

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: Manufacturing Technology

The Manufacturing Technology program of study focuses on occupational and educational opportunities associated with the development and use of automatic and computer-controlled machines, tools, and robots that perform work on metal or plastic. It includes exploration of a variety of machine tools that are used to produce precision parts and instruments. This program of study addresses how to modify parts to make or repair machine tools or maintain individual machines, and how to use hand-welding or flame-cutting equipment.

Secondary Courses for High School Credit

Level 1	- Principles of Manufacturing - Principles of Applied Engineering - Blueprint Reading for Manufacturing Applications
Level 2	- Diversified Manufacturing I - Occupational Safety and Environmental Technology I - Metal Fabrication and Machining I - Entrepreneurship I
Level 3	- Diversified Manufacturing II - Metal Fabrication and Machining II - Precision Metal Manufacturing I - Computer Integrated Manufacturing (PLTW)
Level 4	- Precision Metal Manufacturing II - Precision Metal Manufacturing II + Precision Metal Manufacturing II Lab - Practicum in Manufacturing - Practicum in Manufacturing + Extended Practicum in Manufacturing - Practicum in Entrepreneurship - Practicum in Entrepreneurship + Extended Practicum in Entrepreneurship - Career Preparation for Programs of Study - Career Preparation Programs of Study + Extended Career Preparation

Work-Based Learning and Expanded Learning Opportunities

Work-Based Learning Activities

- Shadow a metallurgist working at a refinery, steel mill, or aircraft manufacturing company
- Intern at a manufacturing plant using CNC machines

Expanded Learning Opportunities

- Tour a manufacturing facility
- Participate in SkillsUSA or TSA

Aligned Industry-Based Certifications

- AM Design and Prototyping
- Applied Industry 4.0
- Autodesk Certified Associate in CAM for 2.5 Axis Milling
- Autodesk Certified Associate in CAM for Turning
- Autodesk Certified Professional in CAM for 3 Axis Milling
- AWS D1.1 Structural Steel
- AWS SENSE Level 1: Entry Welder
- C-101 Certified 4.0 Associate I - Basic Operations
- C-103 Certified 4.0 Associate III - Robot System Operations
- CAM Milling I
- CAM Turning I
- Certified Logistics Technician (CLT)
- Certified Manufacturing Associate (CMfgA)
- Certified Process Control Technician Level 1
- Certified Process Control Technician Level 2
- Certified Process Control Technician Level 3
- Certified Production Technician (CPT) 4.0
- Certified SOLIDWORKS Professional (CSWA) - Additive Manufacturing
- Certified SOLIDWORKS Professional (CSWP) - CAM
- Certified Technician-Supply Chain Automation (CT-SCA)
- Classic Credential: CNC Lathe II
- Classic Credential: Diemaking II
- Classic Credential: Diemaking III
- Classic Credential: Drill Press II
- Classic Credential: EDM II (2-Axis Wire)
- Classic Credential: EDM II (Plunge)
- Classic Credential: Grinding II (Cylindrical)
- Classic Credential: Grinding II (Surface)
- Classic Credential: Job Planning, Benchmark & Layout
- Classic Credential: Milling II
- Classic Credential: Moldmaking II
- Classic Credential: Moldmaking III
- Classic Credential: Screw Machine Operations II (Multi-Spindle)
- Classic Credential: Screw Machine Operations II (Single Spindle)
- Classic Credential: Screw Machine Setup and Operations III (Multi-Spindle)
- Classic Credential: Turning I (Between Centers)
- Classic Credential: Turning I (Chuck)
- Classic Credential: Turning II (Between Centers)
- Classic Credential: Turning II (Chuck)
- CNC 5-Axis Mill Operations
- CNC Lathe Operations
- CNC Milling II
- CNC Turning II
- Core
- Electronic Control Systems
- Introduction to Mechatronics
- CNC Lathe Programming Setup and Operations
- Machining CNC Mill Operations
- Machining CNC Mill Programming Setup and Operations
- Machining Drill Press I
- Machining Grinding I
- Machining Measurement, Material, and Safety
- Machining Milling I
- Maintenance Technology
- Manufacturing Technology
- Precision Machining - Job Ready
- Welding - Job Ready
- Welding Level I



Example Postsecondary Opportunities

Associate Degrees

- Industrial Technology
- Instrumentation Technology
- Manufacturing Engineering Technology
- Machine Shop Technology

Bachelor's Degrees

- Engineering/Industrial Management
- Industrial Engineering
- Mechanical Engineering Technology
- Manufacturing Engineering

Master's, Doctoral, and Professional Degrees

- Mechanical Engineering
- Engineering/Industrial Management
- Industrial Engineering
- Engineering



Example Aligned Occupations

Machinists

Median Wage: \$49,608
Annual Openings: 2,098
10-Year Growth: 23%

Industrial Engineering Technologists and Technicians

Median Wage: \$60,026
Annual Openings: 462
10-Year Growth: 17%

Mechanical Engineers

Median Wage: \$103,189
Annual Openings: 1,455
10-Year Growth: 19%

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/m-manufacturing-technology-extendedpptx.pdf>



Manufacturing Career Cluster

Statewide Program of Study: Manufacturing Technology

Course Information

Level 1

Course	Prerequisites Corequisites	Career Clusters
Principles of Manufacturing* 13032200 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Algebra I or Geometry Recommended Corequisites: None	
Principles of Applied Engineering* 13036200 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	  
Blueprint Reading for Manufacturing Applications* N1303684 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Algebra I, Geometry, and Principles of Construction Recommended Corequisites: None	

Level 2

Course	Prerequisites Corequisites	Career Clusters
Diversified Manufacturing I* 13032650 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Algebra I Recommended Corequisites: None	
Occupational Safety and Environmental Technology I* N1303680 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Principles of Transportation Systems, Principles of Distribution and Logistics, or Principles of Manufacturing Recommended Corequisites: None	  
Metal Fabrication and Machining I 13032700 (2 credits)	Prerequisites: None Corequisites: None Recommended Prerequisites: Algebra I or Geometry Recommended Corequisites: None	
Entrepreneurship I 13011101 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Principles of Business, Marketing, and Finance Recommended Corequisites: None	         

Level 3

Course	Prerequisites Corequisites	Career Clusters
Diversified Manufacturing II 13032660 (1 credit)	Prerequisites: Diversified Manufacturing I Corequisites: None Recommended Prerequisites: Algebra I Recommended Corequisites: None	

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

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 3

Course	Prerequisites Corequisites	Career Clusters
Metal Fabrication and Machining II 13032800 (2 credits)	Prerequisites: Metal Fabrication and Machining I Corequisites: None Recommended Prerequisites: Geometry and Algebra II Recommended Corequisites: None	
Precision Metal Manufacturing I 13032500 (2 credits)	Prerequisites: None Corequisites: None Recommended Prerequisites: Principles of Manufacturing and completion of or concurrent enrollment in Algebra I or Geometry Recommended Corequisites: None	
Computer Integrated Manufacturing (PLTW) N1303748 (1 credit)	Prerequisites: None Corequisites: None Recommended Prerequisites: Introduction to Engineering Design Recommended Corequisites: College preparatory mathematics and science courses	

Level 4

Course	Prerequisites Corequisites	Career Clusters
Precision Metal Manufacturing II 13032600 (2 credits)	Prerequisites: Precision Metal Manufacturing I Corequisites: None Recommended Prerequisites: None Recommended Corequisites: Precision Metal Manufacturing II Lab	
Precision Metal Manufacturing II + Precision Metal Manufacturing II Lab 13032610 (3 credits)	Prerequisites: Precision Metal Manufacturing I Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	

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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	
Practicum in Entrepreneurship* First Time Taken: 13011111 (2 credits)	Prerequisites: None Corequisites: None Recommended Prerequisites: Entrepreneurship I and II, or successful completion of at least two courses in a CTE program of study Recommended Corequisites: None	
Practicum in Entrepreneurship + Extended Practicum in Entrepreneurship* First Time Taken: 13011121 (3 credits)	Prerequisites: None Corequisites: None Recommended Prerequisites: Entrepreneurship I and II, or successful completion of at least two courses in a CTE program of study Recommended Corequisites: None	
Career Preparation for Programs of Study* First Time Taken: 12701121 (2 credits)	Prerequisites: At least one Level 2 or higher CTE course Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	
Career Preparation for Programs of Study + Extended Career Preparation* First Time Taken: 12701141 (3 credits)	Prerequisites: At least one Level 2 or higher CTE course Corequisites: None Recommended Prerequisites: None Recommended Corequisites: None	

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