Texas CTE

Welding I

General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisites: Algebra I, Principles of Manufacturing, Introduction to Precision Metal Manufacturing, or Introduction to Welding. Students shall be awarded two credits for successful completion of this course. W1.A.

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Introduction W1.B

1 Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions W1.B.1

2 The Manufacturing Career Cluster focuses on planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance, and manufacturing/process engineering. W1.B.

3 Welding I provides the knowledge, skills, and technologies required for employment in metal technology systems. Students will develop knowledge and skills related to this system and apply them to personal career development. This course supports integration of academic and technical knowledge and skills. Students will reinforce, apply, and transfer knowledge and skills to a variety of settings and problems. Knowledge about career opportunities, requirements, and expectations and the development of workplace skills prepare students for future success. W1.B.3

4 Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations W1.B.4

5 **Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.** W1.B.5

Knowledge and skills. W1.C

1 **The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:** W1.C.1

- a express ideas to others in a clear, concise, and effective manner through written and verbal communication; W1.C.1.A
- b convey written information that is easily understandable to others; W1.C.1.B
- c demonstrate acceptable work ethics in reporting for duty and performing assigned tasks as directed; W1.C.1.C
- d conduct oneself in a manner acceptable for the profession and work site such as suitable dress and polite speech; W1.C.1.D
- e choose the ethical course of action and comply with all applicable rules, laws, and regulations; W1.C.1.E
- f review the fine, detailed aspects of both quantitative and qualitative work process and end products; W1.C.1.F
- g evaluate systems and operations; identify causes, problems, patterns, or issues; and explore workable solutions or remedies to improve situations; W1.C.1.G
- h follow written and oral instructions and adhere to established business practices, policies, and procedures, including health and safety rules; W1.C.1.H
- i prioritize tasks, follow schedules, and work on goal-relevant activities in a way that uses time wisely in an effective, efficient manner. W1.C.1.I

2 **The student explores the employability characteristics of a successful worker in the global economy. The student is expected to:** W1.C.2

- a explore academic knowledge and skills required for postsecondary education; W1.C.2.A
- b identify employers' expectations to foster positive customer satisfaction; W1.C.2.B
- c demonstrate the professional standards required in the workplace such as interviewing skills, flexibility, willingness to learn new skills and acquire knowledge, self-discipline, self-worth, positive attitude, and integrity in a work situation; W1.C.2.C
- d evaluate personal career goals; W1.C.2.D
- e communicate effectively with others in the workplace to clarify objectives; W1.C.2.E
- f demonstrate skills related to health and safety in the workplace as specified by appropriate governmental regulations. W1.C.2.F

3 **The student applies academic skills to the requirements of welding. The student is expected to:** W1.1.C.3

- a demonstrate effective communication skills with individuals from varied cultures such as fellow workers, management, and customers; W1.1.C.3.A
- b demonstrate mathematical skills to estimate costs; W1.1.C.3.B
- c demonstrate technical writing skills related to work orders; W1.1.C.3.C
- d apply accurate readings of measuring devices; W1.1.C.3.D
- e use appropriate tools to make accurate measurements; W1.1.C.3.E
- f compute measurements such as area, surface area, volume, and perimeter; W1.1.C.3.F
- g solve problems using whole numbers, fractions, mixed numbers, and decimals; W1.1.C.3.G
- h use various methods, including a calculator, to perform computations; W1.1.C.3.H
- i perform conversions between fractions and decimals; W1.1.C.3.I
- j perform conversions between standards units and metric units; W1.1.C.3.J
- k calculate and apply the functions of angles such as using the Pythagorean Theorem; W1.1.C.3.K
- l diagram the parts of a circle. W1.1.C.3.L

4 **The student evaluates the function and application of the tools, equipment, technologies, and materials used in welding. The student is expected to:** W1.1.C.4

- a operate welding equipment according to safety standards; W1.1.C.4.A
- b identify and properly dispose of environmentally hazardous materials used in welding; W1.1.C.4.B
- c explain the importance of recycling materials used in welding; W1.1.C.4.C
- d choose appropriate personal protective equipment; W1.1.C.4.D
- e evaluate skills related to health and safety in the workplace as specified by appropriate governmental regulations W1.1.C.4.E

5 **The student understands welding joint design, symbols, and welds. The student is expected to:** W1.1.C.5

- a demonstrate knowledge of engineering drawings, charts, and diagrams; W1.1.C.5.A
- b interpret orthographic and isometric views of three-dimensional figures; W1.1.C.5.B
- c interpret engineering, drawings, charts, and diagrams; W1.1.C.5.C
- d analyze components of the welding symbol; W1.1.C.5.D
- e identify types of welding joints; W1.1.C.5.E
- f identify positions of welding; W1.1.C.5.F
- g identify types of welds such as fillet, groove, spot, plug, and flanged. W1.1.C.5.G

6 **The student analyzes the concepts and intricacies of inspections and related codes. The student is expected to:** W1.1.C.6

- a explain weld inspection processes; W1.1.C.6.A
- b interpret welding codes. W1.1.C.6.B

7 **The student analyzes oxy-fuel cutting processes on carbon steels. The student is expected to:** W1.1.C.7

- a practice safe operating practices; W1.1.C.7.A
- b perform safe handling of compressed gases; W1.1.C.7.B
- c identify components of oxy-fuel gas cutting system; W1.1.C.7.C
- d demonstrate proper set-up procedures for oxy-fuel cutting process; W1.1.C.7.D
- e identify factors affecting oxy-fuel cutting of base metals; W1.1.C.7.E
- f demonstrate proper cutting techniques such as piercing, straight line, and bevel; W1.1.C.7.F
- g identify acceptable cuts; W1.1.C.7.G
- h evaluate alternative fuel gasses such as propane, propylene, and Chemtane 2®. W1.1.C.7.H

8 **The student analyzes plasma arc cutting on metals. The student is expected to:** W1.1.C.8

- a use safe operating practices; W1.1.C.8.A
- b demonstrate knowledge of the theories of plasma arc cutting; W1.1.C.8.B
- c apply safe handling of compressed air supply; W1.1.C.8.C
- d identify components of plasma arc cutting; W1.1.C.8.D
- e demonstrate correct set-up procedure for plasma arc cutting; W1.1.C.8.E
- f define cutting terms; W1.1.C.8.F
- g perform straight line, piercing, bevels, and shape cuts. W1.1.C.8.G

9 **The student analyzes shielded metal arc welding principles and practices on metals. The student is expected to:** W1.1.C.9

- a use safe operating practices; W1.1.C.9.A
- b analyze welding current relationships such as alternating current and direct current, heat transfer, and polarity; W1.1.C.9.B
- c apply shielded metal arc welding principles; W1.1.C.9.C
- d demonstrate proper set-up procedure for shielded metal arc welding; W1.1.C.9.D
- e explain the American Welding Society (AWS) identification system for shielded metal arc welding electrodes; W1.1.C.9.E
- f determine appropriate electrodes for base metal in shielded metal arc welding; W1.1.C.9.F
- g perform multi-pass groove welds in all positions according to industry-accepted welding standards. W1.1.C.9.G

10 **The student analyzes gas metal arc welding principles and practices. The student is expected to:** W1.1.C.10

- a use safe operating practices; W1.1.C.10.A
- b explain the effects that weld angle, work angle, and electrode extension have on welds; W1.1.C.10.B
- c apply gas metal arc welding principles; W1.1.C.10.C
- d demonstrate proper set-up procedure for gas metal arc welding; W1.1.C.10.D
- e explain the AWS identification system for gas metal arc welding filler metal; W1.1.C.10.E
- f determine appropriate filler metal for base metal in gas metal arc welding; W1.1.C.10.F
- g perform fillet and groove welds in all positions. W1.1.C.10.G

11 **The student analyzes flux cored arc welding principles and practices on metals. The student is expected to:** W1.1.C.11

- a use safe operating practices; W1.1.C.11.A
- b explain the effects that weld angle, work angle, and electrode extension have on welds; W1.1.C.11.B
- c apply flux cored arc welding principles; W1.1.C.11.C
- d demonstrate proper set-up procedure for flux cored arc welding; W1.1.C.11.D
- e explain the AWS identification system for flux cored arc welding electrodes; W1.1.C.11.E
- f determine appropriate filler metal for base metal in flux cored arc welding; W1.1.C.11.F
- g perform fillet and groove welds in all positions. W1.1.C.11.G

12 **The student analyzes gas tungsten arc welding on metals. The student is expected to:** W1.1.C.12

- a use safe operating practices; W1.1.C.12.A
- b analyze electrical welding current relationships such as alternating current and direct current, heat transfer, and polarity; W1.1.C.12.B
- c identify the common types of tungsten and filler metals according to the AWS identification system; W1.1.C.12.C
- d demonstrate proper set-up procedure for gas tungsten arc welding; W1.1.C.12.D
- e perform fillet and groove welds in all positions; W1.1.C.12.E
- f perform welds on metals such as carbon steel, stainless steel, and aluminum W1.1.C.12.F