

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.

COURSES



LEVEL 1

Principles of Manufacturing
Occupational Safety and Environmental Technology I
Computer Aided Design and Drafting for Manufacturing (TBD)

LEVEL 2

Occupational Safety and Environmental Technology II
Robotics I
Programmable Logic Controller I (TBD)

LEVEL 3

Manufacturing Engineering Technology I
Robotics II
Programmable Logic Controller II (TBD)

LEVEL 4

Manufacturing Engineering Technology II
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

Career Prep 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. Program of Study Draft for Public Comment June 2019

COURSE INFORMATION

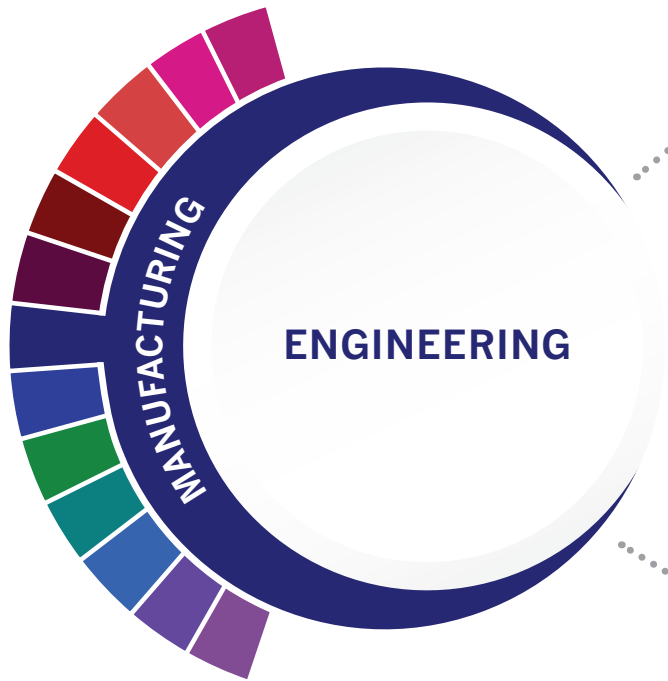
COURSE NAME	SERVICE ID	PREREQUISITES (PREQ) COREQUISITES (CREQ) RECOMMENDED PREREQUISITES (RPREQ) RECOMMENDED COREQUISITIES (CREQ)	GRADE
Principles of Manufacturing	13032200	RPREQ: Algebra I and Geometry	9-12
Occupational Safety and Environmental Technology I	N1303680	RPREQ: Principles of Transportation Systems, Principles of Distribution and Logistics, or Principles of Manufacturing	9-12
Computer Aided Design and Drafting for Manufacturing (TBD)	TBD	TBD	TBD
Occupational Safety and Environmental Technology II	N1303681	RPREQ: Occupational Safety and Environmental Technology I	9-12
Robotics I	13037000	RPREQ: Principles of Applied Engineering	9-10
Programmable Logic Controller I	TBD	TBD	TBD
Manufacturing Engineering Technology I	13032900	RPREQ: Algebra I	10-12
Robotics II	13037050	PREQ: Robotics I	10-12
Programmable Logic Controller II	TBD	TBD	TBD
Manufacturing Engineering Technology II	13032950	PREQ: Manufacturing Engineering Technology I RPREQ: Algebra II, Computer Science, or Physics	11-12
Practicum in Manufacturing	13033000 (2 credits) 13033005 (3 credits)	None	12
Practicum in Entrepreneurship	TBD	TBD	TBD
Career Preparation I	12701300 (2 credits) 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

Principles of Applied Engineering
Introduction to Computer Aided Design and Drafting
Introduction to Engineering Design (PLTW)

LEVEL 2

Manufacturing Engineering Technology I
Engineering Science
Intermediate Computer Aided Design and Drafting

LEVEL 3

Manufacturing Engineering Technology II
Engineering Design and Development (PLTW)
Engineering Design and Presentation I
Computer Integrated Manufacturing (PLTW)
Aerospace Engineering (PLTW)
Digital Electronics
Civil Engineering and Architecture (PLTW)

LEVEL 4

Scientific Research and Design
Engineering Design and Problem Solving
Engineering Design and Presentation II
Practicum in Manufacturing
Practicum in STEM

POSTSECONDARY OPTIONS

HIGH SCHOOL/INDUSTRY CERTIFICATION	CERTIFICATE/LICENSE*	ASSOCIATE'S DEGREE	BACHELOR'S DEGREE	MASTER'S/DOCTORAL PROFESSIONAL DEGREE
Autodesk Certified Professional or User (ACU) - Inventor	Engineer, Professional	Electrical and Electronics Engineering		
Certified SolidWorks Associate (CSWA)	Fluid Power Systems Designer	Drafting and Design Technology/Technician, General	CAD/CADD Drafting and/or Design Technology/Technician	Mechanical Engineering
Certified Engineering Technician - Audio Systems	Certified Biomedical Auditor	Engineering Technology	Bioengineering and Biomedical Engineering	
	Certified Cost Estimator/Analyst	Business Administration and Management, General	Construction Engineering Technology/Technician	Business/Commerce, General

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OCCUPATIONS	MEDIAN WAGE	ANNUAL OPENINGS	% GROWTH
Aerospace Engineers	\$110,843	481	9%
Industrial Engineers	\$97,074	1,263	10%
Mechanical Engineers	\$91,707	1,535	11%
Chemical Engineers	\$112,819	474	9%
Electrical Engineers	\$98,405	1,137	10%

WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

Exploration Activities:
Participate in competitions like Skills USA

Career Prep Activities:
Engineering internship
Apprenticeship in local business/industry
Job shadow a machinist

The Engineering program of study focuses on the design, development, and use of engines, machines, and structures. Students will learn how to apply science, mathematical methods, and empirical evidence to the innovation, design, construction, operation, and maintenance of different manufacturing systems.



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 Engineering program of study will fulfill requirements of the Business and Industry or STEM Endorsement.

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COURSE INFORMATION

COURSE NAME	SERVICE ID	PREREQUISITES (PREQ) COREQUISITES (CREQ) RECOMMENDED PREREQUISITES (RPREQ) RECOMMENDED COREQUISITES (CREQ)	GRADE
Principles of Applied Engineering	13036200	None	9-10
Introduction to Computer Aided Design and Drafting	N1303769	PREQ: Architectural Design	9-12
Introduction to Engineering Design	N1303742	None	9-12
Manufacturing Engineering Technology I	13032900	RPREQ: Algebra I	10-12
Engineering Science	13037500	PREQ: Algebra I and Biology, Chemistry, Integrated Physics and Chemistry (IPC), or Physics; RPREQ: Geometry	10-12
Intermediate Computer Aided Design and Drafting	N1303770	PREQ: Architectural Design and Introduction to Computer Aided Design and Drafting	10-12
Manufacturing Engineering Technology II	13032950	PREQ: Manufacturing Engineering I RPREQ: Algebra II, Computer Science, or Physics	11-12
Engineering Design and Development	N1303749	None	11-12
Engineering Design and Presentation I	13036500	PREREQ: Algebra I	10-12
Computer Integrated Manufacturing	N1303748	None	9-12
Aerospace Engineering	N1303745	None	9-12
Digital Electronics	13037600	PREREQ: Algebra I and Geometry	10-12
Civil Engineering and Architecture	N1303747	None	9-12
Scientific Research and Design	13037200	PREQ: Biology, Chemistry, Integrated Physics and Chemistry (IPC), or Physics	11-12
Engineering Design and Problem Solving	13037300	PREQ: Algebra I and Geometry RPREQ: 2 credits from courses in the STEM cluster	11-12
Engineering Design and Presentation II	13036600	PREQ: Algebra I and Geometry; RPREQ: Principles of Applied Engineering or Engineering Design and Presentation I	11-12
Practicum in Manufacturing	13033000 (2 credits) 13033005 (3 credits)	None	12
Practicum in Science, Engineering, Technology, and Mathematics	13037400 (2 credits) 13037405 (3 credits)	PREQ: Algebra I and Geometry RPREQ: 2 credits from courses in the STEM cluster	12

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

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COURSES



LEVEL 1

Blueprint Reading for Manufacturing Applications
Principles of Manufacturing
Occupational Safety and Environmental Technology I

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

LEVEL 4

Precision in Metal Manufacturing II
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%
Production and Operating Technicians	\$62,171	5,094	9%
CNC Machine Programmers	\$54,891	222	13%

WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

Exploration Activities:
Participate and compete in Skills USA
Job shadow a machinist

Career Prep 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.

Program of Study Draft for Public Comment June 2019



COURSE INFORMATION

COURSE NAME	SERVICE ID	PREREQUISITES (PREQ) COREQUISITES (CREQ) RECOMMENDED PREREQUISITES (RPREQ) RECOMMENDED COREQUISITES (CREQ)	GRADE
Blueprint Reading for Manufacturing Applications	N1303684	RPREQ: Algebra I, Geometry, and Principles of Construction	10-12
Principles of Manufacturing	13032200	RPREQ: Algebra I or Geometry	9-12
Occupational Safety and Environmental Technology I	N1303680	RPREQ: Principles of Transportation Systems, Principles of Distribution and Logistics, or Principles of Manufacturing	9-12
Metal Fabrication and Machining I	13032700	RPREQ: Algebra I and Geometry	10-12
Diversified Manufacturing I	13032650	RPREQ: Algebra I	10-12
Occupational Safety and Environmental Technology II	N1303681	RPREQ: Occupational Safety and Environmental Technology I	9-12
Precision Metal Manufacturing I	13032500	RPREQ: Principles of Manufacturing and completion of or concurrent enrollment in Algebra I or Geometry	10-12
Metal Fabrication and Machining II	13032800	PREQ: Metal Fabrication and Machining I RPREQ: Geometry and Algebra II	11-12
Diversified Manufacturing II	13032660	PREQ: Diversified Manufacturing I RPREQ: Algebra I	11-12
Occupational Safety and Environmental Technology III	N1303682	PREQ: OSET I and II RPREQ: Chemistry or Integrated Physics and Chemistry (IPC)	11-12
Precision Metal Manufacturing II/Lab	13032600 (2 credits) 13032610 (3 credits)	PREQ: Precision Metal Manufacturing I; RPREQ: Precision Manufacturing II Lab	11-12
Practicum in Manufacturing	13033000 (2 credits) 13033005 (3 credits)	None	12
Practicum in Entrepreneurship	TBD	TBD	TBD

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COURSES

Introduction to Welding

LEVEL 1

Welding I

LEVEL 2

Welding II/Lab

LEVEL 3

Practicum in Manufacturing
Practicum in Entrepreneurship (TBD)
Career Preparation I

LEVEL 4



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%

WORK BASED LEARNING AND EXPANDED LEARNING OPPORTUNITIES

Exploration Activities:
Participate and compete in Skills USA
Job shadow a machinist

Career Preparation:
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.



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