ADVANCED MANUFACTURING AND MACHINERY MECHANICS

MANUFACTURING TECHNOLOGY

WELDING

Local Implementation Considerations:

Students completing two or more courses for two or more credits within a program of study earn concentrator status for Perkins V federal accountability reporting.

Proposed Indicator: Students finishing three or more courses for four or more credits with one course from level 3 or 4 within a program of study earn completer status for federal accountability reporting.

Texas Education Agency

## COURSES

**LEVEL 1**
- Principles of Manufacturing
- Occupational Safety and Environmental Technology I
- Principles of Applied Engineering

**LEVEL 2**
- Engineering Design and Presentation I
- Occupational Safety and Environmental Technology II
- Robotics I
- Manufacturing Engineering Technology I
- Programmable Logic Controller I (TBD)

**LEVEL 3**
- Manufacturing Engineering Technology II
- Robotics II
- Programmable Logic Controller II (TBD)

**LEVEL 4**
- Practicum in Manufacturing
- Practicum in Entrepreneurship (TBD)
- Career Preparation I

## POSTSECONDARY OPTIONS

| HIGH SCHOOL/ INDUSTRY CERTIFICATION | CERTIFICATE/ LICENSE* | ASSOCIATE'S DEGREE | BACHELOR'S DEGREE | MASTER'S/ DOCTORAL PROFESSIONAL DEGREE |
|---|---|---|---|---|
| FANUC Robot Operator 1 | Engineer, Professional | Electro- mechanical Engineering/ Technology | Electrical Engineering | |
| Mastercam Associate Level Certification | PMMI Mechatronics: Programmable Logic Controllers 1 | Robotics Technology/ Technician | Engineering, General | |
| NCCER Industrial Maintenance Mechanic | Certified Quality Technician | Instrumentation Technology/ Technician | Industrial Engineering | |
| NIMS Industrial Technology Maintenance - Maintenance Operations | Plant Maintenance Technologist | Industrial Mechanics and Maintenance Technology | Mechanical Engineering | |

Additional industry based certification information is available from the TEA CTE website.

For more information on postsecondary options for this program of study, visit TXCTE.org.

| OCCUPATIONS | MEDIAN WAGE | ANNUAL OPENINGS | % GROWTH |
|---|---|---|---|
| Electro-Mechanical Assemblers | $30,160 | 951 | 9% |
| Electro-Mechanical Technicians | $56,555 | 127 | 9% |
| Industrial Machinery Mechanics | $49,816 | 3,788 | 27% |

## WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

**Exploration Activities:**
Participate in SkillsUSA and local STEM events

**Work Based Learning Activities:**
Apprenticeship at a local business or industry
American Welding Society

The Advanced Manufacturing and Machinery Mechanics program of study focuses on the assembly, operation, maintenance, and repair of electromechanical equipment or devices. Students may work in a variety of mechanical fields, gaining knowledge and experience in robotics, refinery and pipeline systems, deep ocean exploration, or hazardous waste removal. CTE concentrators may work in a variety of fields of engineering.

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 manufacturing/process engineering.

Successful completion of the Advanced Manufacturing and Machinery Mechanics program of study will fulfill requirements of the Business and Industry Endorsement.

Approved Statewide Program of Study - September 2019

Texas Education Agency

# COURSE INFORMATION

| COURSE NAME | SERVICE ID | PREREQUISITES (PREQ) COREQUISITES (CREQ) | GRADE |
|---|---|---|---|
| Principles of Manufacturing | 13032200 (1 credit) | None | 9-12 |
| Occupational Safety and Environmental Technology I | N1303680 (1 credit) | None | 9-12 |
| Principles of Applied Engineering | 13036200 (1 credit) | None | 9-10 |
| Engineering Design and Presentation I | 13036500 (1 credit) | PREQ: Algebra I | 10-12 |
| Occupational Safety and Environmental Technology II | N1303681 (1 credit) | None | 9-12 |
| Manufacturing Engineering Technology I | 13032900 (1 credit) | None | 10-12 |
| Robotics I | 13037000 (1 credit) | None | 9-10 |
| Programmable Logic Controller I | TBD | TBD | TBD |
| Manufacturing Engineering Technology II | 13032950 (1 credit) | PREQ: Manufacturing Engineering Technology I | 11-12 |
| Robotics II | 13037050 (1 credit) | PREQ: Robotics I | 10-12 |
| Practicum in Manufacturing | 13033000 (2 credits)<br>13033005 (3 credits)<br>13033010 (2 credits)<br>13033015 (3 credits) | None | 12 |
| Programmable Logic Controller II | TBD | TBD | TBD |
| Practicum in Entrepreneurship | TBD | TBD | TBD |
| Career Preparation I | 12701300 (2 credits)<br>12701305 (3 credits) | None | 11-12 |

**FOR ADDITIONAL INFORMATION ON THE MANUFACTURING CAREER CLUSTER, PLEASE CONTACT:**

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https://tea.texas.gov/cte

## COURSES

**LEVEL 1**
- Blueprint Reading for Manufacturing Applications
- Principles of Manufacturing
- Occupational Safety and Environmental Technology I
- Principles of Applied Engineering

**LEVEL 2**
- Metal Fabrication and Machining I
- Diversified Manufacturing I
- Occupational Safety and Environmental Technology II

**LEVEL 3**
- Precision Metal Manufacturing I
- Metal Fabrication and Machining II
- Diversified Manufacturing II
- Occupational Safety and Environmental Technology III
- Computer Integrated Manufacturing (PLTW)

**LEVEL 4**
- Precision in Metal Manufacturing II/Lab
- Practicum in Manufacturing
- Practicum in Entrepreneurship (TBD)

## POSTSECONDARY OPTIONS

| HIGH SCHOOL/ INDUSTRY CERTIFICATION | CERTIFICATE/ LICENSE* | ASSOCIATE'S DEGREE | BACHELOR'S DEGREE | MASTER'S/ DOCTORAL PROFESSIONAL DEGREE |
|---|---|---|---|---|
| MSSC Certified Production Technician | Certified Welder or Welder Inspector | Welding Technology/ Welder | Welding Engineering Technology/ Technician | |
| ISCET Associate-Level Certified Electronics Technician | Machining Level 1 - CNC Milling: Programming Setup & Operations | Machine Shop Technology/ Assistant | Biomedical Technology/ Technician | Occupational Health and Industrial Hygiene |
| Mastercam Professional Level Certification | Certified Welding Engineering | Operations Management and Supervision | | |
| NIMS Industrial Technology Maintenance - Basic Mechanical Systems | Certified Environmental, Safety, and Health Trainer | Occupational Safety and Health Technology/ Technician | Environmental Health | |

Additional industry based certification information is available from the TEA CTE website.

For more information on postsecondary options for this program of study, visit TXCTE.org.

| OCCUPATIONS | MEDIAN WAGE | ANNUAL OPENINGS | % GROWTH |
|---|---|---|---|
| Mechanical Engineering Technicians | $57,117 | 453 | 9% |
| CNC Machine Operators | $39,250 | 1,319 | 12% |
| Aerospace Engineering and Operations Technicians | $60,757 | 114 | 9% |
| Electrical and Electronics Engineering Technicians | $60,382 | 1,439 | 9% |
| Industrial Engineering Technicians | $61,672 | 326 | 9% |

## WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

**Exploration Activities:**
Participate and compete in SkillsUSA
Job shadow a machinist

**Work Based Learning Activities:**
Apprenticeship at a local business or industry
American Welding Society

The Manufacturing Technology program of study focuses on the development and use of automatic and computer-controlled machines, tools, and robots that perform work on metal or plastic. Students will learn how to set up and operate a variety of machine tools to produce precision parts and instruments. Students will also learn how to modify parts to make or repair machine tools or maintain individual machines, and how to use hand-welding or flame-cutting equipment.

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 manufacturing/process engineering.

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

Approved Statewide Program of Study - September 2019

Texas Education Agency

# COURSE INFORMATION

| COURSE NAME | SERVICE ID | PREREQUISITES (PREQ) COREQUISITES (CREQ) | GRADE |
|---|---|---|---|
| Blueprint Reading for Manufacturing Applications | N1303684 (1 credit) | None | 10-12 |
| Principles of Manufacturing | 13032200 (1 credit) | None | 9-12 |
| Occupational Safety and Environmental Technology I | N1303680 (1 credit) | None | 9-12 |
| Principles of Applied Engineering | 13036200 (1 credit) | None | 9-10 |
| Metal Fabrication and Machining I | 13032700 (2 credits) | None | 10-12 |
| Diversified Manufacturing I | 13032650 (1 credit) | None | 10-12 |
| Occupational Safety and Environmental Technology II | N1303681 (1 credit) | None | 9-12 |
| Precision Metal Manufacturing I | 13032500 (2 credits) | None | 10-12 |
| Metal Fabrication and Machining II | 13032800 (2 credits) | PREQ: Metal Fabrication and Machining I | 11-12 |
| Diversified Manufacturing II | 13032660 (1 credit) | PREQ: Diversified Manufacturing I<br>RPREQ: Algebra I | 11-12 |
| Occupational Safety and Environmental Technology III | N1303682 (2 credits) | PREQ: OSET I and II | 11-12 |
| Computer Integrated Manufacturing (PLTW) | N1303748 (1 credit) | None | 9-12 |
| Precision Metal Manufacturing II/Lab | 13032600 (2 credits)<br>13032610 (3 credits) | None | 11-12 |
| Practicum in Manufacturing | 13033000 (2 credits)<br>13033005 (3 credits)<br>13033010 (2 credits)<br>13033015 (3 credits) | None | 12 |
| Practicum in Entrepreneurship | TBD | TBD | TBD |
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**FOR ADDITIONAL INFORMATION ON THE MANUFACTURING CAREER CLUSTER, PLEASE CONTACT:**

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## COURSES

**LEVEL 1**
Introduction to Welding

**LEVEL 2**
Welding I

**LEVEL 3**
Welding II/Lab

**LEVEL 4**
Practicum in Manufacturing
Practicum in Entrepreneurship (TBD)
Career Preparation I

## POSTSECONDARY OPTIONS

| HIGH SCHOOL/ INDUSTRY CERTIFICATION | CERTIFICATE/ LICENSE* | ASSOCIATE'S DEGREE | BACHELOR'S DEGREE | MASTER'S/ DOCTORAL PROFESSIONAL DEGREE |
|---|---|---|---|---|
| AWS Certified Welder, D1.1, D9.1 | Certified Welder or Welder Inspector | Welding Technology/ Welder | Welding Engineering Technology/ Technician | |
| ASW SENSE Level 1 | Machining Level 1 - CNC Milling: Programming Setup & Operations | Machine Shop Technology/ Assistant | Biomedical Technology/ Technician | Occupational Health and Industrial Hygiene |
| API 1104 Welding Certificate | Certified Welding Engineering | Operations Management and Supervision | | |
| NCCER Welding, Level 1 | Certified Environmental, Safety, and Health Trainer | Occupational Safety and Health Technology/ Technician | Environmental Health | |

Additional industry based certification information is available from the TEA CTE website.

For more information on postsecondary options for this program of study, visit TXCTE.org.

| OCCUPATIONS | MEDIAN WAGE | ANNUAL OPENINGS | % GROWTH |
|---|---|---|---|
| Welders, Cutters, Solderers, and Brazers | $41,350 | 6,171 | 9% |
| Welding Soldering and Brazing Machine Setters, Operators and Tenders | $40,040 | 280 | 9% |

## WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

**Exploration Activities:**
Participate and compete in SkillsUSA
Job shadow a machinist

**Work Based Learning Activities:**
Apprenticeship at a local business or industry
American Welding Society

The Welding program of study focuses on the development and use of automatic and computer-controlled machines, tools, and robots that perform work on metal or plastic. Students will learn how to modify parts to make or repair machine tools or maintain individual machines, and how to use hand-welding or flame-cutting equipment.

The Manufacturing Career Cluster® focuses 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 manufacturing/process engineering.

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



Texas Education Agency

# COURSE INFORMATION

| COURSE NAME | SERVICE ID | PREREQUISITES (PREQ) COREQUISITES (CREQ) | GRADE |
|---|---|---|---|
| Introduction to Welding | 13032250 (1 credit) | None | 9-12 |
| Welding I | 13032300 (2 credit) | None | 10-12 |
| Welding II/Lab | 13032400 (2 credits)<br>13032410 (3 credits) | PREQ: Welding I | 11-12 |
| Practicum in Manufacturing | 13033000 (2 credits)<br>13033005 (3 credits)<br>13033010 (2 credits)<br>13033015 (3 credits) | None | 12 |
| Practicum in Entrepreneurship | TBD | TBD | TBD |
| Career Preparation I | 12701300 (2 credits)<br>12701305 (3 credits) | None | 11-12 |
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**FOR ADDITIONAL INFORMATION ON THE MANUFACTURING CAREER CLUSTER, PLEASE CONTACT:**

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