

# WELDING TECHNOLOGY

## MASTER PLAN OF INSTRUCTION

### 2021 - 2022

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#### MISSION

The mission of Fort Myers Technical College is to provide high quality career and technical training, in order to prepare students for current and emerging industries, delivered by a professional and caring staff in a positive learning environment.

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Lack of English language skills will not be a barrier to admission and participation. The District may assess each student's ability to benefit from specific programs through placement tests and counseling, and, if necessary, will provide services or referrals to better prepare students for successful participation.



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# Welding Technology

## INTRODUCTION

The Welding Technology program includes classroom and practical experiences in the cutting or joining of metal parts through the application of intense heat, using gas welding or electric arc welding equipment. Covered are selections of proper torch tips and filler rods, adjustment of gas pressure and flame according to size and characteristics of metal. Flame cutting and use of equipment introducing a shield of inert gas (MIG –TIG) around the electric arc to prevent oxidation will be covered. Metal fabrication is included in the program and will contain instruction in metals gauging and the use of cut off shears, brake, drill press, and punch and rollers. Blueprint reading and steel layout will be covered. Emphasis is placed on safety and interpretation of blueprints and layouts.

## PROGRAM MISSION

The mission of the Welding Technology program is to prepare students for employment or advanced training in the welding industry.

## PROGRAM PHILOSOPHY

We believe that competent workers in the high-performance workplace need:

1. Skills in communications, mathematics, critical thinking, teamwork, and effective work habits.
2. Training in emerging concepts and technologies.
3. Relevant work-based learning experience.

We will provide a caring atmosphere that promotes a high degree of student-faculty interaction and fosters development of business and industry partnerships.

## PROGRAM CONTENT

Topics include:

- Shop and personal safety
- Proper use of welding equipment and products
- Basic and advanced welding
- Weld positioning
- Flux-cored arc welding (FCAW or FCA)
- Gas metal arc welding (GMAW); gas tungsten arc welding (GTAW)
- Shielded metal arc welding (SMAW)
- Preparation for the American Welding Society (AWS) certification exam

## ESSENTIAL TRAINING TASKS

### Physical Requirements

Student must have:

- Good hand to eye coordination
- Must be able to work in hot, dirty conditions
- Must be able to lift 50 lbs. and carry
- Must be able to communicate with others
- Must be able to move freely to observe and evaluate project requirements

## **Cognitive Requirements**

- Measure accurately
- Understand basic instructions, written and oral

## **ACCOMMODATIONS**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or post-secondary student's accommodations plan to meet individual needs to ensure equal access. Post-secondary students with disabilities must self-identify, present documentation, required accommodations if needed, and develop a plan with their post-secondary service provider. Accommodations received in post-secondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology, and special communication systems. Documentation of the accommodations requested and services provided are maintained in a confidential file.

## **TUITION**

Tuition is charged for adult students at a reasonable rate that may vary slightly from year to year and is due prior to the first day of each semester. Current fee information is available from Student Services. Tuition is waived for eligible high school dual-enrolled students. Failure to pay all fees due at the time class begins will result in the student not being able to attend class and/or clinical.

## **CLASS SCHEDULE**

Daytime certificated classes meet Monday through Friday from 8:00 A.M. until 2:30 P.M. This amounts to 30 hours of classroom instruction per week. Lunch breaks are 30 minutes in length.

## **ATTENDANCE POLICY**

In an effort to develop appropriate employability skills, FMTC students are expected to attend all class sessions. As is expected in the workplace, when it is necessary to be absent due to illness or emergency situations, all students are to notify the instructor on or before the date of absence. The student attendance policy for each post-secondary program is consistent with industry standards.

Campus attendance is kept via a computerized system. It is the responsibility of the student to **log in and out** in order to receive credit for class time. This allows the school to keep accurate attendance records for the actual number of hours and minutes attended.

All adult students are expected to be in attendance at least 90% of their scheduled hours during each semester. Adult students failing to maintain the 90% attendance standard may not be permitted to continue in their program and may be required to sit out one full semester, unless administration approves to waive the 90% standard based on special circumstances.

### **Absences**

A student who is absent for 6 consecutive class sessions, without prior approval and without contact with the instructor, will be withdrawn from enrollment in his/her program. A student withdrawn for absenteeism must petition administration to return. Students exhibiting a pattern of consecutive absences of 4 days may be subject to dismissal as determined by a School Intervention Team. School Intervention Team meetings will be held as necessary to attempt to alleviate issues resulting in excessive absences and to counsel the student of possible alternatives and consequences.

Students who are late for class, including returning late from lunch, must clock in. Students who leave school early must notify their instructor and clock out. This time out of class is recorded as time absent and is counted against the required 90% attendance. Excessive tardies or early departures will be reported to the Student Affairs Specialist and will result in a meeting with the School Intervention Team.

Adult students who know they will be out of school for an extended period of time (4 days or longer) may apply for a Leave of Absence from their program. A Leave of Absence will be granted only once during a twelve-month period. **STUDENTS WHO EXERCISE A LEAVE OF ABSENCE MAY HAVE TO EXTEND THEIR TIME IN THEIR PROGRAM AND PAY ADDITIONAL FEES.**

### **Leaving Campus during School Hours**

Students must notify their instructor when leaving campus early. This is for the safety of students, to accurately track time, and to allow the instructor to best utilize instructional resources.

## **PLAN OF INSTRUCTIONAL PRACTICES**

### **Teaching Methods**

The Welding Technology program combines classroom study with hands-on welding in the shop area.

The Welding Technology program advances students at their own pace using study modules, films, and slide study materials.

Program standards require competency levels to be completed with at least 75% accuracy.

The Welding Technology program uses A.W.S. welding standards for work appraisal and welding performance standards.

### **Safety**

Safety equipment and clothing requirements:

1. Eye protection, safety glasses with side shields – clear lens. If the student requires the use of personal prescription glasses, he or she will need a set of prescription safety glasses rated to a level of Z-87.1
2. FMTC Welding Uniform Shirt (included in tuition and fees)
3. Blue jeans
4. Safety shoes, protective toe style (shoes must cover the ankle)
5. Green Welding jacket

### **Evaluation**

Class performance, quizzes, tests, attendance, portfolio assessments, completion of project assignments, decision-making, work habits, achievement of entry-level competencies, and other methods are used for evaluation.

### **Work-Based Activities**

Work-based learning activities play an integral part of the curriculum of FMTC's career-technical training programs. These activities are planned with two objectives in mind. First, the activity provides students with the opportunity to develop and apply 'real world' experience using the knowledge and skills attained in the program. Second, the activity provides the instructor with objective input from potential employers or customers of program graduates. Each work-based activity has a written instructional plan outlining objectives, experiences, competencies, and evaluation required during the activity.

Work-based activities are program specific and may include:

- Unpaid in-school shop activities to provide customer service opportunities under the direct supervision of the program instructor.
- Unpaid job shadowing experiences that may include in-school or off-campus employer-based experiences under the supervision of a qualified employer representative who is working closely with the program instructor.
- Paid or unpaid cooperative training experiences conducted at the employer's work location under the supervision of a qualified employer representative and under the direction of the program instructor.

## **Cooperative Education**

Cooperative training is available for students and coordinated by the instructor and career specialist. Cooperative training is for students who have shown competence in program training that indicates readiness for placement in an on-the-job program. High school students participating in the cooperative job placement program must be in the 12<sup>th</sup> grade. To be eligible for a cooperative education experience, students must have completed one-half of the required program hours and requirements.

Students may be returned to the program for additional training if they do not function satisfactorily on the job or when the cooperative agreement is terminated at the request of the student, parent, employer, or program instructor. Veterans will be accepted into the program in accordance with the Department of Veterans Affairs approved program.

Additional information regarding cooperative training opportunities may be obtained from the program instructor or career specialist.

## **Job Shadowing**

Job shadowing experiences, or volunteer experiences, are available to students as part of their program training. These experiences are designed to give the student actual hands-on experience doing a variety of related tasks. Length and type of experiences will vary. The program instructor determines appropriateness of the experience. Additional information regarding job-shadowing experiences may be obtained from the program instructor or career specialist.

## **GRADING PROCEDURE**

### **Teacher Grading Procedure**

Students are graded on a daily basis. Each student starts the day with four (4) points and through attitude, effort, safety, duties, and the student either maintains the 4 points or may be graded down by the instructor. All students progress to different competencies in a set procedure determined by industry standards and American Welding Society (AWS) standards.

- Hands-on and knowledge 75%
- Employability 25%

The grading scale for the program is as follows:

A	90 – 100%
B	80 – 89%
C	70 – 79%
D	60 – 69%
F	0 – 59%

Fort Myers Technical College is a post-secondary institute designed to provide trained individuals to industry. The approved post-secondary program grading requirements must be met if the student is to receive a certificate.

### **Program Progress**

Students are required to complete the program of training within the hours allotted by the state of Florida for completion. Progress must be at a rate that will allow completion of the program with the number of membership hours stated in the Curriculum Frameworks.

Failure to progress at this rate will require the student to meet with the program instructor, career specialist, and an administrator in order to identify an appropriate completion point or to assist the student in selecting a more appropriate training program.

## **Work Habits**

Effective work habits are the cornerstone to successful employment. Students are expected to demonstrate productive work habits during all phases of enrollment. Instructors will work with students who need assistance in this area to improve the overall possibility for successful employment.

**Attendance:** Attends class, arrives/leaves on time; begins and ends work as expected.

**Character:** Displays loyalty, honesty, trustworthiness, dependability, reliability, initiative, self-discipline, and self-responsibility; displays a high level of effort and commitment to performing and completing work.

**Teamwork:** Respects the right of others; respects confidentiality; is cooperative; is assertive; displays a customer service attitude; seeks opportunities for continuous learning; demonstrates mannerly behavior; encourages and facilitates cooperation, pride, trust, and group identity; fosters commitment and team spirit.

**Appearance:** Displays appropriate dress, grooming, hygiene, and etiquette; wears full regulation uniform.

**Attitude:** Displays a willingness to cooperate and accept constructive criticism; sets realistic expectations; approaches assignments with interest.

**Productivity:** Is prepared for class by reading assignments and completing homework; contributes to class discussions; and involvement in lab activities (in other words, no sleeping or daydreaming). Follows safety practices; conserves and maintains equipment and supplies; keeps work area neat and clean; follows directions and procedures; makes up assignments and tests punctually; notifies proper authorities of situations presenting potential safety hazards; does not use or knowingly permits others to use tools and equipment improperly; stays on task and utilizes time constructively.

**Organization:** Manifests skill in prioritizing and management of time and stress; demonstrates flexibility in adapting to changes.

**Communication:** Communicates accurate information to others in a professional and courteous manner; displays appropriate nonverbal (eye contact, body language) and oral (listening, telephone etiquette, grammar) skills; asks pertinent questions; listens attentively to others, notifies instructor in advance of absences or tardies.

## **SATISFACTORY ACADEMIC PROGRESS**

In order to receive and continue to receive financial assistance of any type, a student must maintain satisfactory academic progress. The Financial Aid Advisor will require a progress report to be completed by the student's instructor and submitted to the Financial Aid Office prior to each disbursement.

Students are considered to be making Satisfactory Academic Progress (SAP) if they successfully complete their scheduled clock hours, achieve a specific cumulative grade evaluation or grade point average (GPA), and do not exceed the maximum time limits to complete their course of study. Each Student Academic Progress will be checked at 450 clock hours and prior to subsequent disbursements for students enrolled in programs one academic year or greater. Progress will be checked at the half-way point for programs less than one academic year. No SAP is required prior to the first disbursement.

## **REQUIREMENTS FOR A CERTIFICATE**

All competencies specified in the Florida Curriculum Frameworks for the program must be successfully completed. Successful completion is at least a 75% average in the areas of skills, knowledge, and work habits.

Proficiency in the competency standards listed in the Master Plan of Instruction must be demonstrated.

Students must meet minimum T.A.B.E. skill requirements (or qualify for an exemption) prior to graduation.

In addition to the requirements above, the recommendation of the instructor for certification includes: consideration of personal appearance, willingness to learn and to work, punctuality, cooperative attitude, and appropriate work habits.

Students who exit the program early and have successfully completed each course or the competencies of an Occupational Completion Point (OCP), will be issued a partial certificate. This certificate does not require a student to master the state-mandated basic skills level.

### **WELDING TECHNOLOGY STUDENT DRESS CODE**

Students who attend FMTC shall dress in a manner appropriate for the job in which they are receiving training, including any special protective gear and professional uniforms. All clothing must be neither distracting nor offensive and be clean, neat, modest, in good repair, and appropriately sized.

Administration has the final authority for determining whether or not a student's apparel conforms to the dress code. When it is determined that it does not, students will be required to change into clothing which will conform to this code or leave campus. Students may return to campus when they have changed into appropriate clothing.

**Dress Code/Uniforms Required:** FMTC Welding Uniform shirt, blue jeans, leather belt (must be worn at all times), boots that cover the ankle (8 inch boots preferred – Examples: Bates, Danner, Redwing). You will be on your feet the majority of the day; comfortable boots will make your transition into the weldingfield much easier.

### **JOB DESCRIPTIONS**

#### **OCP A Welder Assistant 1&2**

Student completing OCP A should be able to assist a welder in basic functions in the welding field, such as grinding, clean-up, and getting materials ready.

#### **OCP B Welder, SMAW 1&2**

The student will have the ability to do basic welding and tacking under the guidance and supervision of a qualified person with the SMAW process.

#### **OCP C Welder**

The student may operate and preform welding in all positions and different size wire (electrode) and cover gases and maintain machinery in the GMAW process.

### **TEXTBOOKS**

For the most recent book list for the Welding Technology program, visit FMTC's online bookstore – [www.fmtcshop.com](http://www.fmtcshop.com).

### **REQUIRED MATERIALS**

Required Tools:

- Welding helmet (auto dark)
- Welding jacket
- Stick welding gloves
- MIG welding gloves
- TIG welding gloves
- Leather material handling gloves
- Welding cap or beanie
- Lock for toolbox

### **PROGRAM OBJECTIVES**

See the attached Florida Department of Education curriculum framework for program objectives and competencies.

**Florida Department of Education  
Curriculum Framework**

**Program Title:** Welding Technology  
**Program Type:** Career Preparatory  
**Career Cluster:** Manufacturing

<b>Career Certificate Program – Career Preparatory</b>	
Program Number	J400400
CIP Number	0648050805
Grade Level	30, 31
Standard Length	1050 hours
Teacher Certification	Refer to the <b>Program Structure</b> section
CTSO	SkillsUSA
SOC Codes (all applicable)	51-9198 – Helpers-Production Workers 51-4121 – Welders, Cutters, Solderers, and Brazers
CTE Program Resources	<a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml</a>
Basic Skills Level	Mathematics: 9 Language: 9 Reading: 9

### **Purpose**

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the manufacturing career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the manufacturing career cluster. This program offers a broad foundation of knowledge and skills to prepare students for employment in the welding industry.

The content includes but is not limited to planning, management, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

**Additional Information** relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

### **Program Structure**

This program is a planned sequence of instruction consisting of three occupational completion points.

This program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44 (3)(b), F.S.

To teach the course(s) listed below, instructors must hold at least one of the teacher certifications indicated for that course.



The following table illustrates the postsecondary program structure:

OCP	Course Number	Course Title	Teacher Certification	Length	SOC Code
A	PMT0070	Welder Assistant 1	METAL WORK 7G WELDING @7 7G	150 hours	51-9198
	PMT0071	Welder Assistant 2		150 hours	51-9198
B	PMT0072	Welder, SMAW 1		150 hours	51-4121
	PMT0073	Welder, SMAW 2		150 hours	51-4121
C	PMT0074	Welder		450 hours	51-4121

### **National Standards**

Industry or National Standards corresponding to the standards and/or benchmarks for the Welding Technology program can be found using the following link:

<http://www.aws.org/w/a/certification/CW/>

### **Common Career Technical Core** – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

### **Standards**

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate an understanding and apply workplace safety and workplace organization skills.
- 02.0 Demonstrate basic knowledge of industrial and manufacturing processes.
- 03.0 Describe and identify metals and their properties accurately.
- 04.0 Demonstrate and apply basic knowledge of drawing and interpreting AWS welding symbols.
- 05.0 Apply basic oxy-fuel gas cutting principles and practices.
- 06.0 Create a product using basic oxy-fuel gas cutting principles and practices.
- 07.0 Apply intermediate oxy-fuel gas cutting principles and practices.
- 08.0 Demonstrate plasma arc cutting principles and practices.
- 09.0 Demonstrate a basic understanding of shielded metal arc welding (SMAW).
- 10.0 Create a product using basic shielded metal arc welding (SMAW) principles and practices.
- 11.0 Apply basic shielded metal arc welding (SMAW) skills.

- 12.0 Demonstrate and apply Carbon Arc Gouging (GAC) principles and practices.
- 13.0 Apply visual examination skills.
- 14.0 Create a product using Carbon Arc Gouging and basic shielded metal arc welding (SMAW) principles and practices.
- 15.0 Demonstrate an understanding of employability skills and career opportunities related to the welding industry.
- 16.0 Apply intermediate shielded metal arc welding (SMAW) skills.
- 17.0 Create a product using intermediate shielded metal arc welding (SMAW) principles and practices
- 18.0 Apply basic gas metal arc welding (GMAW) skills.
- 19.0 Apply intermediate gas metal arc welding (GMAW) skills.
- 20.0 Apply basic flux-core arc welding (FCAW) skills.
- 21.0 Apply intermediate flux-core arc welding (FCAW) skills.
- 22.0 Apply basic gas tungsten arc welding (GTAW) skills.
- 23.0 Apply intermediate gas tungsten arc welding (GTAW) skills.
- 24.0 Demonstrate and apply basic pipe welding principles and practices.