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
- Occupational Safety and Environmental Technology II
- Metal Fabrication and Machining II
- Precision Metal Manufacturing I
- Computer Integrated Manufacturing (PLTW)

Level 4
- Occupational Safety and Environmental Technology III
- 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

Aligned Advanced Academic Courses

Dual Credit	Dual credit offerings will vary by local education agency.

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 towards concentrator/completer status for this program of study.

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

- AWS D1.1 Structural Steel
- AWS SENSE Level I: Entry Welder
- C-101 Certified Industry 4.0 Associate - Basic Operations
- C-103 Certified Industry 4.0 Associate - Robot System Operations
- Certified Manufacturing Associate
- Certified Production Technician (CPT) 4.0
- Certified SOLIDWORKS Professional (CSWP) - Additive Manufacturing
- Certified SOLIDWORKS Professional (CSWP) – CAM
- CNC Lathe Operations
- CNC Lathe Set Up and Operations
- Machining CNC Mill Operations Level I
- Machining CNC Mill Programming Setup and Operations Level I
- Machining CNC Milling Skills Level II
- Machining CNC Turning Level II
- Machining Drill Press Level I
- Machining Grinding Level I
- Machining Measurement, Material, and Safety Level I
- Machining Milling Level I
- Manufacturing Technology
- NCCER Core
- NCCER Welding Level I
- Precision Machining - Job Ready
- Welding - Job Ready
- Certified Logistics Technician (CLT)
- Certified Technician-Supply Chain Automation (CT-SCA)

Successful completion of the Manufacturing Technology program of study will fulfill requirements of the Business and Industry endorsement.

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: $48,732
Annual Openings: 3,385
10-Year Growth: 23%

Industrial Engineering Technologists and Technicians
Median Wage: $62,096
Annual Openings: 787
10-Year Growth: 17%

Mechanical Engineers
Median Wage: $99,937
Annual Openings: 1,755
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/programs-of-study-additional-resources

Manufacturing Technology

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	

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.*

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

Manufacturing Career Cluster

Statewide Program of Study: Manufacturing Technology

Course Information

Level 3

Course	Prerequisites | Corequisites	Career Clusters
Occupational Safety and Environmental Technology II* N1303681 (1 credit)	**Prerequisites:** None **Corequisites:** None **Recommended Prerequisites:** Occupational Safety and Environmental Technology I **Recommended Corequisites:** None	
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:** Concurrently in college preparatory math and science and Engineering Design **Recommended Corequisites:** None	

Level 4

Course	Prerequisites | Corequisites	Career Clusters
Occupational Safety and Environmental Technology III N1303682 (2 credits)	**Prerequisites:** Occupational Safety and Environmental Technology I and Occupational Safety and Environmental Technology II **Corequisites:** None **Recommended Prerequisites:** Chemistry or Integrated Physics and Chemistry (IPC) **Recommended Corequisites:** None	
Precision Metal Manufacturing II 13032600 (2 credits)	**Prerequisites:** Precision Metal Manufacturing I **Corequisites:** None **Recommended Prerequisites:** None **Recommended Corequisites:** None	

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Manufacturing Career Cluster

Statewide Program of Study: Manufacturing Technology

Level 4

Course Information

Course	Prerequisites | Corequisites	Career Clusters
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	
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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Manufacturing Technology