



Scope and Sequence Curriculum Outline

Career Program: Welding Technology I

DOE Code: 5776

Career Cluster: Manufacturing

Recommended Grade Levels: 11, 12

Prerequisites: None

High School Credits: 3 per semester (6 total per school year)

Additional Information: Counts as a Directed Elective or Elective for the General, Core 40, Academic Honors and Technical Honors diplomas

Program Description: Welding Technology I includes classroom and laboratory experiences that develop a variety of skills in oxy-fuel cutting and shielded metal arc welding. OSHA standards and guidelines endorsed by the American Welding Society (AWS) are used to enforce safety at all times. Instructional activities emphasize properties of metals, safety issues, print reading, electrical principles, welding symbols, and mechanical drawing through projects and exercises that teach students how to weld and be prepared for college and career success.

Alignment: Indiana Department of Education Academic Standards Course Framework; American Welding Society (AWS) SENSE Level I – Entry Welder Certification; American Welding Society (AWS) SENSE Level I – Entry Welder Training Achievement Record; Ivy Tech Community College (dual credit agreement); *Welding Skills* (Moniz, 5th Edition) textbook materials

Companion Documents: WCC Welding Technology I Program Syllabus; WCC High School Pathway Plan; WCC Program Description Guide

Curriculum Content Summary:

- Workplace Competency
- Career Development
- Safety and Health in Welding
- Drawing and Welding Symbol Interpretation
- Manual and Mechanized Oxyfuel Cutting
- Shielded Metal Arc Welding
- Welding Inspection and Testing

Content	Indiana DOE Standards	Knowledge & Skills <i>(Based on AWS)</i>	Example Activities	Time Frame	Evaluation / Certification
<p>DOMAIN Workplace Competency</p> <p>Core Standard I Students establish appropriate workplace behaviors and characteristics to prepare for completion of further education in welding training programs</p>	<p>WTI-1.1 Allocate the appropriate resources for task completion</p> <p>WTI-1.2 Demonstrate effective interpersonal skills</p> <p>WTI-1.3 Develop leadership skills</p> <p>WTI-1.4 Establish positive relationships with people from diverse backgrounds</p> <p>WTI-1.5 Research, analyze, and use data for work assignments</p> <p>WTI-1.6 Apply effective critical thinking, decision making, and problem-solving techniques</p> <p>WTI-1.7 Select and use appropriate tools and technology</p> <p>WTI-1.8 Implement quality assurance measures and safeguards</p> <p>WTI-1.9 Follows verbal instructions to complete work assignments</p> <p>WTI-1.10 Follows written instructions to complete work assignments</p> <p>WTI-1.11 Demonstrate effective listening and speaking skills</p> <p>WTI-1.12 Perform appropriate mathematical calculations correctly</p> <p>WTI-1.13 Exhibit a responsible work ethic</p> <p>WTI-1.14 Demonstrate accepted standards for ethical behavior</p> <p>WTI-1.15 Perform housekeeping duties</p> <p>WTI-1.16 Prepares time or job cards, reports or records</p>	<ul style="list-style-type: none"> • Prepares time or job cards, reports or records • Performs housekeeping duties • Follows verbal instructions to complete work assignments • Follows written instructions to complete work assignments 	<ul style="list-style-type: none"> • SkillsUSA membership • Skill competitions • Student ambassadors • National Technical Honor Society 	<p>1 week</p> <p>Reinforced all year through continued practice</p>	<ul style="list-style-type: none"> • Daily Activity Log • Classroom work • Dual Credit • Weekly participation • Work Ethic Certification • Essential Skills Evaluation • Technical Skills Evaluation

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<p>DOMAIN Career Development</p> <p>Core Standard 2 Students apply and adapt appropriate personal and professional skills to effectively manage welding careers</p>	<p>WTI-2.1 Establish a personal career goal and develop objectives for achieving the goal</p> <p>WTI-2.2 Evaluate employment and career pathway opportunities related to established career interest(s)</p> <p>WTI-2.3 Create a continuing education plan that identifies further education and training options</p> <p>WTI-2.4 Prepare for exams leading to certifications recognized by business and industry</p> <p>WTI-2.5 Develop skills needed to enter the workforce</p> <p>WTI-2.6 Evaluate resources that keep workers current in the career field</p> <p>WTI-2.7 Demonstrate skills and attitudes needed for lifelong learning</p> <p>WTI-2.8 Apply effective money management strategies</p>	<ul style="list-style-type: none"> • Creates a resume for entry level work • Completes mock interviews with industry representatives • Prepares for certification exams • Demonstrates skills needed for employment and lifelong learning 	<ul style="list-style-type: none"> • Mock interviews with industry representatives • Resume writing project • Research project on a welding process • Industry speakers • Field trips to local companies • WCC Open House where industry representatives attend 	<p>1 week</p> <p>Reinforced all year through continued practice</p>	<ul style="list-style-type: none"> • Resume project • Mock interviews • Research project • Daily Activity Log • Classroom work • Dual Credit • Weekly participation • Work Ethic Certification • Essential Skills Evaluation • Technical Skills Evaluation

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<p>DOMAIN Safety and Health in Welding</p> <p>Core Standard 3 Students integrate proper safety procedures in class activities and projects to meet professional and governmental standards</p>	<p>WTI-3.1 Apply safe practices according to American National Standards Institute safety Standards</p> <p>WTI-3.2 Utilize proper safe operation practices in work area</p> <p>WTI-3.3 Demonstrates proper use and inspection of ventilation equipment</p> <p>WTI-3.4 Demonstrates proper Hot Zone operation</p> <p>WTI-3.5 Select proper procedures actions for working in confined spaces</p> <p>WTI-3.6 Demonstrates proper use of precautionary labeling and SDS information</p> <p>WTI-3.7 Demonstrates proper inspection and operation of equipment used for each welding and thermal cutting process used</p>	<ul style="list-style-type: none"> • Demonstrates proper use and inspection of Personal Protection Equipment (PPE) • Demonstrates proper safe operation practices in the work area • Demonstrates proper use and inspection of ventilation equipment • Demonstrates proper Hot Zone operation • Demonstrates proper work actions for working in confined spaces • Demonstrates proper use of precautionary labeling and SDS information • Demonstrates proper inspection and operation of equipment used for each required welding and thermal cutting process (This is best done as a part of the process module/unit for each of the required welding and thermal cutting processes) 	<ul style="list-style-type: none"> • PPE safe use demonstrations and practice • Fabrication/ shop equipment safe use demonstrations and practice • Welding equipment safe use demonstrations and practice 	<p>5 weeks</p> <p>Reinforced all year through continued practice</p>	<ul style="list-style-type: none"> • AWS Sense Level I Mod 2 written test • Written and performance safety evaluations • Daily Activity Log • Classroom work • Dual Credit • Weekly participation

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<p>DOMAIN Drawing and Welding Symbol Interpretation</p> <p>Core Standard 4 Students interpret technical drawings and documents to perform welding processes to specifications</p>	<p>WTI-4.1 Analyze and interpret blueprints</p> <p>WTI-4.2 Interprets basic elements of a drawing or sketch</p> <p>WTI-4.3 Interprets welding symbol information</p> <p>WTI-4.4 Fabricates parts from a drawing or sketch</p>	<ul style="list-style-type: none"> • Interprets basic elements of a drawing or sketch • Interprets welding symbols information • Fabricates parts from a drawing or sketch 	<ul style="list-style-type: none"> • Sketching a design for plasma cutting project • Review of welding symbols using flash cards • Repetitive reinforcement activities 	<p>2 weeks</p> <p>Reinforced all year through continued practice</p>	<ul style="list-style-type: none"> • AWS Sense Level I Mod 3 written test • Daily Activity Log • Classroom work • Dual credit • Weekly participation • Written and performance welding symbol interpretation tests

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<p>DOMAIN Manual and Mechanized Oxyfuel Cutting</p> <p>Core Standard 5 Students create sound manual and automatic oxyfuel cuts on materials to meet industry standards</p>	<p>WTI-5.1 Perform manual and automatic oxyfuel gas cutting</p> <p>WTI-5.2 Performs safety inspections of manual oxy fuel gas cutting (OFC) equipment and accessories</p> <p>WTI-5.3 Makes minor external repairs to manual OFC equipment and accessories</p> <p>WTI-5.4 Sets up for manual OFC operations on carbon steel</p> <p>WTI-5.5 Operates manual OFC equipment on carbon steel</p> <p>WTI-5.6 Performs straight, square edge cutting operations in the flat position on carbon steel</p> <p>WTI-5.7 Performs shape, square edge cutting operations in the flat position on carbon steel</p> <p>WTI-5.8 Performs straight, bevel edge cutting operations in the flat and position on carbon steel</p> <p>WTI-5.9 Performs scarfing and gouging operations to remove base and weld metal, in flat and horizontal positions on carbon steel</p> <p>WTI-5.10 Performs safety inspections of mechanized OFC equipment and accessories</p> <p>WTI-5.11 Makes minor external repairs to mechanized OFC equipment and accessories</p> <p>WTI-5.12 Sets up for mechanized OFC operations on carbon steel</p> <p>WTI-5.13 Operates mechanized OFC equipment on carbon steel</p> <p>WTI-5.14 Performs straight, square edge cutting operations in the flat position on carbon steel using mechanized OFC</p> <p>WTI-5.15 Performs straight, bevel edge cutting operations in the flat position on of carbon steel using mechanized OFC</p> <p>WTI-5.16 Examines tacks, root passes, intermediate layers, and completed welds</p>	<ul style="list-style-type: none"> • Performs safety inspections of manual OFC equipment and accessories • Makes minor external repairs to manual OFC equipment and accessories • Sets up for manual OFC operations on carbon steel • Operates manual OFC equipment on carbon steel • Performs straight, square edge cutting operations in the flat and horizontal positions on carbon steel • Performs shape, square edge cutting operations in the flat and horizontal positions on carbon steel • Performs straight, bevel edge cutting operations in the flat and horizontal positions on carbon steel • Performs scarfing and gouging operations to remove base and weld metal, in the flat and horizontal positions on carbon steel • Performs safety inspections of mechanized OFC equipment and accessories • Makes minor external repairs to mechanized OFC equipment and accessories • Sets up for mechanized OFC operations on carbon steel • Operates mechanized OFC equipment on carbon steel • Performs straight, square edge cutting operations in the flat position on carbon steel • Performs straight, bevel edge cutting operations in the flat position on carbon steel 	<ul style="list-style-type: none"> • Welding equipment safe use and demonstrations and practice • OFC start up and shut down procedures • Perform OFC cutting – manual and machine – to prepare certification plates 	<p>2 weeks</p> <p>Reinforced all year through continued practice</p>	<ul style="list-style-type: none"> • AWS Sense Level I Mod 8 written test • OFC start up and shut down performance test • Practical OFC evaluation test • Daily Activity Log • Classroom work • Dual Credit • Weekly participation

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<p>DOMAIN Shielded Metal Arc Welding</p> <p>Core Standard 6 Students execute appropriate Shielded Metal Arc welds on a variety of industrial metal to meet industry standards</p>	<p>WTI-6.1 Apply Shielded Metal Arc Welding (SMAW) welding process fundamentals to actual lab Experiences</p> <p>WTI-6.2 Set up for SMAW operations on carbon steel</p> <p>WTI-6.3 Operate SMAW equipment on carbon steel</p> <p>WTI-6.4 Make fillet welds in all positions on carbon steel</p> <p>WTI-6.5 Make groove welds in all positions on carbon steel</p> <p>WTI-6.6 Pass SMAW welder performance qualification test (2G and 3G, uphill, limited thickness test plates) on carbon steel</p>	<ul style="list-style-type: none"> • Performs safety inspections of SMAW equipment and accessories • Makes minor external repairs to SMAW equipment and accessories • Sets up for SMAW operations on carbon steel • Operates SMAW equipment on carbon steel • Makes fillet welds in all positions on carbon steel • Makes groove welds in all positions on carbon steel • Passes SMAW welder performance qualification test (2G and 3G, uphill, limited thickness test plates) on carbon steel 	<ul style="list-style-type: none"> • Welding equipment safe use demonstrations and practice • Basic machine set up and operation • Striking an arc and running a bead • Performing fillet and groove welds in horizontal, vertical, and overhead positions using 6010/7018 electrodes 	<p>24 weeks</p> <p>Reinforced all year through continued practice</p>	<ul style="list-style-type: none"> • AWS Sense Level I Mod 4 written test • Multiple practical evaluation for fillet and groove welds across all positions • Sense Level I 2G practical certification test • Sense Level I 3G practical certification test • Daily Activity Log • Classroom work • Dual credit • Weekly participation

Content	Indiana DOE Standards	Knowledge & Skills <i>(Based on AWS)</i>	Example Activities	Time Frame	Evaluation / Certification
<p>DOMAIN Welding Inspection and Testing</p> <p>Core Standard 7 Students evaluate various weld stages to meet inspection criteria</p>	<p>WTI-7.1 Examine cut surfaces and edges of prepared base metal parts</p> <p>WTI-7.2 Examine tacks, intermediate layers, and completed welds</p>	<ul style="list-style-type: none"> Examines cut surfaces and edges of prepared base metal parts Examines tacks, root passes, intermediate layers and completed welds 	<ul style="list-style-type: none"> Inspections of personal welds throughout entire welding process Visual examinations of other students' bend tests Interpretation of certification code requirements and application to their and other students' certification tests 	<p>1 week</p> <p>Reinforced all year through continued practice</p>	<ul style="list-style-type: none"> AWS Sense Level I Mod 9 written test Daily Activity Log Classroom work Dual credit Weekly participation