

Introduction to Welding YAG

§127.820 | One Credit | Full Year | 36 Weeks | Grades 9–12 | Classroom / Virtual Welding Environment

Course Information: Introduction to Welding introduces welding technology, safety, tools and equipment, measurement, welding drawings and joints, welding careers, codes and standards, oxy-fuel cutting, shielded metal arc welding (SMAW), and gas metal arc welding (GMAW). This YAG is designed for a classroom without a live welding or cutting laboratory. Performance-oriented content is addressed through virtual welding equipment when supported, equipment/component identification, demonstrations and video analysis, process simulations, troubleshooting scenarios, drawings, measurement activities, and project-planning applications. No live arc welding, oxy-fuel cutting, or compressed-gas operation is required by this instructional sequence. Recommended prerequisite or corequisite: Algebra I. §127.15(d)(1) CTE Employability Skills are integrated throughout.

GP	Wks	Unit & Focus	Major Learning Tasks & Assessments	Integrated TEKS	Extension Activities
1	1–2	Unit 1 - Welding Industry, Careers & Workplace Readiness	- Explore welding occupations, industries, education/training and career pathways - Identify employer expectations and professional standards - Practice workplace communication, interviewing and goal setting - Analyze workplace health/safety expectations and governmental regulations - Launch a welding career portfolio	- IW1(A–F) §127.15(d)(1)	- ACCESS: welding career explorer - Career pathway research - Professionalism scenarios
1	3–5	Unit 2 - Welding Safety, PPE, Hazards & Environmental Practices	- Identify welding/cutting hazards without operating live equipment - Select appropriate PPE for common welding and cutting scenarios - Analyze equipment-safety procedures through demonstrations and case scenarios - Identify environmentally hazardous welding materials and proper disposal - Explain recycling practices and complete a classroom safety/hazard audit	- IW1(F) - IW2(A–E)	- PPE selection lab - Hazard-identification scenarios - Safety procedure analysis
1	6–7	Unit 3 - Welding Tools, Equipment, Power Sources & Materials	- Identify common welding tools, machines, power sources, accessories and consumables - Match tools/equipment to intended applications - Analyze equipment setup diagrams and manufacturer information - Compare common base metals and consumables at an introductory level - Use virtual/physical non-operational components for identification where available	- IW2(A–E) - IW4(A–G) reinforcement	- Equipment identification - Virtual equipment tour - Tool/material matching
1	8–9	Unit 4 - Welding Math, Measurement & Technical Applications	- Solve welding problems using whole numbers, fractions, mixed numbers and decimals - Convert fractions/decimals and standard/metric units - Use classroom measuring tools on non-welding materials and drawings - Apply measurement to joint dimensions and project layouts - Document calculations using technical vocabulary	IW4(A–G)	- Measurement challenge - Conversion practice - Applied layout worksheet
2	10–11	Unit 5 - Welding Sketches, Joint Types & Weld Identification	- Create and interpret introductory welding sketches - Identify common joint configurations and weld types - Relate fillet, groove and other weld types to example applications - Use models/images to analyze joint preparation and fit-up - Complete a joint-and-weld identification assessment	- IW3(A–B) - IW4(A–G)	- Joint models - Sketching practice - Weld identification gallery
2	12–13	Unit 6 - Welding Careers, Codes, Standards & Project Planning	- Explore welding career specializations and advancement pathways - Explain the purpose of welding codes and standards - Introduce API 1104 and AWS D1.1 through classroom examples - Compare independent and collaborative roles in welding projects - Develop a simple theoretical welding project plan	- IW5(A–D) - IW1(A–F)	- ACCESS: education/credential research - Code-awareness activity - Team project planning
2	14–15	Unit 7 - Oxy-Fuel Cutting: Theory, Safety & Process Simulation	- Identify oxy-fuel cutting components and compressed-gas hazards - Sequence safe setup/shutdown procedures using diagrams or simulation - Analyze factors affecting oxy-fuel cutting of carbon steel - Explain piercing, straight-line and bevel-cutting techniques - Evaluate sample cut images/videos for technique and quality	- IW6(A–F) - IW2(A,D–E)	- Virtual/process simulation - Component identification - Cut-quality analysis
2	16–17	Unit 8 - SMAW Fundamentals & Virtual Welding	- Explain SMAW principles, welding current and basic machine setup - Select appropriate electrodes for sample base-metal/application scenarios - Sequence joint preparation and safe setup procedures - Use virtual welders, when supported, to practice work angle, travel angle, speed and arc-control concepts - Analyze recorded/sample fillet and groove welds in multiple positions	- IW7(A–G) - IW3(A–B) - IW4(A–G)	- Virtual SMAW practice - Electrode selection scenarios - Weld-video analysis
2	18	Semester 1 Exam - Introduction to Welding	- Cumulative written/application assessment covering career readiness, safety, tools/equipment, measurement, joints/sketches, codes, oxy-fuel theory and SMAW fundamentals - Virtual or scenario-based process application - Semester portfolio review	- Cumulative IW1–7 as introduced §127.15(d)(1)	Targeted review/remediation
3	19–21	Unit 9 - SMAW Virtual Skill Development & Troubleshooting	- Use virtual welding equipment to reinforce SMAW setup and technique when supported - Analyze fillet/groove welds and welding positions using images, video and simulation - Diagnose common technique problems from virtual performance data or scenarios - Recommend adjustments to angle, travel speed and other relevant variables - Document performance/reflection using welding terminology	- IW7(A–G) - IW3(A–B) - IW4(A–G)	- Virtual SMAW skill challenges - Troubleshooting scenarios - Performance-data reflection

GP	Wks	Unit & Focus	Major Learning Tasks & Assessments	Integrated TEKS	Extension Activities
3	22–24	Unit 10 - GMAW Fundamentals & Virtual Welding	• Explain GMAW principles and identify process components • Sequence safe equipment setup for sample base metals • Compare basic metal-transfer processes • Use virtual welders, when supported, to practice GMAW technique and process variables • Analyze fillet/groove weld examples for process selection and quality	• IW8(A–E) • IW2(A,D–E) • IW3(A–B)	• Virtual GMAW practice • Equipment/setup sequencing • Transfer-process comparison
3	25–27	Unit 11 - Weld Quality, Inspection & Process Troubleshooting	• Identify visual characteristics of acceptable and unacceptable welds • Analyze common weld discontinuities/defects from photographs and virtual results • Compare SMAW and GMAW applications, equipment and operating variables • Apply measurement and joint knowledge to inspection scenarios • Develop corrective-action recommendations for simulated welding problems	• IW3(A–B) • IW4(A–G) • IW5(B) • IW7(A–G) • IW8(A–E)	• Defect identification • Virtual weld inspection • Process troubleshooting
4	28–30	Unit 12 - Welding Process Selection & Applied Design	• Compare oxy-fuel cutting, SMAW and GMAW for selected applications • Select a process based on material, joint, position, equipment and project needs • Interpret/create sketches and specify joint/weld requirements • Apply math and measurement to a theoretical fabrication problem • Justify process and consumable choices in writing/presentation	• IW3(A–B) • IW4(A–G) • IW5(A–D) • IW6–8 applied	• Process-selection case study • Design challenge • Technical presentation
4	31–33	Unit 13 - Welding Project Design Capstone	• Design a complete theoretical welded project without live fabrication • Create project sketch, dimensions, joint/weld selections and material list • Select welding/cutting processes, equipment and consumables • Develop safety analysis, setup sequence, work plan and quality criteria • Use virtual welding evidence, when available, to support selected process decisions	• IW1(A–F) • IW2(A–E) • IW3(A–B) • IW4(A–G) • IW5(A–D) • IW6(A–F) • IW7(A–G) • IW8(A–E)	• Capstone design packet • Virtual process evidence • Peer design review
4	34–35	Unit 14 - Career Portfolio, Communication & Welding Showcase	• Finalize career portfolio and evaluate progress toward personal career goals • Research next-step welding coursework, training, certifications and employment • Practice résumé/interview and professional communication skills • Present capstone design and defend safety/process/material decisions • Reflect on readiness for a future laboratory-based welding course	• IW1(A–F) • IW5(A,D) • §127.15(d)(1)	• ACCESS: résumé/postsecondary planning • Mock interview • Capstone presentation
4	36	Semester 2 Exam & Virtual Welding Showcase	• Cumulative assessment across all Introduction to Welding TEKS • Scenario-based process selection, setup, safety and troubleshooting assessment • Final portfolio/capstone presentation and virtual welding reflection	• Cumulative IW1–8 • §127.15(d)(1)	• Targeted remediation • Student showcase

Introduction to Welding TEKS Coverage Checklist

Coverage verification: All eight current Introduction to Welding knowledge and skills strands and all 42 student expectations in §127.820(d), plus §127.15(d)(1) CTE Employability Skills, are intentionally addressed. Because this course is delivered without a live welding laboratory, standards containing performance verbs are taught and assessed through virtual welding, simulation, demonstration analysis, equipment/setup sequencing, models, technical drawings, process scenarios, and project planning as appropriate to available classroom technology.

Strand	SEs	Knowledge & Skills Focus	YAG Placement	Coverage
IW1	A–F	Successful worker: postsecondary skills, employer expectations, professional standards, career goals, communication, workplace health/safety	Units 1–2, 6, 13–14	100%
IW2	A–E	Welding equipment safety, hazardous materials, recycling, PPE and safety procedures	Units 2–3, 7, 10, 13	100%
IW3	A–B	Welding sketches and common weld/joint types	Units 5, 8–13	100%
IW4	A–G	Welding academic skills: technical writing, measurement, fractions/decimals and standard/metric conversions	Units 3–5, 8–13	100%
IW5	A–D	Welding careers, API/AWS code awareness, independent project work and collaboration	Units 6, 11–14	100%
IW6	A–F	Oxy-fuel cutting safety, compressed gases, components/setup, cutting factors and techniques	Units 7, 12–13	100%
IW7	A–G	SMAW safety, current, principles/setup, electrodes, fillet/groove welds and joint preparation	Units 8–9, 11–13	100%
IW8	A–E	GMAW safety, principles/setup, base-metal equipment setup and fillet/groove welds with transfer processes	Units 10–13	100%
§127.15(d)(1)	Integrated	Required CTE employability skills	All units	100%

Implementation Notes

- Introduction to Welding is delivered as a classroom course. Students are not expected to perform live arc welding, oxy-fuel cutting, compressed-gas setup, or other activities requiring a functioning welding laboratory.
- Virtual welders should be used wherever their capabilities align to the instructional objective, particularly for SMAW/GMAW technique, welding positions, work/travel angle, travel speed, consistency, and performance feedback.
- Where a TEKS expectation describes physical setup or performance, instruction should use the closest available safe modality: virtual simulation, instructor/media demonstration, equipment/component identification, setup sequencing, models, diagrams, video analysis, troubleshooting scenarios, or process-planning tasks.
- Assessment language should distinguish between conceptual/virtual proficiency and physical welding proficiency. Completion of this course should not be represented as evidence that a student has performed live welding or cutting.
- The capstone is a welding project design and process-planning experience rather than fabrication. It integrates drawings, measurements, joints, process/consumable selection, safety analysis, work sequencing, quality criteria and virtual welding evidence.
- ACCESS should support welding career exploration, postsecondary/technical training, credentials, résumé/interview preparation and transition into a laboratory-based Welding I course.
- Weeks 18 and 36 are reserved for cumulative semester exams. No instructional unit crosses the semester boundary.