SACRAMENTO CITY UNIFIED SCHOOL DISTRICT
BOARD OF EDUCATION

Agenda Item 11.1j

Meeting Date: August 11, 2022

Subject: **Approve Request to Add/Amend New Council on Occupational Education Programs to Charles A. Jones Career and Education Center Manufacturing Training Center: Introduction to Manufacturing; Electro-Mechanical Assembly; Material Handling and Logistics; Welding Fabrication I; (Amend) Manufacturing Technician**

- ☐ Information Item Only
- ☒ Approval on Consent Agenda
- ☐ Conference (for discussion only)
- ☐ Conference/First Reading (Action Anticipated: _____)
- ☐ Conference/Action
- ☐ Action
- ☐ Public Hearing

Division: Academic Office

Recommendation: Approve adding and amending new programs

Background/Rationale: As CAJ prepares to launch its newest SCUSD Board approved and Council on Occupational Education approved Manufacturing Technician program in fall 2022, CAJ seeks to maximize opportunities for the community to explore the career field while earning stackable certificates. The full CAJ Manufacturing Technician program will take students about 9 months to complete. CAJ also wants to provide opportunities for shorter pathways of study that will allow students to earn certifications quicker and spark interest in them to continue their education in the field. CAJ is requesting approval to add four additional high-interest manufacturing programs: Introduction to Manufacturing (80 hours); Electro-Mechanical Assembly (40 hours); Material Handling and Logistics (40 hours); Welding Fabrication I (90 hours). CAJ also requests to shorten the currently approved Manufacturing Technician program from 1080 hours to 900 hours, so that participating students can earn certifications quicker for a faster onramp to employment and/or apprenticeship. These new programs are the building blocks for the full Manufacturing Technician program, and students who complete the shorter programs will be able to transfer into the 900-hour Manufacturing Technician program with part of that program already completed. A master schedule aligns the new programs with the Manufacturing Technician program schedule, and the CAJ Manufacturing Teacher will be able to teach all programs. CAJ continues to partner with Sacramento Valley Manufacturing Alliance (SVMA) and other manufacturing partners in the area who sit on the manufacturing advisory committees. Students completing any CAJ Manufacturing programs will earn industry-recognized certifications and qualify to apply to an employer-sponsored apprenticeship program with SVMA.

Financial Considerations: None

LCAP Goal(s): College, Career and Life Ready Graduates, Operational Excellence

Documents Attached:

1. Signature pages - (5) - for approvals to add/amend new CAJ Manufacturing programs: Introduction to Manufacturing (80 hours); Electro-Mechanical Assembly (40 hours); Material Handling and Logistics (40 hours); Welding Fabrication I (90 hours). Manufacturing Technician program (900 hours)
2. Adult Education Program Outlines
3. Manufacturing Occupational Outlook Employment Statistics
4. A22 CDE Course Approvals – Program Year 2022-23

Estimated Time of Presentation: N/A
Submitted by: Angela Hatter, Coordinator III, Adult Education
Approved by: Jorge A. Aguilar, Superintendent

Charles A. Jones Career and Education Center – 323100
Request for Program Changes Under 25%

New Program Name to Add	Program Hours	NCES Classification of Instructional Programs (CIP) Code
Introduction to Manufacturing	**80**	**48.0503**

The changes herein are approved as noted:

Christina Pritchett, Board President (Trustee Area 3) **Sacramento City Unified School District**	**Date**	**Jorge A. Aguilar, Superintendent**	**Date**

Charles A. Jones Career and Education Center – 323100
Request for Program Changes Under 25%

New Program Name to Add	Program Hours	NCES Classification of Instructional Programs (CIP) Code
Electro-Mechanical Assembly	**40**	**15.0699**

The changes herein are approved as noted:

Christina Pritchett, Board President (Trustee Area 3) **Sacramento City Unified School District**	**Date**	**Jorge A. Aguilar, Superintendent**	**Date**

Charles A. Jones Career and Education Center – 323100
Request for Program Changes Under 25%

New Program Name to Add	Program Hours	NCES Classification of Instructional Programs (CIP) Code
Material Handling and Logistics	**40**	**52.0203**

The changes herein are approved as noted:

Christina Pritchett, Board President (Trustee Area 3) **Sacramento City Unified School District**	**Date**	**Jorge A. Aguilar, Superintendent**	**Date**

Charles A. Jones Career and Education Center – 323100
Request for Program Changes Under 25%

New Program Name to Add	Program Hours	NCES Classification of Instructional Programs (CIP) Code
Welding Fabrication I	**90**	**48.0508**

The changes herein are approved as noted:

Christina Pritchett, Board President (Trustee Area 3) **Sacramento City Unified School District**	**Date**	**Jorge A. Aguilar, Superintendent**	**Date**

Charles A. Jones Career and Education Center – 323100
Request for Program Changes Under 25%

Program Name	NCES Classification of Instructional Programs (CIP) Code
Manufacturing Technician	15.0613

Old Program hours	1080
New Program hours	**900**

The changes herein are approved as noted:

Christina Pritchett, Board President (Trustee Area 3) **Date**
Sacramento City Unified School District

Jorge A. Aguilar, Superintendent **Date**

Sacramento City Unified School District

ADULT EDUCATION COURSE OUTLINE

PROGRAM AREA: Career Technical Education **COURSE NUMBER**: _____

ADULT SCHOOL: Sacramento City Unified School District **UPDATED**: May 22, 2022

SCHOOL SITE: Charles A. Jones Career and Education Center **TOTAL HOURS**: 80

COURSE TITLE: Introduction to Manufacturing

COURSE DESCRIPTION:

The Introduction to Manufacturing class is a component of the Manufacturing Technician Program and a pre-requisite for three program pathways: Welder, Machinist, and Manufacturing Engineering Technician. The course consists of 80 hours of classroom and practical exercises touching on various manufacturing topics, including safety, blueprint reading, tool identification, and an overview manufacturing process. The training covers fundamental knowledge and skills through classroom lectures and hands-on activities in the manufacturing lab. Successful students earn industry-recognized training certificates through California/Occupational Safety and Health Administration (Cal/OSHA) and the Society of Manufacturing Engineers (SME). The students who complete the program will gain foundational skills to prepare them for entry-level roles in manufacturing companies in welding, assembly, machining, quality, and material handling.

I. ADMISSION REQUIREMENTS

- High school diploma
- Right to Work documentation
- Assessment test with a passing score of 239 for reading and 236 for math
- Cal Jobs registration
- SETA Job Center intake and required workshops
- Attend the one-time Orientation Session on the Charles A. Jones Career and Education Center campus

II. PROGRAM CONTENT THAT IS CONSISTENT WITH DESIRED STUDENT LEARNING OUTCOMES:

To provide students with the essential manufacturing skill and knowledge to enter the workforce as an entry-level manufacturing technician, enter an employer-sponsored apprenticeship program, and earn industry-recognized certifications. Successful students will earn a 10-hr Cal/OSHA General Industry Safety and Health training card and the SME Certified Manufacturing Associate (CMfgA) certification. The students will be able to interpret manufacturing documentation to set up, operate, and troubleshoot manufacturing equipment. The students who complete the program will have the foundational skills to prepare them for entry-level manufacturing technician roles and identify areas for further training in welding, assembly, machining, quality, and material handling.

III. PROGRAM LENGTH:

The manufacturing Technician course is 80 hours in length, over approximately 3 instructional weeks.

IV. PROGRAM OBJECTIVES:

Upon successful completion of this course, the student will gain the skills and knowledge necessary to perform the following manufacturing tasks:

A. Acquire and accurately use manufacturing sector terminology and protocols at the career readiness level for communicating effectively in verbal and written formats.
B. Demonstrate understanding of the safety principles in written and verbal form by earning a 10-hr. Cal/OSHA General Industry training card
C. Demonstrate an understanding of fundamental manufacturing processes and terminology in written and verbal form by passing the Society of Manufacturing Engineers (SME) ToolingU exam.
D. Analyze given design documentation defining a part, verbally describe the process sequence, and apply manufacturing skills required to manufacture the part in a practical lab setting.
E. Use existing and emerging technology to produce products and services required in the manufacturing workplace environment.
F. Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the manufacturing workplace environment.
G. Apply essential technical knowledge and skills common in the manufacturing sector, following procedures when performing technical tasks.
H. Demonstrate and apply the knowledge and skills contained in industry standards in the classroom, laboratory, and workplace settings.

I. Validate that a provided part meets specifications from its engineering drawing by comparing specifications by demonstrating proper technique using appropriate precision measuring tools.
J. Describe and layout a project according to specifications or engineering drawings.
K. Research and compare the properties of two metals using two different material specifications and a process specification.
L. Demonstrate a saw operation(s) to produce a length of bar stock to specification.
M. Demonstrate bending, shaping, other metal forming, and fabrication techniques, including basic hand filing and cold form bending with cold forming machinery.

V. COMPETENCY TESTS:

Students will complete online unit module exams for online lessons in SME ToolingU. Students also complete separate written exams and competency evaluations for certification to the SME Certified Manufacturing Associate and 10-hr. Cal/OSHA General Safety and Health Program. The final exam for this course is the SME CMfgA practice exam with a 75% mastery level. The instructor also observes student performance and learning through informal formative assessment.

LEARNING ACTIVITIES:

(NOTE: These are ESTIMATED times and can fluctuate based on student performance and industry (advisory committee) input)

Units of Instruction and total hours of instruction

1. Introduction To Manufacturing (80 hrs.)

1.1. Introduction to the five major types of manufacturing processes
- 1.1.1. Additive
- 1.1.2. Subtractive
- 1.1.3. Forming
- 1.1.4. Joining
- 1.1.5. Surface finishing

1.2. Demonstrate safe operation and use of general hand and power tools
1.3. Terminology & common components
1.4. Overview of quality
1.5. Overview of manufacturing operations
1.6. General Industry Safety & Health (10-hr Cal/OSHA card)
1.7. Prepare for the SME Certified Manufacturing Associate (CMfgA) exam

Total program hours 80

VI. INSTRUCTIONAL MATERIALS:

Various instructional techniques are used, including instructor demonstrations, computer-based tutorials, multimedia presentations, and individual and group projects. Software resources for the shop floor and material resource management will also be used to provide an authentic real-life experiential learning environment in the lab. Raw materials and components to support lab actives and manipulatives for demonstration.

VII. EQUIPMENT:

The following types of equipment used throughout the course:

Horizontal and Vertical Bandsaws
Drill Presses
Sheers
Pan Break
Hydraulic press
Sheet metal roll
Ironworker
Notchers
Manual Lathes
Manual Mills
CNC Lathes
CNC Mills
CNC plasma cutters
CNC waterjet
Arc welders
Soldering Irons
3D printers
Laser engravers
Metrology bench tools
Hand tools for machine shop, assembly, and welding shops
Blasting and finishing equipment

VIII. METHOD OF PROGRAM EVALUATION:

Students complete online module exams for each online module in the SME ToolingU and have both periodic mid-unit formative assessments and end-of-unit assessments based on specific unit topics. Industry certification exams based on SME and Cal/OSHA are offered at appropriate program milestones. Assessments may be in the form of paper or computer-based tests, hands-on skills demonstration activities, and unit signature projects. The last unit in the program is a culminating capstone project that tests the program's skills that

simulate an authentic, real-world manufacturing project. Grading is 50% based on exams and quizzes and 50% on lab-based activities.

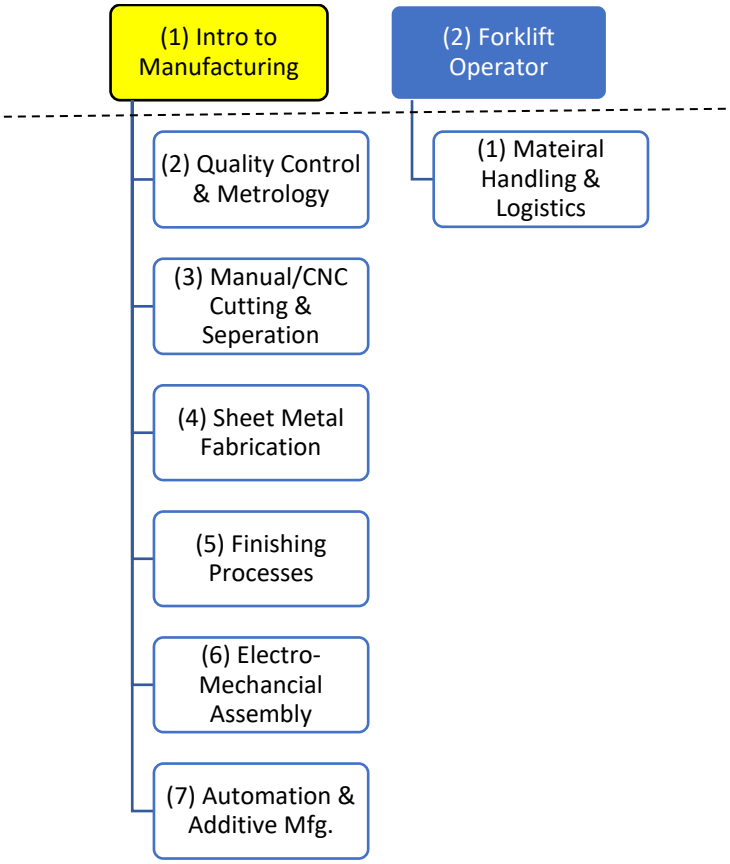
IX. LEVEL OF SKILLS AND/OR PROFICIENCY REQUIRED FOR COMPLETION:

Each student must achieve a score of 75% overall mastery to complete the program successfully. The mastery of individual industry certification exams is governed by the accrediting organization and may vary by organization but typically range from 70%-80%. Program completion is not required to sign up for industry certification examinations. However, we highly recommend that students finish the program to prepare them to perform well on the exams.

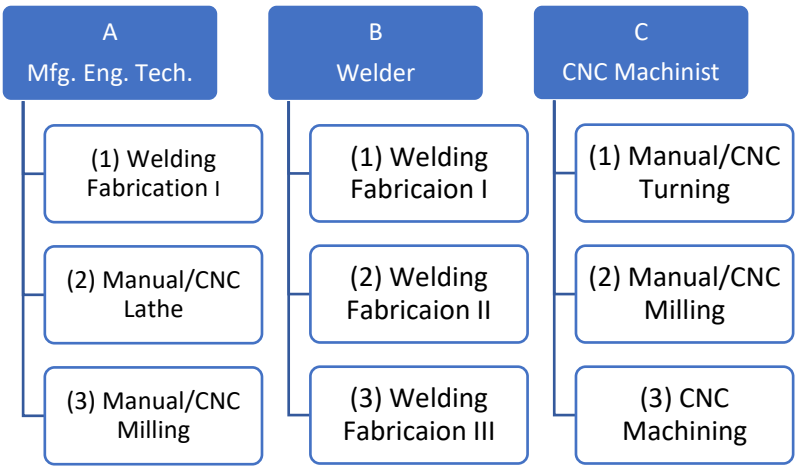
IX. APPROPRIATE DELIVERY FORMATS FOR THE SUBJECT MATTER BEING TAUGHT:

Course content delivery is through a traditional classroom and laboratory format. The program includes computer-based instruction, which students will complete according to a defined schedule in a supervised computer lab. Copies of computer-based instructional materials are available upon request. Students will also have instructional time performing hands-on applications in the manufacturing lab, simulating the documentation and software used in a modern manufacturing environment.

FOUNDATIONAL & CORE UNITS



SPECIALTY TRACK UNITS



CAPSTONE UNITS

Sacramento City Unified School District

ADULT EDUCATION COURSE OUTLINE

PROGRAM AREA: Career Technical Education **COURSE NUMBER**: _____

ADULT SCHOOL: Sacramento City Unified School District **UPDATED**: May 22, 2022

SCHOOL SITE: Charles A. Jones Career and Education Center **TOTAL HOURS**: 40

COURSE TITLE: Electro-Mechanical Assembly

COURSE DESCRIPTION:

The Electro-Mechanical Assembly class is a component of the Manufacturing Technician Program. The training contains fundamental knowledge of assembly processes, including identifying and applying essential hand tools techniques, safe operation presses, engraving machines, and in-process and final inspection techniques. Identification and application of mechanical assembly hardware such as threaded and non-threaded fasteners and mechanical components will be coved in the class. Students will perform pressing interference fit hardware and learn the basics of lubricants, adhesives, sealants, and thread locking compounds. Students will also learn the safe operation of soldering and heat shrinking and crimping equipment. In the lab, students build wiring harnesses and test the continuity of constructed projects by interpreting engineering drawings and specifications. After completing the training, students will have the knowledge and technical competency for entry-level employment in the manufacturing industry, trade apprenticeships, and industry-standard certifications through further study. The students who complete the program will have the foundational skills to prepare them for entry-level assembly technician roles. The Introduction to Manufacturing or Manufacturing Pre-Apprenticeship are prerequisites classes for this course.

I. ADMISSION REQUIREMENTS

- High school diploma
- Right to Work documentation
- Assessment test with a passing score of 239 for reading and 236 for math
- Cal Jobs registration
- SETA Job Center intake and required workshops

- Attend the one-time Orientation Session on the Charles A. Jones Career and Education Center campus
- Completion of either Introduction to Manufcatruon or Manufacturing Pre-Apprenticeship class

II. PROGRAM CONTENT THAT IS CONSISTENT WITH DESIRED STUDENT LEARNING OUTCOMES:

To provide students with the basic manufacturing skill and knowledge to enter the workforce as entry-level manufacturing technicians, enter an employer-sponsored apprenticeship program, and earn industry-recognized certifications. The students will be able to interpret manufacturing documentation to set up, build and troubleshoot electro-mechanical assemblies. The students who complete the program will have the foundational skills to prepare them for an entry-level role as an assembly technician.

III. PROGRAM LENGTH:

The manufacturing Technician course is 40 hours in length, over approximately 1-1/2 instructional weeks.

IV. PROGRAM OBJECTIVES:

Upon successful completion of this course, the student will gain the skills and knowledge necessary to perform the following manufacturing tasks:

A. Acquire and accurately use manufacturing sector terminology and protocols at the career readiness level for communicating effectively in verbal and written formats.
B. Use existing and emerging technology to produce products and services required in the manufacturing workplace environment.
C. Create alternative solutions to solve a problem unique to the manufacturing sector using critical and creative thinking, logical reasoning, and problem-solving techniques.
D. Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the manufacturing workplace environment.
E. Apply essential technical knowledge and skills common in the manufacturing sector, following procedures when performing technical tasks.
F. Demonstrate and apply the knowledge and skills contained in industry standards in the classroom, laboratory, and workplace settings.
G. Describe and layout a project according to specifications or engineering drawings.

V. COMPETENCY TESTS:

Students will complete online unit module exams for online lessons in SME ToolingU, separate written exams, and hands-on competency evaluations. Final exams are conducted at the course. The instructor also observes student performance and learning through informal formative assessment.

LEARNING ACTIVITIES:

(NOTE: These are ESTIMATED times and can fluctuate based on student performance and industry (advisory committee) input)

Units of Instruction and total hours of instruction

1. Electro-Mechanical Assembly (40 hrs.)

[Prerequisite: Intro to Manufacturing or Manufacturing Pre-Appenticeship]

- 1.1.1. Overview of electro-mechanical processes
- 1.1.2. Identify and apply basic hand tools associated with mechanical assembly
- 1.1.3. Demonstrate safe operation manual machines:
  - 1.1.3.1. Presses (arbor, hydraulic)
- 1.1.4. Demonstrate safe operation of CNC cutting machines
  - 1.1.4.1. CNC laser engraving
- 1.1.5. Perform in-process and final inspection techniques for mechanical assembly processes
- 1.1.6. Identify and apply mechanical assembly hardware and fabrication techniques
  - 1.1.6.1. Advanced threaded and non-threaded fasteners
  - 1.1.6.2. Mechanical components
  - 1.1.6.3. Pressing interference fit hardware
  - 1.1.6.4. Basics of lubricants, adhesives, sealants, and thread locking compounds
- 1.1.7. Identify and apply basic hand tools associated with electro-mechanical assembly
- 1.1.8. Demonstrate safe operation manual machines:
  - 1.1.8.1. Soldering irons & soldering guns
  - 1.1.8.2. Digital Multi-Meters (DMMs)
  - 1.1.8.3. Heat shrink and crimping equipment
- 1.1.9. Perform in-process and final inspection techniques for electro-mechanical assembly processes
- 1.1.10. Identify and apply electro-mechanical assembly hardware and processes
  - 1.1.10.1. Circuit boards and solid-state hardware
  - 1.1.10.2. Wiring harness connectors
  - 1.1.10.3. Heat shrinking
  - 1.1.10.4. Wire labeling
  - 1.1.10.5. Crimping hardware

1.1.10.6. Basics of soldering, de-soldering, fluxes, and insulating compounds
1.1.11. Troubleshoot electrical connections through continuity testing
1.1.12. Construct projects by interpreting drawings and manufacturing specifications

Total program hours 40

VI. INSTRUCTIONAL MATERIALS:

Various instructional techniques are used, including instructor demonstrations, computer-based tutorials, multimedia presentations, and individual and group projects. Software resources for shop floor and material resource management will also be used to provide an authentic real-life experiential learning environment in the lab. Raw materials and components to support lab actives and manipulatives for demonstration.

VII. EQUIPMENT:

The following types of equipment used throughout the course:

Horizontal and Vertical Bandsaws
Drill Presses
Arc welders
Soldering Irons
Laser engravers
Metrology bench tools
Hand tools for assembly
DMMs
Blasting and finishing equipment

VIII. METHOD OF PROGRAM EVALUATION:

Students complete online module exams for each online module in the SME ToolingU and have periodic mid-unit formative assessments, and end-of-unit assessments based on specific unit topics covered by lecture topics Assessments may be in the form of paper or computer-based tests, hands-on skills demonstration activities, and unit signature projects. Students' skills are tested through simulated and authentic, real-world manufacturing projects. Grading is 50% based on exams and quizzes and 50% on lab-based activities.

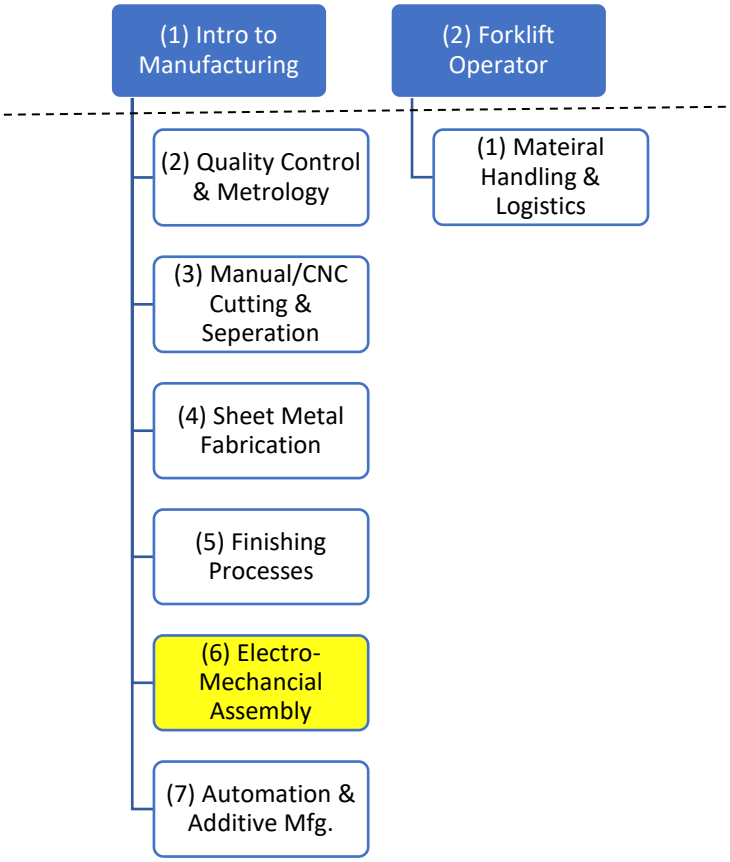
IX. LEVEL OF SKILLS AND/OR PROFICIENCY REQUIRED FOR COMPLETION:

Each student must achieve a score of 75% overall mastery to complete the program successfully. If offered, the mastery of individual industry certification exams is governed by the accrediting organization and may vary by organization but typically range from 70%-80%. Program completion is not required to sign up for industry certification examinations. However, we highly recommend that students finish the program to prepare them to perform well on the exams

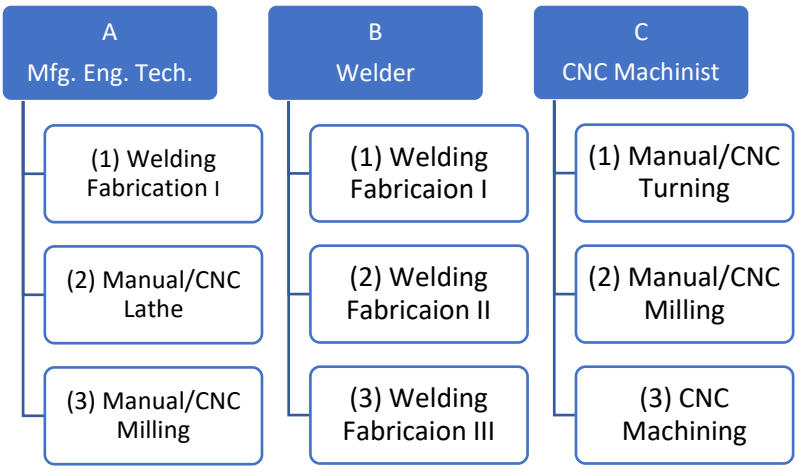
IX. APPROPRIATE DELIVERY FORMATS FOR THE SUBJECT MATTER BEING TAUGHT:

Course content delivery is through a traditional classroom and laboratory format. The program includes computer-based instruction, which students will complete according to a defined schedule in a supervised computer lab. Copies of computer-based instructional materials are available upon request. Students will also have instructional time performing hands-on applications in the manufacturing lab, simulating the documentation and software used in a modern manufacturing environment.

FOUNDATIONAL & CORE UNITS



SPECIALTY TRACK UNITS



CAPSTONE UNITS

Sacramento City Unified School District

ADULT EDUCATION COURSE OUTLINE

PROGRAM AREA: Career Technical Education **COURSE NUMBER**: _____

ADULT SCHOOL: Sacramento City Unified School District **UPDATED**: May 21, 2022

SCHOOL SITE: Charles A. Jones Career and Education Center **TOTAL HOURS**: 40

COURSE TITLE: Material Handling and Logistics

COURSE DESCRIPTION:

The Material Handling and Logistics class is a component of the Manufacturing Technician Program. This program prepares the student with the principles and technical skills to work in material handling and logistics in a manufacturing operation. The training contains fundamental knowledge of material handling and logistics principles, including an overview of manufacturing operations flow and essential functions of inventory systems, such as receiving, Work In Progress (WIP), finished goods, and shipping transactions. Material handling activities included forklift, packaging, physical inventory, lifting, and tool room management through hands-on learning in the manufacturing training lab. This program's core competencies are based on industry practices, California/Occupational Safety and Health Administration (Cal/OSHA), and Society of Manufacturing Engineers (SME) standards. The students who complete the program will have the foundational skills to prepare them for an entry-level role in material handling. Current operator training certification for Class I & IV forklifts is required for this class.

I. ADMISSION REQUIREMENTS

- High school diploma
- Right to Work documentation
- Assessment test with a passing score of 239 for reading and 236 for math
- Cal Jobs registration
- SETA Job Center intake and required workshops
- Attend the one-time Orientation Session on the Charles A. Jones Career and Education Center campus
- Current operator training certification for Class I & IV forklifts

II. PROGRAM CONTENT THAT IS CONSISTENT WITH DESIRED STUDENT LEARNING OUTCOMES:

This program provides students with the essential skill and knowledge to enter the workforce as an entry-level position in a logistics department at a manufacturer, enter an employer-sponsored apprenticeship program, and complete one core component in the Manufacturing Technician program. Students will learn foundational skills for entry-level manufacturing roles in material handling, logistics, stock room, and tool room management.

III. PROGRAM LENGTH:

The manufacturing Technician course is 40 hours long, over approximately 1-1/2 instructional weeks

IV. PROGRAM OBJECTIVES:

Upon successful completion of this course, the student will gain the skills and knowledge necessary to perform the following manufacturing tasks:

A. Acquire and accurately use manufacturing sector terminology and protocols at the career readiness level for communicating effectively in verbal and written formats.
B. Use existing and emerging technology to produce products and services required in the manufacturing workplace environment.
C. Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the manufacturing workplace environment.
D. Apply essential technical knowledge and skills common in the manufacturing sector, following procedures when performing technical tasks.
E. Demonstrate and apply the knowledge and skills contained in industry standards in the classroom, laboratory, and workplace settings.

V. COMPETENCY TESTS:

Students will complete online unit module exams for online lessons in SME ToolingU. Students also complete separate written exams and hands-on competency evaluations for mateiral handling and logistics-related topics. The instructor also observes student performance and learning through informal formative assessment.

LEARNING ACTIVITIES:

(NOTE: These are ESTIMATED times and can fluctuate based on student performance and industry (advisory committee) input)

Units of Instruction and total hours of instruction

1. **Material Handling and Logistics (40 hrs.)**
   [Pre-requisite: current operator training certification for Class I & IV forklifts]
   - 1.1. Overview of manufacturing operations flow
     - 1.1.1. Estimating and Quoting
     - 1.1.2. Order entry
     - 1.1.3. Purchasing, Purchase orders (PO)
     - 1.1.4. Project planning, Work orders (WO) & traveler packages
     - 1.1.5. Packing Slips (PS)
     - 1.1.6. Bills of Lading (BL)
     - 1.1.7. Essential functions of Material/Enterprise Resource Planning (MRP/ERP) systems
   - 1.2. Logistics
     - 1.2.1. Inventory system transactions
       - 1.2.1.1. Receiving
       - 1.2.1.2. Work In Progress (WIP) transactions
       - 1.2.1.3. Finished goods inventory
       - 1.2.1.4. Shipping
     - 1.2.2. Material handling
       - 1.2.2.1. Forklift activities
       - 1.2.2.2. Packaging
       - 1.2.2.3. Lifting (hoists, cranes, and slings)
       - 1.2.2.4. Physical inventory
       - 1.2.2.5. Tool crib (room) management

Total program hours 40

VI. INSTRUCTIONAL MATERIALS:

Various instructional techniques are used, including instructor demonstrations, computer-based tutorials, multimedia presentations, and individual and group projects. Software resources for CAD/CAM programming, CNC code editing, shop floor, and material resource management will also be used to provide an authentic real-life experiential learning environment in the lab. Raw materials and components to support lab actives and manipulatives for demonstration.

VII. EQUIPMENT:

The following types of equipment used throughout the course:

Class I Industrial Lift Truck

Class IV Indusrial Lift Truck
Pallets
Traffic cones
Pallet Racks
Mock stockroom and inventory
Mateiral banding kit and staps
Lifting attachments
Inventory system computers.
Labeling and bar code scanning equipment
Packaging workstation
Laser engraver

VIII. METHOD OF PROGRAM EVALUATION:

Students complete online module exams for each online module in the SME ToolingU and have both periodic mid-unit formative assessments and end-of-unit assessments based on specific unit topics covered by lecture topics. Assessments may be in the form of paper or computer-based tests, hands-on skills demonstration activities, and unit signature projects. Skills tests simulate authentic, real-world manufacturing scenarios. Grading is to be 50% based on exams and quizzes and 50% on lab-based activities.

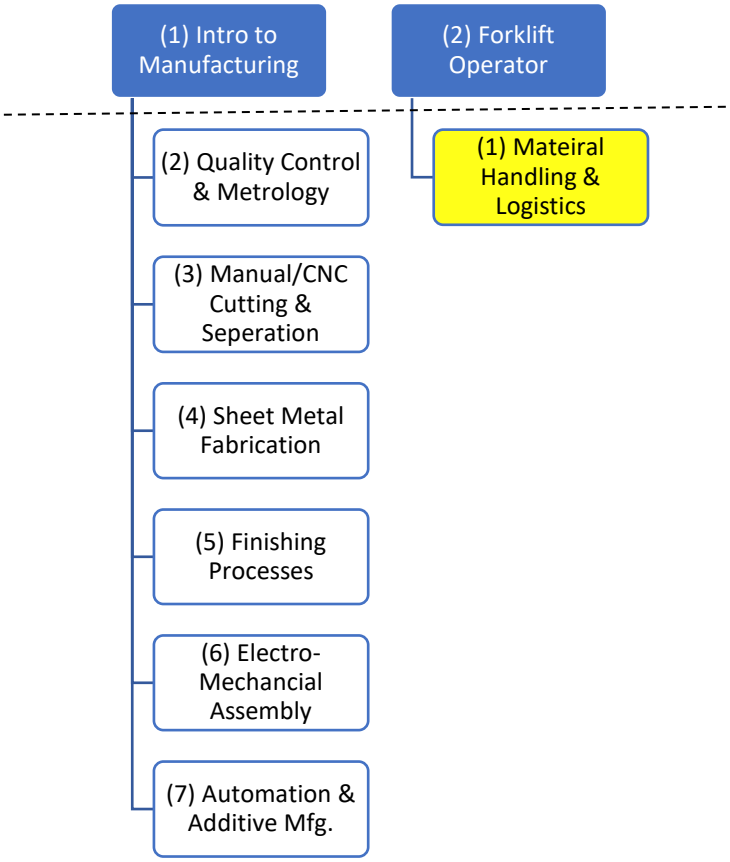
IX. LEVEL OF SKILLS AND/OR PROFICIENCY REQUIRED FOR COMPLETION:

Each student must achieve a score of 75% overall mastery to complete the program successfully. . If offered, the mastery of individual industry certification exams is governed by the accrediting organization and may vary by organization but typically range from 70%-80%. Program completion is not required to sign up for industry certification examinations. However, we highly recommend that students finish the program to prepare them to perform well on the exams.

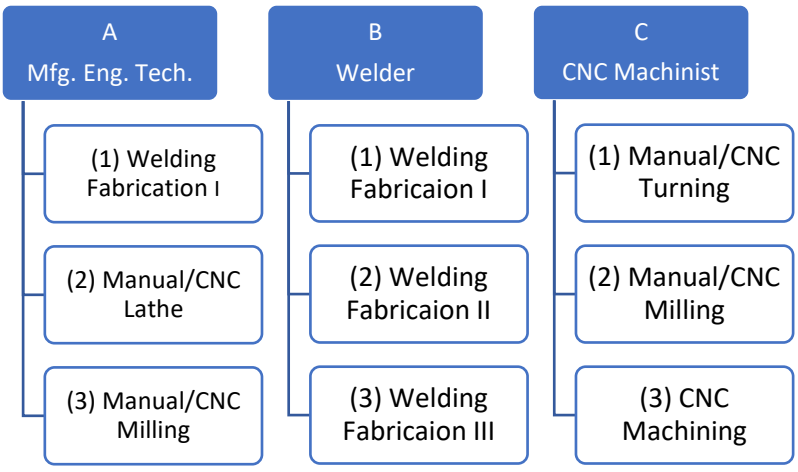
IX. APPROPRIATE DELIVERY FORMATS FOR THE SUBJECT MATTER BEING TAUGHT:

Course content delivery is through a traditional classroom and laboratory format. The program includes computer-based instruction, which students will complete according to a defined schedule in a supervised computer lab. Copies of computer-based instructional materials are available upon request. Students will also have instructional time performing hands-on applications in the manufacturing lab, simulating the documentation and software used in a modern manufacturing environment.

FOUNDATIONAL & CORE UNITS



SPECIALTY TRACK UNITS



CAPSTONE UNITS

Sacramento City Unified School District

ADULT EDUCATION COURSE OUTLINE

PROGRAM AREA: Career Technical Education **COURSE NUMBER**: _____

ADULT SCHOOL: Sacramento City Unified School District **UPDATED**: May 22, 2022

SCHOOL SITE: Charles A. Jones Career and Education Center **TOTAL HOURS**: 90

COURSE TITLE: Welding Fabrication I

COURSE DESCRIPTION:

The Welding Fabrication I class is a component of the Manufacturing Technician Program and a specialty track unit for two program pathways: Welder and Manufacturing Engineering Technician. This program prepares students with the principles and technical skills to manufacture welded components. The core competencies related to industrial processes covered in this class are rooted in Amerian Welding Society (AWS) standards. The training contains fundamental knowledge of welding processes, including identifying and applying essential hand tools and deburring techniques, welding processes**,** welding safety procedures, Personal Protective Equipment (PPE), set-up and layout**,** and fixture techniques. The course covers the safe operation of oxy/fuel torches, arc welding, and plasma cutting by constructing projects from engineering drawings in the manufacturing lab. Students will also learn the safe operation of essential weld preparation tools such as handheld grinders and abrasive saws. After completing the training, students will have the knowledge and technical competency for entry-level employment in the manufacturing industry, trade apprenticeships, and industry-standard certifications through further study. The students who complete the program will have the foundational skills to prepare them for entry-level manufacturing technician roles in welding. The Introduction to Manufacturing or Manufacturing Pre-Apprenticeship are prerequisites classes for this course.

I. ADMISSION REQUIREMENTS

- High school diploma
- Right to Work documentation
- Assessment test with a passing score of 239 for reading and 236 for math

- Cal Jobs registration
- SETA Job Center intake and required workshops
- Attend the one-time Orientation Session on the Charles A. Jones Career and Education Center campus
- Completion of either Introduction to Manufcatruon or Manufacturing Pre-Apprenticeship class

II. PROGRAM CONTENT THAT IS CONSISTENT WITH DESIRED STUDENT LEARNING OUTCOMES:

To provide students with the essential welding fabrication skills and knowledge to enter the workforce as an entry-level welder, enter an employer-sponsored apprenticeship program, and earn industry-recognized certifications through further study. Students will learn skills that prepare them for certification through the American Welding Society (AWS). The students will be able to interpret manufacturing documentation to set up, fabricate, and weld manufactured parts. The students who complete the program will have the foundational skills to prepare them for entry-level manufacturing technician roles in welding.

III. PROGRAM LENGTH:

The manufacturing Technician course is 90 hours long, over approximately 3 instructional weeks.

IV. PROGRAM OBJECTIVES:

Upon successful completion of this course, the student will gain the skills and knowledge necessary to perform the following manufacturing tasks:

A. Acquire and accurately use manufacturing sector terminology and protocols at the career readiness level for communicating effectively in verbal and written formats.
B. Use existing and emerging technology to produce products and services required in the manufacturing workplace environment.
C. Create alternative solutions to solve a problem unique to the manufacturing sector using critical and creative thinking, logical reasoning, and problem-solving techniques.
D. Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the manufacturing workplace environment.
E. Apply essential technical knowledge and skills common in the manufacturing sector, following procedures when performing technical tasks.
F. Demonstrate and apply the knowledge and skills contained in industry standards in the classroom, laboratory, and workplace settings.

G. Validate that a provided part meets specifications from its engineering drawing by comparing specifications by demonstrating proper technique using appropriate precision measuring tools.
H. Describe and layout a project according to specifications or engineering drawings.
I. Demonstrate a saw operation(s) to produce a length of bar stock to specification.
J. Demonstrate bending, shaping, other metal forming, and fabrication techniques, including processes such as basic hand filing, knurling on a lathe, forging metal shapes or objects, green sand casting, sheet metal machines, spot welding equipment or rivets, cold form bending with cold forming machinery or homemade devices, and shapes to achieve a specific design specification.
K. Demonstrate how materials can be processed through the use of welding tools and equipment.
L. Differentiate and apply various types of welding assembly processes..
M. Explore and understand various welding systems that require standard hand and machine tools.
N. Understand various joining or combining processes, including welding processes used in manufacturing, maintenance, and repair.

V. COMPETENCY TESTS:

Students will complete online unit module exams for online lessons in SME ToolingU. Students also complete separate written exams and hands-on competency evaluations for certifications to AWS standards for related topics. The final exam is conducted at the end of the class. The instructor also observes student performance and learning through informal formative assessment.

LEARNING ACTIVITIES:

(NOTE: These are ESTIMATED times and can fluctuate based on student performance and industry (advisory committee) input)

Units of Instruction and total hours of instruction

1. Welding Fabrication I (90 hrs.)

[Prerequisite: Intro to Manufacturing or Manufacturing Pre-Appenticeship]

1.1. Overview of welding processes
1.2. Identify and apply essential hand tools and deburring techniques associated with welding processes
1.3. Demonstrate the use of welding safety procedures and Personal Protective Equipment (PPE)
1.4. Apply welding set-up and layout techniques
1.5. Apply welding fixture techniques

1.6. Demonstrate safe operation of basic pneumatic and power tools associated with welding fabrication
  1.6.1. Handheld grinders
  1.6.2. Abrasive saws
1.7. Demonstrate safe operation of manual machines:
  1.7.1. Oxy/Fuel welding, cutting, and brazing
  1.7.2. Arc welders, MIG & Stick Rod
  1.7.3. Plasma cutter
1.8. Perform in-process and final inspection techniques for welding processes
1.9. Construct projects by interpreting drawings and manufacturing specifications
1.10. Prepare for applicable AWS certification exam(s)

Total program hours 90

VI. INSTRUCTIONAL MATERIALS:

Various instructional techniques are used, including instructor demonstrations, computer-based tutorials, multimedia presentations, and individual and group projects. Software resources for shop floor and material resource management will also be used to provide an authentic real-life experiential learning environment in the lab. Raw materials and components to support lab actives and manipulatives for demonstration.

VII. EQUIPMENT:

The following types of equipment used throughout the course:

Horizontal and Vertical Bandsaws
Drill Presses
Sheers
Pan Break
Hydraulic press
Sheet metal roll
Ironworker
Notchers
Manual Mills
plasma cutter
OXY/Fuel Torch
Arc welders (MIG & Stick)
Metrology bench tools
Hand tools for welding shops
Blasting and finishing equipment
Grinders

Abrasive cutting equipment

VIII. METHOD OF PROGRAM EVALUATION:

Students complete online module exams for each online module in the SME ToolingU and have both periodic mid-unit formative assessments and end-of-unit assessments based on specific unit topics covered by lecture topics. Industry certification exams based on SME, AWS, and other industry groups will be offered at appropriate program milestones. Assessments may be in the form of paper or computer-based tests, hands-on skills demonstration activities, and unit signature projects. The last unit in the program is a culminating capstone project that tests the program's skills that simulate an authentic, real-world manufacturing project. Grading is to be 50% based on exams and quizzes and 50% on lab-based activities.

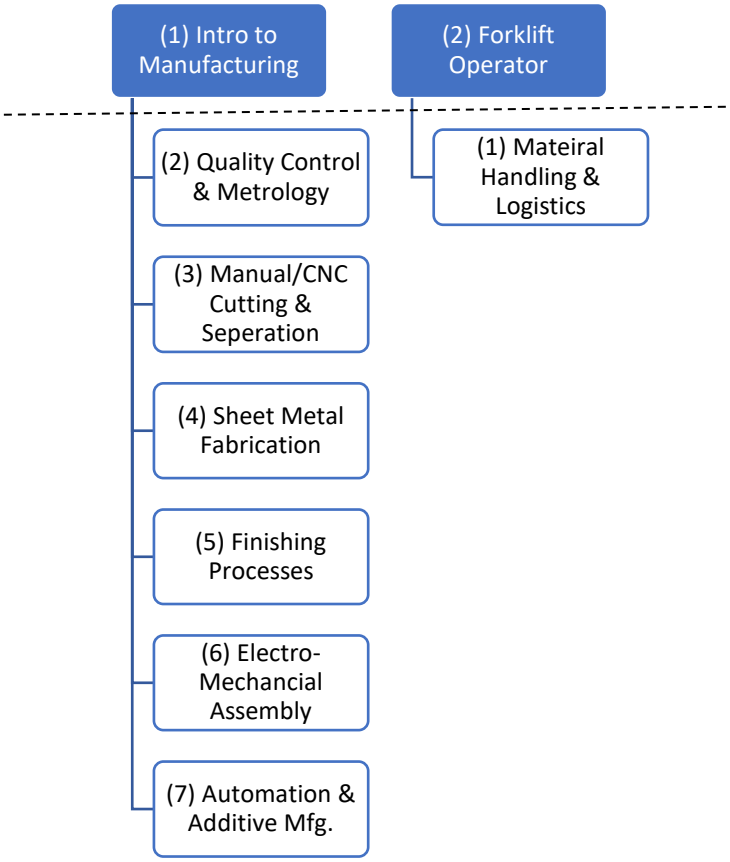
IX. LEVEL OF SKILLS AND/OR PROFICIENCY REQUIRED FOR COMPLETION:

Each student must achieve a score of 75% overall mastery to complete the program successfully. If offered, the mastery of individual industry certification exams is governed by the accrediting organization and may vary by organization but typically range from 70%-80%. Program completion is not required to sign up for industry certification examinations. However, we highly recommend that students finish the program to prepare them to perform well on the exams.

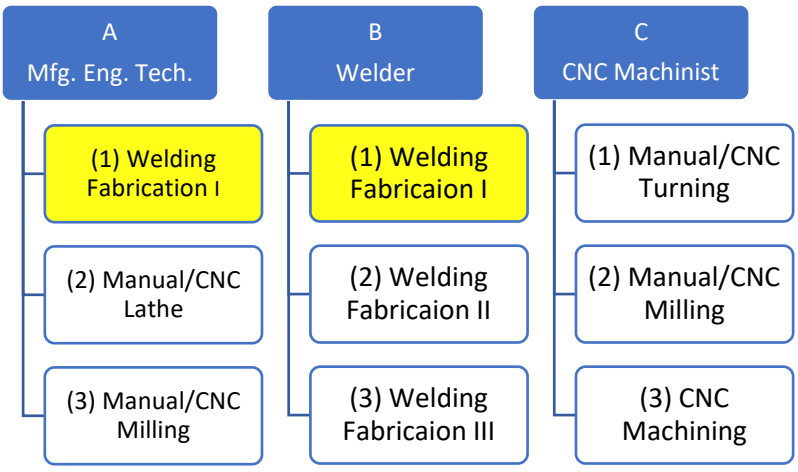
IX. APPROPRIATE DELIVERY FORMATS FOR THE SUBJECT MATTER BEING TAUGHT:

Course content delivery is through a traditional classroom and laboratory format. The program includes computer-based instruction, which students will complete according to a defined schedule in a supervised computer lab. Copies of computer-based instructional materials are available upon request. Students will also have instructional time performing hands-on applications in the manufacturing lab, simulating the documentation and software used in a modern manufacturing environment.

FOUNDATIONAL & CORE UNITS



SPECIALTY TRACK UNITS



CAPSTONE UNITS

Sacramento City Unified School District

ADULT EDUCATION COURSE OUTLINE

PROGRAM AREA: Career Technical Education **COURSE NUMBER**: _____

ADULT SCHOOL: Sacramento City Unified School District **UPDATED**: May 21, 2022

SCHOOL SITE: Charles A. Jones Career and Education Center **TOTAL HOURS**: 900

COURSE TITLE: Manufacturing Technician

COURSE DESCRIPTION:

This program prepares the student with the principles and technical skills for manufacturing products. The core competencies related to industrial processes covered in this program are rooted in California/Occupational Safety and Health Administration (Cal/OSHA), Society of Manufacturing Engineers (SME), National Insitute of Metalworking Standards (NIMS), and Amerian Welding Society (AWS) standards. The training contains fundamental knowledge of manufacturing processes, including troubleshooting manufacturing problems through hands-on experiential learning. After completing the training, students will have the knowledge and technical competency for entry-level employment in the manufacturing industry, trade apprenticeships, and industry-standard certifications. The students who complete the program will have the foundational skills to prepare them for entry-level manufacturing technician roles in welding, assembly, machining, quality, and material handling.

I. ADMISSION REQUIREMENTS

- High school diploma
- Right to Work documentation
- Assessment test with a passing score of 239 for reading and 236 for math
- Cal Jobs registration
- SETA Job Center intake and required workshops
- Attend the one-time Orientation Session on the Charles A. Jones Career and Education Center campus

II. PROGRAM CONTENT THAT IS CONSISTENT WITH DESIRED STUDENT LEARNING OUTCOMES:

To provide students with the essential manufacturing skill and knowledge to enter the workforce as entry-level manufacturing technicians, enter an employer-sponsored apprenticeship program, and earn industry-recognized certifications. Successful students will earn a 10-hr Cal/OSHA General Industry training card, Certified Forklift Operator Card, and pass the SME Certified Manufacturing Associate (CMfgA) exam in the program's first units. Students will learn a wide breadth of skills that prepare them for certification through the National Institute of Metalworking Standards (NIMS) and the American Welding Society (AWS) for appropriate processes. The students will be able to interpret manufacturing documentation to set up, operate, and troubleshoot manufacturing equipment. The students who complete the program will have the foundational skills to prepare them for entry-level manufacturing technician roles in welding, assembly, machining, quality, and material handling.

III. PROGRAM LENGTH:

The manufacturing Technician course is 900 hours long, over approximately 9 months, or 36 instructional weeks.

IV. PROGRAM OBJECTIVES:

Upon successful completion of this course, the student will gain the skills and knowledge necessary to perform the following manufacturing tasks:

A. Acquire and accurately use manufacturing sector terminology and protocols at the career readiness level for communicating effectively in verbal and written formats.
B. Use existing and emerging technology to produce products and services required in the manufacturing workplace environment.
C. Create alternative solutions to solve a problem unique to the manufacturing sector using critical and creative thinking, logical reasoning, and problem-solving techniques.
D. Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the manufacturing workplace environment.
E. Apply essential technical knowledge and skills common in the manufacturing sector, following procedures when performing technical tasks.
F. Demonstrate and apply the knowledge and skills contained in industry standards in the classroom, laboratory, and workplace settings.

G. Validate that a provided part meets specifications from its engineering drawing by comparing specifications by demonstrating proper technique using appropriate precision measuring tools.
H. Describe and layout a project according to specifications or engineering drawings.
I. Demonstrate proper technique with layout tools and work-holding devices such as three- and four-jaw chucks, collet chucks, angle plates, sine bars, parallels, and v-blocks to machine a real part.
J. Research and compare the properties of two metals using two different material specifications and a process specification.
K. Demonstrate a saw operation(s) to produce a length of bar stock to specification.
L. Demonstrate bending, shaping, other metal forming, and fabrication techniques, including processes such as basic hand filing, knurling on a lathe, forging metal shapes or objects, green sand casting, sheet metal machines, spot welding equipment or rivets, cold form bending with cold forming machinery or homemade devices, and shapes to achieve a specific design specification.
M. Identify and select the right grinding wheel, perform wheel dressing, and grind the provided part/material to the size and surface finish specifications provided.
N. Perform a series of routine boring operations from a set of specifications or a drawing and explain the selection of proper tools for each step of the process.
O. Describe and demonstrate the machining of an external and internal taper, knurled part, and threaded and bored part on an engine lathe to plan specification or drawing to produce a part and measure each end diameter within tolerance.
P. Produce parts to specification using a boring head or angular cutting with a sine bar, a keyway, and pockets with a typical vertical mill.
Q. Produce parts to specifications or drawings provided on computer numerical controlled (CNC) machines.
R. Demonstrate common functions or controls through manual input and through programmed input.
S. Demonstrate an understanding of basic G and M Code Programming and the use of the Cartesian coordinate system and machine axis.
T. Demonstrate how materials can be processed through the use of welding tools and equipment.
U. Differentiate and apply various types of welding assembly processes.
V. Understand finishing processes and the differences between various types of finishing materials used in the manufacture of products.
W. Understand and defend the purposes and processes of inspection and quality control in manufacturing processes.
X. Explore and understand various welding systems that require standard hand and machine tools.
Y. Understand various automated welding systems, welding design for manufacturing, flexible manufacturing systems, and materials resource planning.

Z. Understand various joining or combining processes, including welding processes used in manufacturing, maintenance, and repair.

V. COMPETENCY TESTS:

Students will complete online unit module exams for online lessons in SME ToolingU. Students also complete separate written exams and hands-on competency evaluations for certifications to OSHA, SME, and NIMS standards for related topics. Final exams are conducted at the end of each program block. The instructor also observes student performance and learning through informal formative assessment.

LEARNING ACTIVITIES:

(NOTE: These are ESTIMATED times and can fluctuate based on student performance and industry (advisory committee) input)

Units of Instruction and total hours of instruction

Foundational Units (Pre-Requisites 87.5 hrs.)

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1. Introduction To Manufacturing (80 hrs.)

- 1.1.1. Introduction to the five major types of manufacturing processes
  - 1.1.1.1. Additive
  - 1.1.1.2. Subtractive
  - 1.1.1.3. Forming
  - 1.1.1.4. Joining
  - 1.1.1.5. Surface finishing
- 1.1.2. Demonstrate safe operation and use of general hand and power tools
- 1.1.3. Terminology & common components
- 1.1.4. Overview of quality
- 1.1.5. Overview of manufacturing operations
- 1.1.6. General Industry Safety & Health (10-hr Cal/OSHA card)
- 1.1.7. Prepare for the SME Certified Manufacturing Associate (CMfgA) exam

2. Forklift Operator (7.5 Hrs.)

- 2.1. Instruction and assessment on principles of safe operation of counterbalance industrial lift trucks
- 2.2. Demonstration of safe operation of counterbalance industrial lift trucks
- 2.3. Practical exercise operating counterbalance lift trucks
- 2.4. Assessment of individual students operating counterbalance lift trucks on a qualification driving course under the observation of a qualified instructor.

Core Units (430 hrs.)

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1. **Material Handling and Logistics (40 hrs.)**
   [Pre-requisite: current operator training certification for Class I & IV forklifts]
   - 1.1. Overview of manufacturing operations flow
     - 1.1.1. Estimating and Quoting
     - 1.1.2. Order entry
     - 1.1.3. Purchasing, Purchase orders (PO)
     - 1.1.4. Project planning, Work orders (WO) & traveler packages
     - 1.1.5. Packing Slips (PS)
     - 1.1.6. Bills of Lading (BL)
     - 1.1.7. Essential functions of Material/Enterprise Resource Planning (MRP/ERP) systems
   - 1.2. Logistics
     - 1.2.1. Inventory system transactions
       - 1.2.1.1. Receiving
       - 1.2.1.2. Work In Progress (WIP) transactions
       - 1.2.1.3. Finished goods inventory
       - 1.2.1.4. Shipping
     - 1.2.2. Material handling
       - 1.2.2.1. Forklift activities
       - 1.2.2.2. Packaging
       - 1.2.2.3. Lifting (hoists, cranes, and slings)
       - 1.2.2.4. Physical inventory
       - 1.2.2.5. Tool crib (room) management

2. **Quality Control and Metrology (90 hrs.)**
   [Pre-requisite: Intro to Manufacturing or Manufacturing Pre-Appenticeship]
   - 2.1. Overview of Quality Systems
     - 2.1.1. AS9100
     - 2.1.2. ISO900x
     - 2.1.3. 5S
     - 2.1.4. Six Sigma
   - 2.2. Manufacturing Documentation
     - 2.2.1. Blueprint reading
     - 2.2.2. Basics of tolerance
     - 2.2.3. Quality Inspection Reports (QIR)
     - 2.2.4. Discrepancy tags and Discrepancy Material Reports (DMR)
     - 2.2.5. Material Review Board (MRB)
   - 2.3. Metrology
     - 2.3.1. Basics of measurement
     - 2.3.2. Reading dials and vernier scales

2.3.3. Layout dye and scribing
2.3.4. Use of calipers
2.3.5. Use of micrometers
2.3.6. Use of height gages
2.3.7. Use of gage blocks
2.3.8. Use of gage pins
2.3.9. Use of Go-Nogo gages, including thread gages
2.3.10. Inspection of threads
2.3.11. Inspection of surface roughness
2.3.12. Inspection of material hardness
2.3.13. Surface plate set-up and care including:
2.3.13.1. Sine bar and gage block stack calculation
2.3.13.2. Angle plates
2.3.13.3. Vee-blocks

2.4. Coordinate Measurement Machine (CMM)
2.4.1. Cartesian coordinate system and six degrees of freedom
2.4.2. Importation of Computer-Aided Design solid model data
2.4.3. Conceptual programming flow
2.4.4. Machine set-up
2.4.5. Operating CMM and output of QIR data

2.5. Inspection of projects by interpreting drawings and manufacturing specifications
2.6. Prepare for applicable NIMS certification exam(s)

3. Manual/CNC Cutting & Separation (90 hrs.)

[Pre-requisite: Intro to Manufacturing or Manufacturing Pre-Appenticeship]

3.1. Overview of cutting and separation processes
3.1.1. Identify and apply essential hand tools and deburring techniques associated with cutting and separation processes

3.2. Demonstrate safe operation of basic pneumatic and power tools
3.2.1. Pedestal grinders, including wheel selection

3.3. Demonstrate safe operation manual machines:
3.3.1. Band saws (horizontal and vertical configurations)
3.3.2. Sheers (mechanical, hydraulic, and power)
3.3.3. Abrasive wheel saws
3.3.4. Ironworker cutting operations

3.4. Overview of XY table CNC cutting machine types and configurations
3.5. Review of Cartesian coordinate systems as related to XY table CNC cutting machines
3.6. Demonstrate safe operation XY table CNC cutting machines
3.6.1. CNC plasma jet cutter
3.6.2. CNC water jet cutter
3.6.3. CNC laser engraving/cutter

3.7. Perform in-process and final inspection techniques for cutting and separation processes
3.8. Construct projects by interpreting drawings and manufacturing specifications

3.9. Prepare for applicable NIMS certification exam(s)

4. Sheet Metal Fabrication (90 hrs.)

[Pre-requisite: Intro to Manufacturing or Manufacturing Pre-Appenticeship]

4.1.1. Overview of sheet metal processes
4.1.2. Identify and apply hand tools and deburring techniques associated with sheet metal fabrication processes
4.1.3. Demonstrate safe operation manual machines:
4.1.3.1. Brakes (pan & press)
4.1.3.2. Sheers (mechanical, hydraulic, and power)
4.1.3.3. Notchers
4.1.3.4. Rolls
4.1.3.5. Tube Benders
4.1.3.6. Flanging machines
4.1.3.7. Punches
4.1.4. Demonstrate safe operation of CNC cutting machines
4.1.4.1. CNC punch
4.1.5. Sheet metal hardware and safe fabrication techniques
4.1.5.1. Basics of threaded and non-threaded sheet metal fasteners
4.1.5.2. Riveting
4.1.5.3. Swaging
4.1.6. Perform in-process and final inspection techniques for sheet metal fabrication processes
4.1.7. Construction of projects by interpreting drawings and manufacturing specifications
4.1.8. Prepare for applicable NIMS certification exam(s)

5. Finishing Processes (40 hrs.)

[Pre-requisite: Intro to Manufacturing or Manufacturing Pre-Appenticeship]

5.1. Overview of the part finishing processes
5.1.1. Mechanical
5.1.2. Chemical
5.1.2.1. Plating
5.1.2.2. Anodizing
5.1.2.3. Passivation
5.1.2.4. Alodine
5.1.2.5. Heat treatment
5.1.3. Coatings
5.1.3.1. Spray painting (liquid, dry powder)
5.1.3.2. Dip coatings
5.1.3.3. Disposition coatings
5.2. Identify and apply essential hand tools and deburring techniques associated with finishing processes

5.3. Identify and apply the basics of hand finishing and handling of manufactured parts
5.4. Demonstrate safe operation manual machines:
5.4.1. Media blasters (sand, bead, etc.)
5.4.2. Grinders
5.4.3. Buffers
5.4.4. Tumblers
5.4.5. Spray coating equipment
5.5. Perform in-process and final inspection techniques for finishing processes
5.6. Construct projects by interpreting drawings and manufacturing specifications
5.7. Prepare for applicable NIMS certification exam(s)

6. Electro-Mechanical Assembly (40 hrs.)

[Pre-requisite: Intro to Manufacturing or Manufacturing Pre-Appenticeship]

6.1.1. Overview of electromechanical processes
6.1.2. Identify and apply basic hand tools associated with mechanical assembly
6.1.3. Demonstrate safe operation manual machines:
6.1.3.1. Presses (arbor, hydraulic)
6.1.4. Demonstrate safe operation of CNC cutting machines
6.1.4.1. CNC laser engraving
6.1.5. Perform in-process and final inspection techniques for mechanical assembly processes
6.1.6. Identify and apply mechanical assembly hardware and fabrication techniques
6.1.6.1. Advanced threaded and non-threaded fasteners
6.1.6.2. Mechanical components
6.1.6.3. Pressing interference fit hardware
6.1.6.4. Basics of lubricants, adhesives, sealants, and thread locking compounds
6.1.7. Identify and apply basic hand tools associated with electromechanical assembly
6.1.8. Demonstrate safe operation manual machines:
6.1.8.1. Soldering irons & soldering guns
6.1.8.2. Digital Multi-Meters (DMMs)
6.1.8.3. Heat shrink and crimping equipment
6.1.9. Perform in-process and final inspection techniques for electromechanical assembly processes
6.1.10. Identify and apply electromechanical assembly hardware and processes
6.1.10.1. Circuit boards and solid-state hardware
6.1.10.2. Wiring harness connectors
6.1.10.3. Heat shrinking
6.1.10.4. Wire labeling
6.1.10.5. Crimping hardware
6.1.10.6. Basics of soldering, de-soldering, fluxes, and insulating compounds
6.1.11. Troubleshoot electrical connections through continuity testing
6.1.12. Construct projects by interpreting drawings and manufacturing specifications

7. Automation and Additive Manufacturing (40 hrs.)

[Pre-requisite: Intro to Manufacturing or Manufacturing Pre-Appenticeship]

7.1. Overview of automation processes

7.2. Overview of additive manufacturing processes and technology

7.2.1. Casting

7.2.2. Molding

7.2.3. SLS

7.2.4. SLA

7.2.5. FDM

7.2.6. LOM

7.3. Demonstrate safe operation of Additive Manufacturing FDM equipment (3D Printing)

7.4. Prepare for the SME Additive Manufacturing certification (AM) exam

Specialty Track Units (Complete one Track, 270 Hrs.)

Track A Units –Manufacturing Engineering Technician (270 Hrs.)

1. Welding Fabrication I (90 hrs.)

[Pre-requisite: Intro to Manufacturing or Manufacturing Pre-Appenticeship]

1.1. Overview of welding processes

1.2. Identify and apply essential hand tools and deburring techniques associated with welding processes

1.3. Demonstrate the use of welding safety procedures and Personal Protective Equipment (PPE)

1.4. Apply welding set-up and layout techniques

1.5. Apply welding fixture techniques

1.6. Demonstrate safe operation of basic pneumatic and power tools associated with welding fabrication

1.6.1. Handheld grinders

1.6.2. Abrasive saws

1.7. Demonstrate safe operation of manual machines:

1.7.1. Oxy/Fuel welding, cutting, and brazing

1.7.2. Arc welders, MIG & Stick Rod

1.7.3. Plasma cutter

1.8. Perform in-process and final inspection techniques for welding processes

1.9. Construct projects by interpreting drawings and manufacturing specifications

1.10. Prepare for applicable AWS certification exam(s)

1. Manual/CNC Turning (90 hrs.)

[Pre-requisite: Manual/CNC Cutting & Separation]

1.1. Overview of lathe types and configurations

1.2. Essential hand tools and deburring techniques associated with lathe machining

1.3. Review of Cartesian coordinate systems as related to the axis of motion of lathes
1.4. Basics of lathe cutting tools, tool holding, and work holding systems
1.5. Calculate speed and feed parameters for lathe operations
1.6. Demonstrate safe set-up and operation of manual lathes:
1.7. Demonstrate safe set-up and operation of CNC lathes, including essential G & M codes
1.8. Perform in-process and final inspection techniques for lathe machining processes
1.9. Construct projects by interpreting drawings and manufacturing specifications
1.10. Prepare for applicable NIMS certification exam(s)

2. Manual/CNC Milling (90 hrs.)

[Pre-requisite: Manual/CNC Cutting & Separation]

2.1. Overview of milling machine types and configurations
2.2. Essential hand tools and deburring techniques associated with milling machining
2.3. Review of Cartesian coordinate systems as related to the axis of motion of milling machines
2.4. Basics of milling cutting tools, tool holding, and work holding systems
2.5. Calculate speed and feed calculations for lathe operations
2.6. Demonstrate safe set-up and operation of manual vertical mills:
2.7. Demonstrate safe set-up and operation of CNC mills, including essential G & M codes
2.8. Perform in-process and final inspection techniques for milling machining processes
2.9. Construct projects by interpreting drawings and manufacturing specifications
2.10. Prepare for applicable NIMS certification exam(s)

Track B Units –Welder (270 Hrs.)

2. Welding Fabrication I (90 hrs.)

[Pre-requisite: Intro to Manufacturing or Manufacturing Pre-Appenticeship]

2.1. Overview of welding processes
2.2. Identify and apply essential hand tools and deburring techniques associated with welding processes
2.3. Demonstrate the use of welding safety procedures and Personal Protective Equipment (PPE)
2.4. Apply welding set-up and layout techniques
2.5. Apply welding fixture techniques
2.6. Demonstrate safe operation of basic pneumatic and power tools associated with welding fabrication
2.6.1. Handheld grinders
2.6.2. Abrasive saws
2.7. Demonstrate safe operation of manual machines:
2.7.1. Oxy/Fuel welding, cutting, and brazing
2.7.2. Arc welders, MIG & Stick Rod
2.7.3. Plasma cutter
2.8. Perform in-process and final inspection techniques for welding processes
2.9. Construct projects by interpreting drawings and manufacturing specifications

2.10. Prepare for applicable AWS certification exam(s)

3. Welding Fabrication II (90 hrs.)

[Pre-requisite: Welding Fabrication I]

3.1. Review of welding processes and intermediate techniques.
3.2. Demonstrate the use of welding safety procedures and Personal Protective Equipment (PPE)
3.3. Apply intermediate welding set-up and layout techniques
3.4. Apply intermediate welding fixture techniques
3.5. Demonstrate safe operation of basic pneumatic and power tools associated with welding fabrication
  3.5.1. Handheld grinders
  3.5.2. Abrasive saws
3.6. Demonstrate safe operation manual machines:
  3.6.1. Oxy/Fuel welding, cutting, and brazing
  3.6.2. Arc welders, MIG, TIG & Stick Rod
  3.6.3. Plasma cutter
3.7. Perform in-process and final inspection techniques for welding processes
3.8. Construct projects by interpreting drawings and manufacturing specifications
3.9. Prepare for applicable AWS certification exam(s)

4. Welding Fabrication III (90 hrs.)

[Pre-requisite: Welding Fabrication II]

4.1. Review of welding processes and advanced techniques.
4.2. Demonstrate the use of welding safety procedures and Personal Protective Equipment (PPE)
4.3. Apply advanced welding set-up and layout techniques
4.4. Apply advanced welding fixture techniques
4.5. Demonstrate safe operation of basic pneumatic and power tools associated with welding fabrication
  4.5.1. Handheld grinders
  4.5.2. Abrasive saws
4.6. Demonstrate safe operation of manual machines:
  4.6.1. Oxy/Fuel welding, cutting, and brazing
  4.6.2. Arc welders, MIG, TIG & Stick Rod
  4.6.3. Plasma cutter
  4.6.4. Resistance welders (spot welding)
4.7. Perform in-process and final inspection techniques for welding processes
4.8. Construct projects by interpreting drawings and manufacturing specifications
4.9. Prepare for applicable AWS certification exam(s)

Track C Units –CNC Machinist (270 Hrs.)

1. Manual/CNC Milling (90 hrs.)

[Pre-requisite: Manual/CNC Cutting & Separation]

1.1. Overview of milling machine types and configurations
1.2. Essential hand tools and deburring techniques associated with milling machining
1.3. Review of Cartesian coordinate systems as related to the axis of motion of milling machines
1.4. Basics of milling cutting tools, tool holding, and work holding systems
1.5. Calculate speed and feed calculations for lathe operations
1.6. Demonstrate safe set-up and operation of manual vertical mills:
1.7. Demonstrate safe set-up and operation of CNC mills, including essential G & M codes
1.8. Perform in-process and final inspection techniques for milling machining processes
1.9. Construct projects by interpreting drawings and manufacturing specifications
1.10. Prepare for applicable NIMS certification exam(s)

2. Manual/CNC Turning (90 hrs.)

[Pre-requisite: Manual/CNC Cutting & Separation]

2.1. Overview of lathe types and configurations
2.2. Essential hand tools and deburring techniques associated with lathe machining
2.3. Review of Cartesian coordinate systems as related to the axis of motion of lathes
2.4. Basics of lathe cutting tools, tool holding, and work holding systems
2.5. Calculate speed and feed parameters for lathe operations
2.6. Demonstrate safe set-up and operation of manual lathes:
2.7. Demonstrate safe set-up and operation of CNC lathes, including essential G & M codes
2.8. Perform in-process and final inspection techniques for lathe machining processes
2.9. Construct projects by interpreting drawings and manufacturing specifications
2.10. Prepare for applicable NIMS certification exam(s)

3. **CNC Machining (90 hrs.)**

[Pre-requisite: Manual/CNC Milling and Manual/CNC Turning]

3.1. Advanced milling cutting tools, tool holding, and work holding systems
3.2. Calculate speed and feed calculations for advanced lathe and mill operations
3.3. Demonstrate safe set-up and operation of CNC mills and CNC lathes, including advanced G & M codes
3.4. Perform in-process and final inspection techniques for machining processes
3.5. Construct projects by interpreting drawings and manufacturing specifications
3.6. Prepare for applicable NIMS certification exam(s)

Capstone (112.5-350 Hrs.)

---

1. Capstone Project and/or Capstone Externship (112.5-350 Hrs.)

[Pre-requisite: Complete Foundational Units, Core Units, and Specialty Track Unit A, B, or C]

1.1. Capstone Project

1.1.1. Culminating project demonstrating skills learned in the program focusing on the area of specialty.
1.1.2. Select from several predetermined project options
1.1.3. Construct project by interpreting drawings and manufacturing specifications
1.1.4. Students may propose a concept for approval for the capstone project provided:
1.1.4.1. The project reflects elements from each unit in the program
1.1.4.2. Obtain senior faculty approval for the project
1.2. Capstone Externship
1.2.1. Externship requirements:
1.2.1.1. Reflect applied skills that align with a specialty track
1.2.1.2. Obtain senior faculty for the project
1.2.1.3. Hours applied must be recorded and validated by the worksite supervisor and reported to the instructor of record.

Total program hours 900

VI. INSTRUCTIONAL MATERIALS:

Various instructional techniques are used, including instructor demonstrations, computer-based tutorials, multimedia presentations, and individual and group projects. Software resources for CAD/CAM programming, CNC code editing, shop floor, and material resource management provide an authentic real-life experiential learning environment in the lab. Raw materials and components to support lab actives and manipulatives for demonstration.

VII. EQUIPMENT:

The following types of equipment used throughout the course:

Horizontal and Vertical Bandsaws
Drill Presses
Sheers
Pan Break
Hydraulic press
Sheet metal roll
Ironworker
Notchers
Manual Lathes
Manual Mills
CNC Lathes
CNC Mills
CNC plasma cutters
CNC waterjet

OXY/Fuel Torch
Arc welders
Soldering Irons
3D printers
Laser engravers
Coordinate Measurement Machines
Metrology bench tools
Hand tools for machine shop, assembly, and welding shops
Blasting and finishing equipment
Painting and paint prep. equipment
Industrial Robotics & automation equipment

VIII. METHOD OF PROGRAM EVALUATION:

Students complete online module exams for each online module in the SME ToolingU and have both periodic mid-unit formative assessments and end-of-unit assessments based on specific unit topics covered by lecture topics. Industry certification exams based on SME, NIMS, AWS, Cal/OSHA, and other industry groups are offered at appropriate program milestones. Assessments may be in the form of paper or computer-based tests, hands-on skills demonstration activities, and unit signature projects. The last unit in the program is a culminating capstone project that tests the program's skills that simulate an authentic, real-world manufacturing project. Grading is 50% based on exams and quizzes and 50% on lab-based activities.

IX. LEVEL OF SKILLS AND/OR PROFICIENCY REQUIRED FOR COMPLETION:

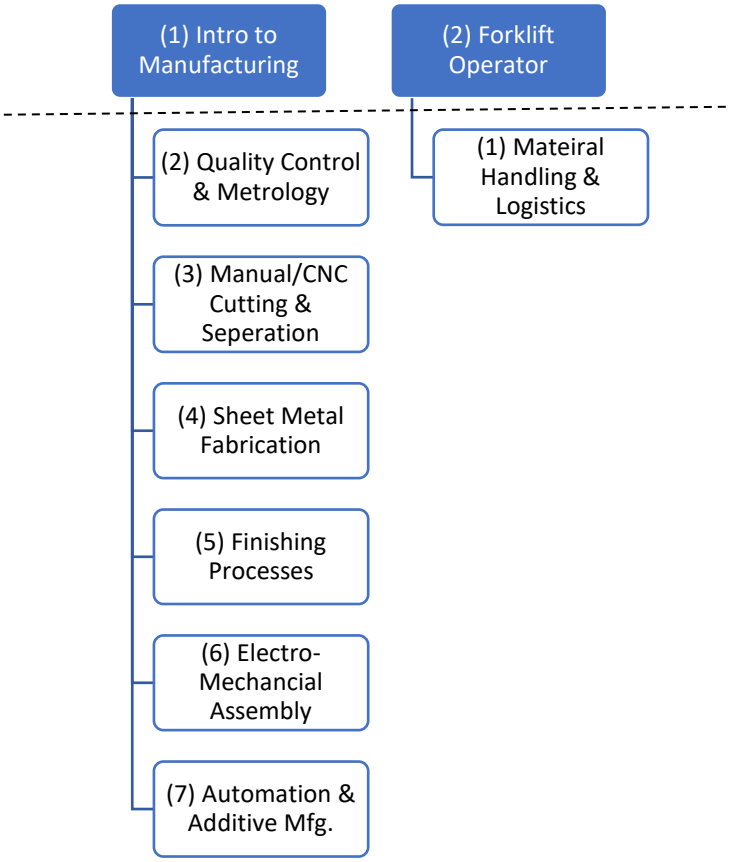
Each student must achieve a score of 75% overall mastery to complete the program successfully. The mastery of individual industry certification exams is governed by the accrediting organization and may vary by organization but typically range from 70%-80%. Program completion is not required to sign up for industry certification examinations. However, we highly recommend that students finish the program to prepare them to perform well on the exams.

IX. APPROPRIATE DELIVERY FORMATS FOR THE SUBJECT MATTER BEING TAUGHT:

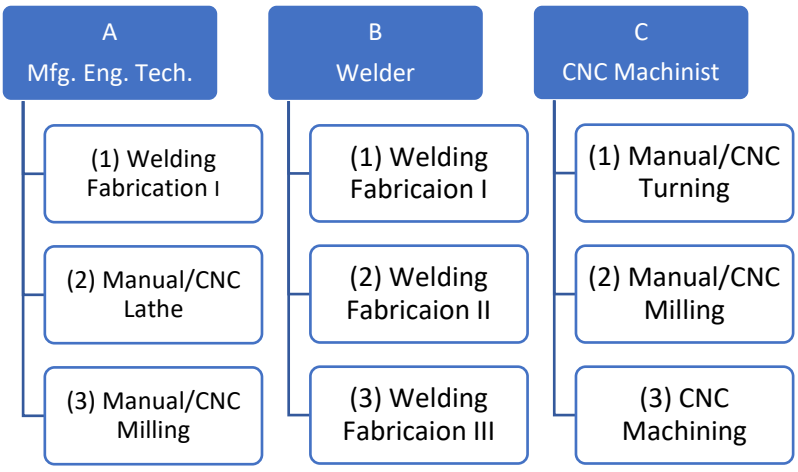
Course content delivery is through a traditional classroom and laboratory format. The program includes computer-based instruction, which students will complete according to a defined schedule in a supervised computer lab. Copies of computer-based instructional materials are available upon request. Students will also have instructional time performing

hands-on applications in the manufacturing lab, simulating the documentation and software used in a modern manufacturing environment.

FOUNDATIONAL & CORE UNITS



SPECIALTY TRACK UNITS



CAPSTONE UNITS

CareerOneStop Occupation Profile

Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic

Description: what do they do?

Set up, operate, or tend more than one type of cutting or forming machine tool or robot.

Also known as:

CNC Machine Setter (Computer Numerically Controlled Machine Setter), Cell Technician, Fabrication Set-Up Person, Injection Molding Technician, Machine Operator, Machine Technician, Mold Setter, Production Operator, Shear Operator, Tooling Set-Up Person

---

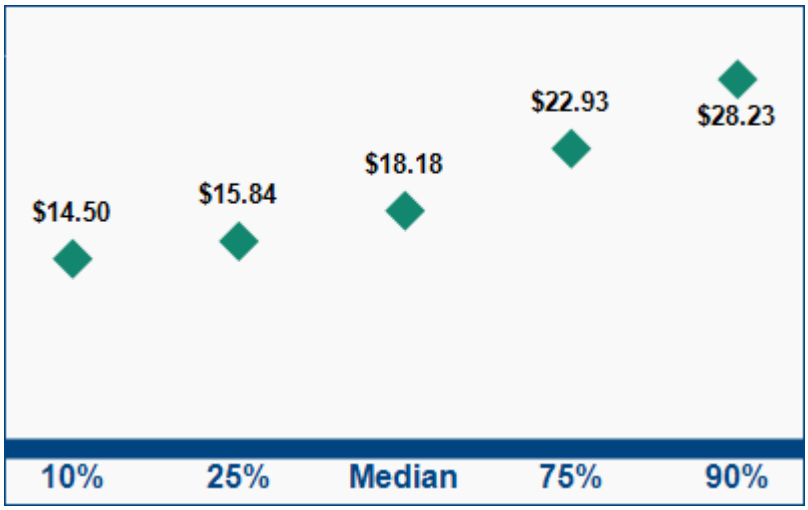
Projected employment

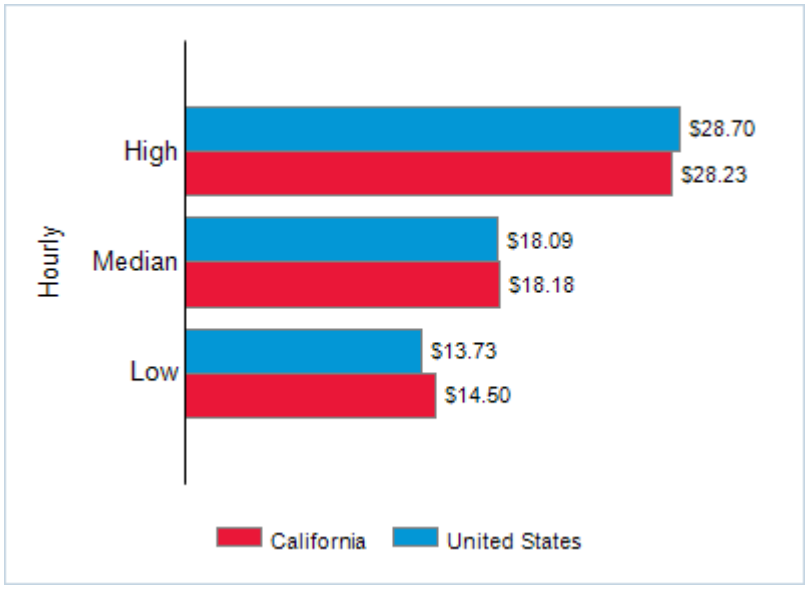
California	United States
6,300 **2018 Employment**	138,400 **2020 Employment**
6,300 **2028 Employment**	150,200 **2030 Employment**
0% **Percent change**	9% **Percent change**
660 **Annual projected job openings**	15,600 **Annual projected job openings**

Compare projected employment

Typical wages

Hourly wages for Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic in California



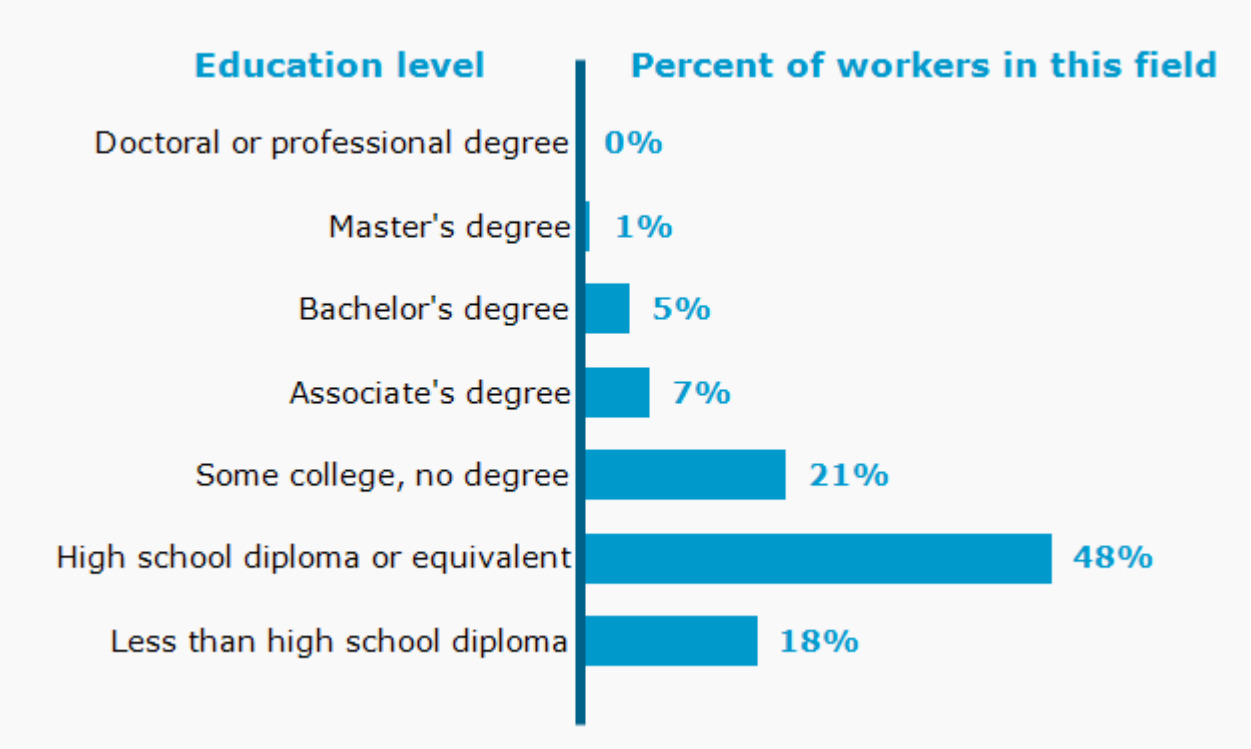


Location	California	United States
10%	$14.50	$13.73
25%	$15.84	$14.56
Median	$18.18	$18.09
75%	$22.93	$22.84
90%	$28.23	$28.70

See more wages

Typical education

How much education do most people in this career have?



Find local training

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https://www.CareerOneStop.org/Toolkit/Careers/Occupations/occupation-profile.aspx

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CareerOneStop Occupation Profile

Electro-Mechanical and Mechatronics Technologists and Technicians

Description: what do they do?

Operate, test, maintain, or adjust unmanned, automated, servomechanical, or electromechanical equipment. May operate unmanned submarines, aircraft, or other equipment to observe or record visual information at sites such as oil rigs, crop fields, buildings, or for similar infrastructure, deep ocean exploration, or hazardous waste removal. May assist engineers in testing and designing robotics equipment.

Also known as:

Designer, Electro-Mechanic, Electro-Mechanical Technician (E/M Technician), Electronic Technician, Engineering Specialist, Engineering Technician, Maintenance Technician, Mechanical Technician, Process Control Tech, Product Test Specialist

---

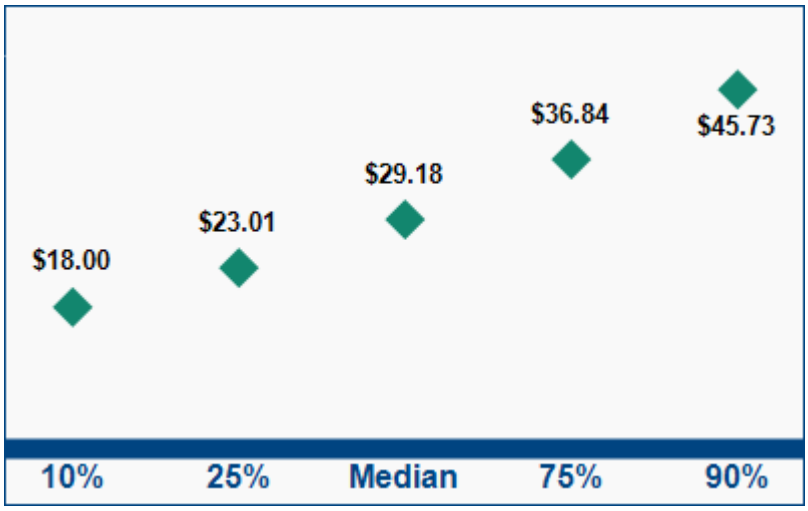
Projected employment

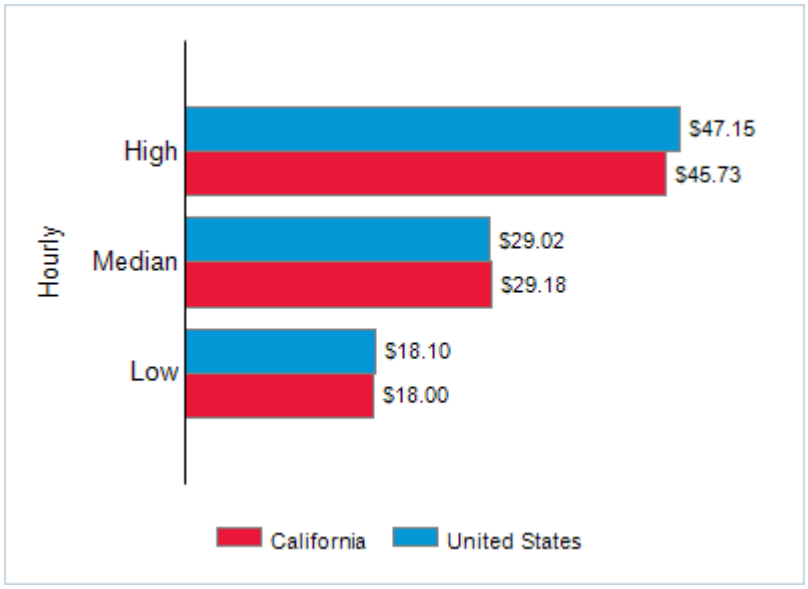
California	United States
2,500 **2018 Employment**	13,400 **2020 Employment**
2,700 **2028 Employment**	13,100 **2030 Employment**
8% **Percent change**	-2% **Percent change**
270 **Annual projected job openings**	1,200 **Annual projected job openings**

Compare projected employment

Typical wages

Hourly wages for Electro-Mechanical and Mechatronics Technologists and Technicians in California



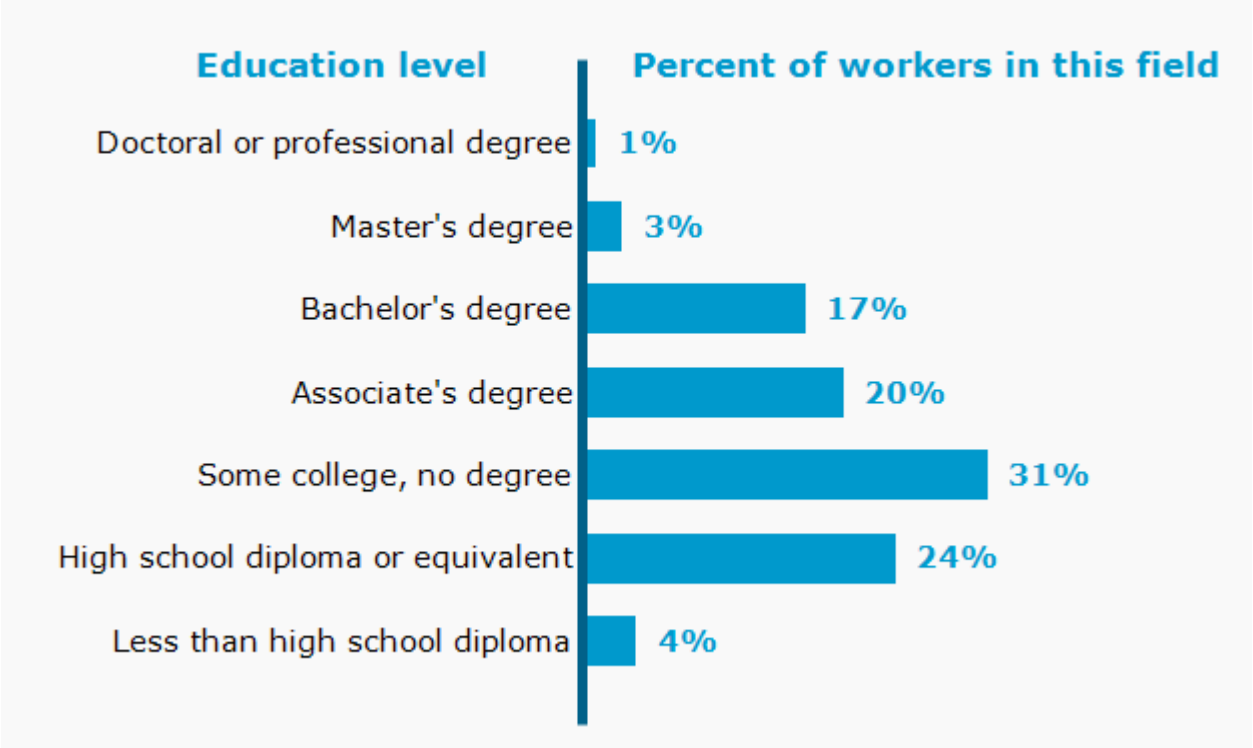


Location	California	United States
10%	$18.00	$18.10
25%	$23.01	$22.92
Median	$29.18	$29.02
75%	$36.84	$36.98
90%	$45.73	$47.15

See more wages

Typical education

How much education do most people in this career have?



Find local training

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Find more information including data update schedules at CareerOneStop's Data Sources (https://www.careeronestop.org/Help/data-sources.aspx).

CareerOneStop Occupation Profile

Shipping, Receiving, and Inventory Clerks

Description: what do they do?

Verify and maintain records on incoming and outgoing shipments involving inventory. Duties include verifying and recording incoming merchandise or material and arranging for the transportation of products. May prepare items for shipment.

Also known as:

Materials Control Associate, Order Fulfillment Specialist, Receiver, Receiving Associate, Receiving Clerk, Receiving Coordinator, Shipper, Shipping Clerk, Shipping Coordinator, Traffic Assistant

---

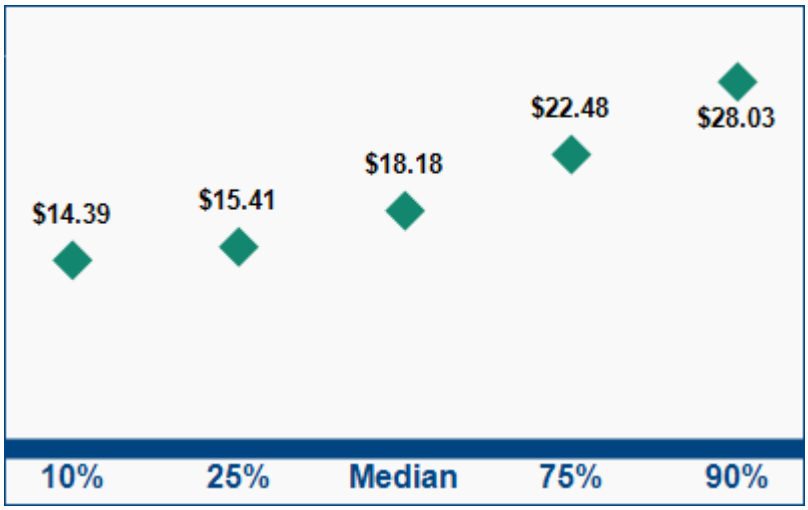
Projected employment

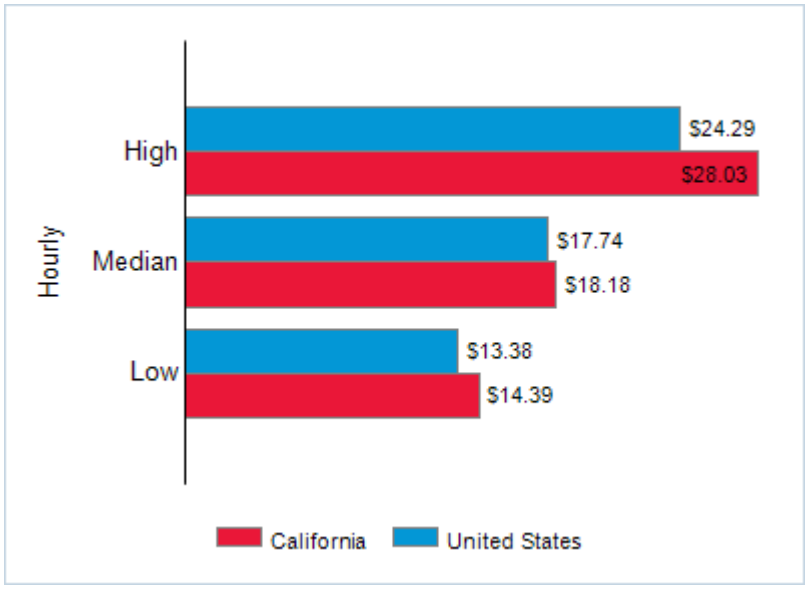
California	United States
93,600 **2018 Employment**	734,900 **2020 Employment**
99,100 **2028 Employment**	694,300 **2030 Employment**
6% **Percent change**	-6% **Percent change**
10,110 **Annual projected job openings**	64,000 **Annual projected job openings**

Compare projected employment

Typical wages

Hourly wages for Shipping, Receiving, and Inventory Clerks in California



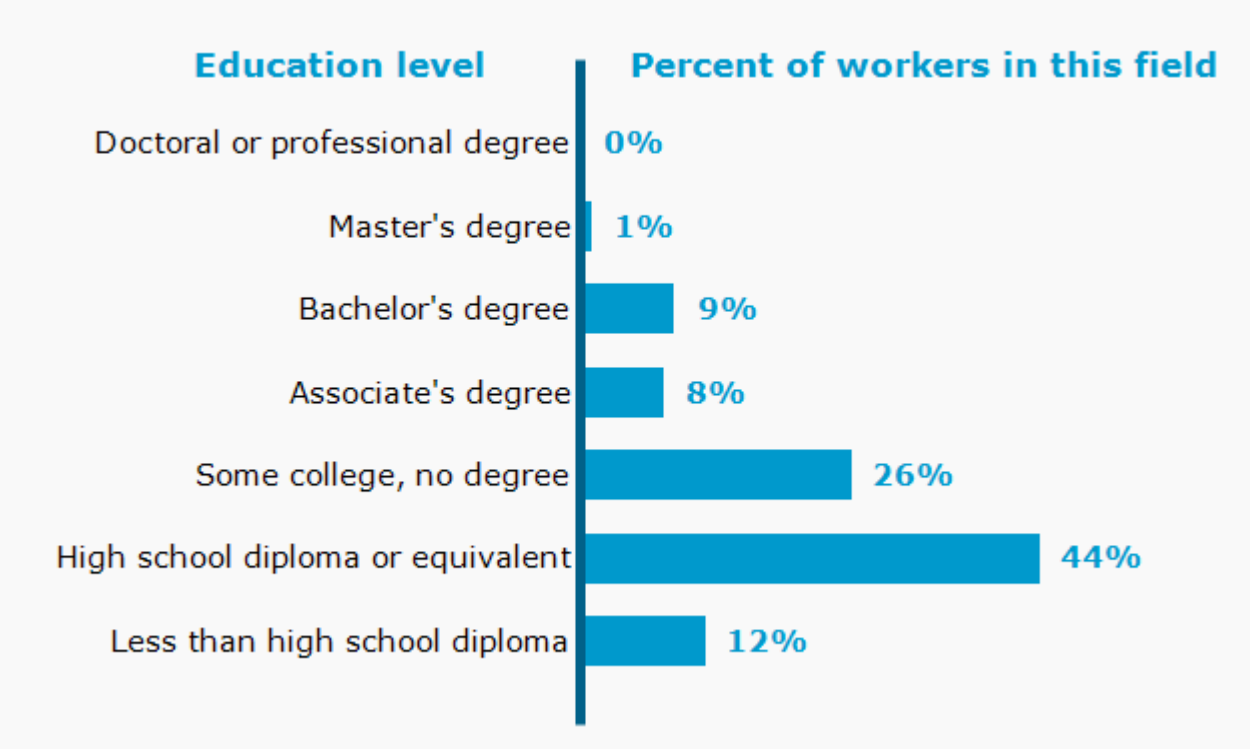


Location	California	United States
10%	$14.39	$13.38
25%	$15.41	$14.35
Median	$18.18	$17.74
75%	$22.48	$21.97
90%	$28.03	$24.29

See more wages

Typical education

How much education do most people in this career have?



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CareerOneStop Occupation Profile

Welders, Cutters, Solderers, and Brazers

Description: what do they do?

Use hand-welding, flame-cutting, hand-soldering, or brazing equipment to weld or join metal components or to fill holes, indentations, or seams of fabricated metal products.

Also known as:

Aluminum Welder, Assembly Line Brazer, Brazer, Fabrication Welder, Fabricator, Maintenance Welder, Solderer, Sub Arc Operator, Welder, Wirer

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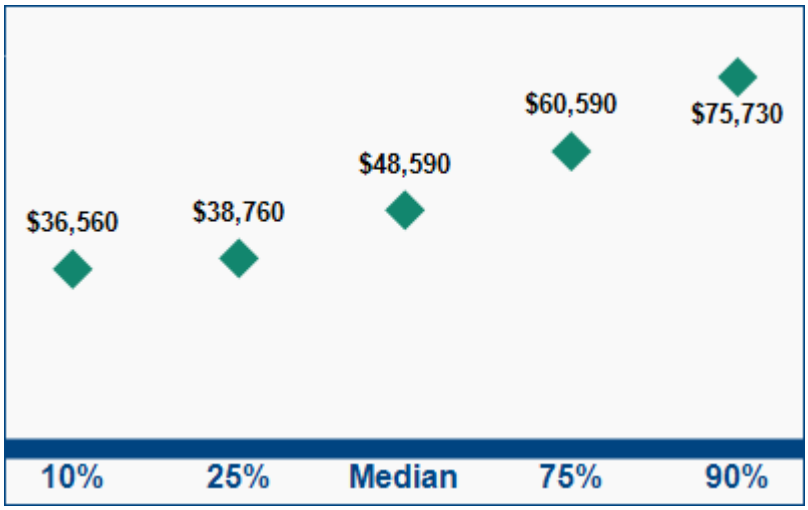
Projected employment

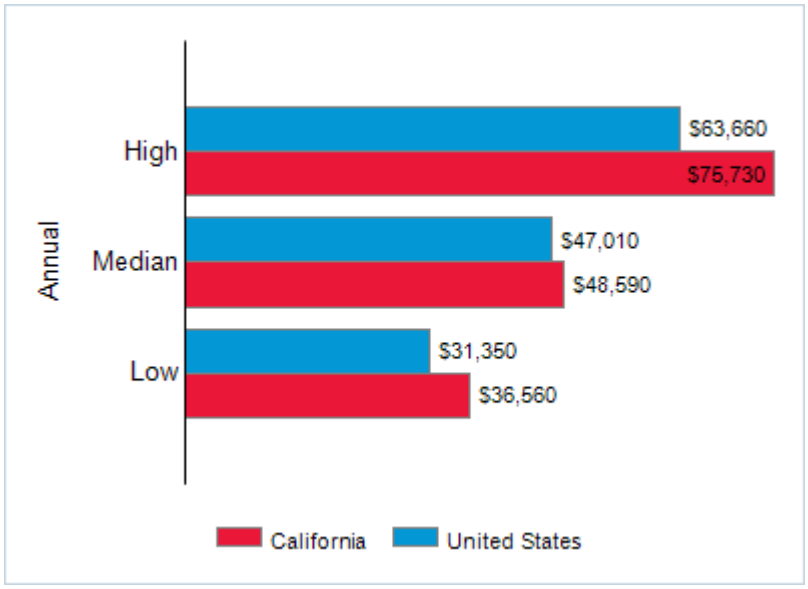
California	United States
33,000 **2018 Employment**	418,200 **2020 Employment**
34,000 **2028 Employment**	452,400 **2030 Employment**
3% **Percent change**	8% **Percent change**
3,770 **Annual projected job openings**	49,200 **Annual projected job openings**

Compare projected employment

Typical wages

Annual wages for Welders, Cutters, Solderers, and Brazers in California



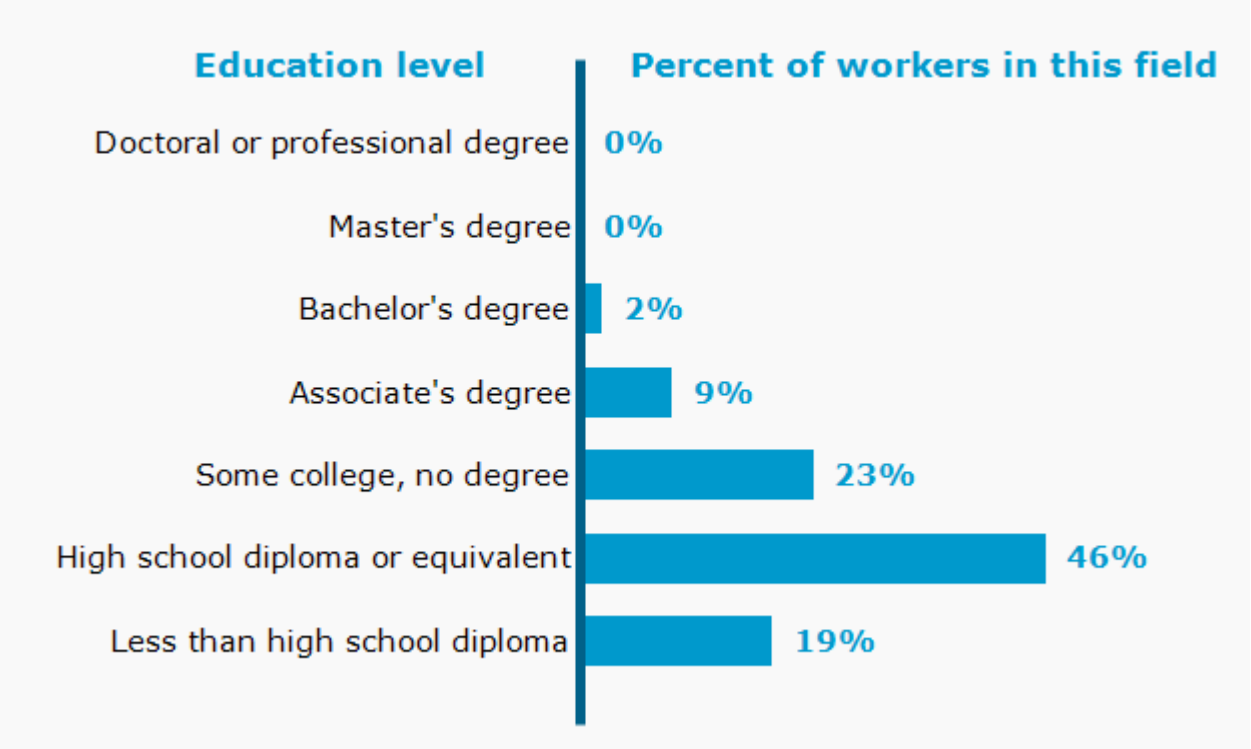


Location	California	United States
10%	$36,560	$31,350
25%	$38,760	$37,860
Median	$48,590	$47,010
75%	$60,590	$56,850
90%	$75,730	$63,660

See more wages

Typical education

How much education do most people in this career have?



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Find more information including data update schedules at CareerOneStop’s Data Sources (https://www.careeronestop.org/Help/data-sources.aspx).

California Department of Education

Date: July 25, 2022

To: Susan Lytle Gilmore
A. Warren McClaskey Adult Center
and Charles A. Jones Career and
Education Center

CDS:34 - 67439

From: Adult Education Office
916–327–6378

Subject: Course Approval for 2022-23

Your request for approval of the following 26 courses have been received, recorded, and approved for the 2022 - 2023 school year.

Number	Name	Course Outline Year	Study Date
4412	Apparel Manufacturing, Production, and Maintenance	2022	
2102	Basic English	2022	
2402	Basic Mathematics	2022	
4245	Biotechnology I	2022	
4622	Business Support and Services	2022	
9997	Community Access Skills and Functional Academics	2022	
4250	Diagnostic Services	2022	
5632	Emerging Technologies in Manufacturing and Product Development	2022	
5633	Exploration of Manufacturing Occupations	2022	
5940	Exploring Technology (General Industrial Arts)	2022	
5634	Graphic Production Technologies	2022	
5516	Heating, Ventilation, and Air Conditioning (HVAC) Systems	2022	
5501	Introduction to Building and Construction Trades	2022	
4260	Introduction to Pharmacy	2022	
9998	Life Skills and functional Academics	2022	
5635	Machining and Forming Technologies	2022	
5955	Manufacturing Technology (Metal Shop)	2022	
5636	Manufacturing/Materials/Processing/Production	2022	
5637	Manufacturing—Comprehensive	2022	
4275	Medical Office	2022	
4604	Network Engineering	2022	
4279	Nursing Service	2022	
9969	Test Preparation	2022	
5639	Welding Technologies and Fabrication	2022	
5619	Welding Technology	2022	
9996	Workplace Skills and Functional Academics	2022	

You are authorized to expend California Adult Education Program funds for the above courses. It is recommended that you use these Course Titles with additional supporting classes listed when communicating program offerings to the public.

Course Outlines for all apportionment classes shall be on file and available for review at the adult school or the district office (5 CCR 10508).
To meet optimum educational standards, these course outlines should contain:

- Goals and purposes
- Performance objectives or competencies
- Instructional strategies
- Units of study, with approximate hours allotted for each unit
- Evaluation procedures
- Clear course completion requirements of established goals and objectives

Career Technical Education: Before establishing a Career Technical Education or Occupational Education Program, a job market study of your region must be conducted and reviewed every two years to justify the need for the program being offered. Refer to the Job Market Study in EC 52519; 52520 for more information.

Education Codes: 1900; 41976; 52506; 52515; 52518; 52570.

For Vocational Education courses:
Before establishing a Vocational or Occupational Education Program, you must conduct a job market study in your market area and have it reviewed every two years to justify the vocational program. Refer to the Job Market Study in EC 52519; 52520 for more information.