Course	Prerequisites Corequisites	Career Clusters
Introduction to Welding 13032250 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Algebra I Recommended Corequisites: None	 
Principles of Manufacturing* 13032200 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Algebra I or Geometry Recommended Corequisites: None	
Small Engine Technology I 13040000 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	 

Level 2

Course	Prerequisites Corequisites	Career Clusters
Construction Technology I 13005100 (2 credits)	Prerequisites: None Corequisites: None Recommended Prerequisites: Principles of Construction or Principles of Architecture Recommended Corequisites: None	 
Electrical Technology I 13005600 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Principles of Architecture or Principles of Construction Recommended Corequisites: None	  
Heating, Ventilation, and Air Conditioning (HVAC) and Refrigeration Technology I 13005800 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Principles of Architecture, Principles of Construction, or Construction Technology I Recommended Corequisites: None	 
Industrial Maintenance TBD (TBD credit)	Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: TBD Recommended Corequisites: TBD	

Level 3

Course	Prerequisites Corequisites	Career Clusters
Basic Fluid Power N1303683 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Algebra I, Geometry, and Solid-State Electronics Recommended Corequisites: None	
Mechanical Maintenance TBD (TBD credit)	Prerequisites: TBD Corequisites: TBD Recommended Prerequisites: TBD Recommended Corequisites: TBD	

* Indicates course is included in more than one program of study.

For additional information on the **Manufacturing** career cluster, contact cte@tea.texas.gov or visit <https://tea.texas.gov/cte>



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Course Information

Level 4

Course	Prerequisites Corequisites	Career Clusters
Practicum in Manufacturing First Time Taken: 13033000 (2 credits) Second Time Taken: 13033010 (2 credits)	Prerequisites: None Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	 
Practicum in Manufacturing + Extended Practicum in Manufacturing First Time Taken: 13033005 (3 credits) Second Time Taken: 13033015 (3 credits)	Prerequisites: None Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	 
Career Preparation for Programs of Study First Time Taken: 12701121 (2 credits)	Prerequisites: None Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	
Career Preparation for Programs of Study + Extended Career Preparation First Time Taken: 12701141 (3 credits)	Prerequisites: None Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	

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