# Scope & Sequence

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| Course Name: Welding II Lab **TSDS PEIMS Code:** 13032410 | | | **Course Credit:** 3.0  **Course Requirements:** This course is recommended for students in grades 11-12.  **Prerequisites:** Welding I.  **Recommended Corequisites:** Welding II. |
| **Course Description:** Welding II Lab provides an introduction to welding technology with an emphasis on basic welding laboratory principles and operating procedures. Topics include: industrial safety and health practices, hand tool and power machine use, measurement, laboratory operating procedures, welding power sources, welding career potentials, and introduction to welding codes and standards. This course provides knowledge, skills, and technologies required for employment in welding industries. 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. | | | |
| **NOTE:** This is a suggested scope and sequence for the course content. This content will work with any textbook or instructional materials. If locally adapted, make sure all TEKS are covered. | | | |
| **Total Number of Periods**  **Total Number of Minutes**  **Total Number of Hours** | 175 Periods  7,875 Minutes  131.25 Hours\* | \*Schedule calculations based on 175/180 calendar days. For 0.5 credit courses, schedule is calculated out of 88/90 days. Scope and sequence allows additional time for guest speakers, student presentations, field trips, remediation, extended learning activities, etc. | |

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| **Unit Number, Title, and Brief Description** | **# of Class Periods\***  (assumes 45-minute periods)  Total minutes per unit | **TEKS Covered**  **130.365 Knowledge and skills** |
| **Unit 1: Workplace Regulations, Safety & Compliance Review**  This unit will expose students to the important regulations and safety standards that are implemented within this industry. Students will learn that such practices are in place to manage resources to minimize losses and liabilities to businesses in the industry. During this unit students will acquire and apply basic knowledge of using and maintaining professional welding equipment. Students will identify materials and resources commonly used and recycled in welding. Students will demonstrate the proper use and care of Personal Protection Equipment (PPE) used in machining, sheet metal, and welding. | 10 Periods  450 Minutes | (2) The student knows the functions and applications of the tools, equipment, technologies, and materials used in welding. The student is expected to:  (A) use welding equipment according to safety standards;  (B) dispose of environmentally hazardous materials used in welding;  (C) explain the importance of recycling materials used in welding;  (E) use appropriate personal protective equipment to follow safety measures |
| **Unit 2: Oxy-Fuel Cutting**  Students will be able to identify and explain, oxy-fuel cutting. Students will demonstrate the safe setting up and disassembly process of oxy-fuel, propane, propylene, and Chemtane 2® equipment. Students will demonstrate lighting, adjusting, and making cuts with oxy-fuel. Students will be able to identify and understand some common hazards in oxy-fuel cutting. | 20 Periods  900 Minutes | (5) The student performs oxy-fuel cutting processes. The student is expected to:  (A) use safe operating practices;  (B) perform safe handling of compressed gases;  (C) assemble components involved in setting up for oxy-fuel gas cutting processes;  (D) demonstrate proper set-up for cutting techniques such as piercing, straight line, and bevel; and  (E) evaluate acceptable and unacceptable cuts |
| **Unit 3: Plasma Arc Cutting**  Students will learn knowledge regarding plasma arc cutting. Students will be able to identify and demonstrate setting up plasma arc cutting equipment. Students will identify, explain, and demonstrate the proper processes, safety procedures, and fume extraction for plasma arc cutting. Students will demonstrate the skills required to perform various cuts with plasma arc on various materials, including steel, aluminum, and stainless steel. | 20 Periods  900 Minutes | (6) The student performs plasma arc cutting on metals. The student is expected to:  (A) use safe operating practices;  (B) explain the difference between safe and unsafe storage and handling of compressed gas supply;  (C) employ proper set-up procedures for plasma arc cutting; and  (D) demonstrate proper cutting techniques, including straight line, piercing, and bevels |
| **Unit 4: Shielded Metal Arc Welding (SMAW)**  Students will understand that Shielded Metal Arc Welding process (SMAW), commonly referred to as stick welding, derives the heat for welding from an electric arc established between a consumable stick electrode and the part to be welded. During this unit students will demonstrate knowledge of Shielded Metal Arc Welding (SMAW) including setting up of equipment. Students will identify and explain the American Welding Society (AWS) classification of wire. Students will identify, explain, and demonstrate the proper AWS codes for fillet weld quality performing fillet welds in the flat, horizontal, vertical, and overhead positions to AWS code through National Skills Education standards. | 20 Periods  900 Minutes | (7) The student performs shielded metal arc welding principles and practices on metals. The student is expected to:  (A) use safe operating practices;  (B) demonstrate shielded metal arc welding principles;  (C) demonstrate proper set-up procedures for shielded metal arc welding;  (D) select appropriate electrodes for base metal in shielded metal arc welding;  (E) perform welds such as fillet and groove according to industry-accepted welding standards;  (F) perform multiple pass welds;  (G) prepare joints for welding; and  (H) explain heating processes such as pre-heating and post-heating |
| **Unit 5: Gas Metal Arc Welding**  Students will learn and understand that Gas Metal Arc Welding (GMAW) is a process in which an electric arc forms between a consumable wire electrode and the workpiece metal(s), which heats the workpiece metal(s), causing them to melt and join; GMAW eliminates any need for a welding rod. Students will use appropriate equipment for safe operating practices for base metal in gas metal arc welding. Students will identify, explain, and demonstrate the proper AWS codes for fillet weld quality performing fillet welds in the flat, horizontal, vertical, and overhead positions to AWS code. | 20 Periods  900 Minutes | (8) The student demonstrates proper set-up procedure for gas metal arc welding. The student is expected to:  (A) use safe operating practices;  (B) demonstrate gas metal arc welding principles;  (C) demonstrate proper set-up for gas metal arc welding;  (D) select appropriate filler metals for base metal in gas metal arc welding; and  (E) perform fillet and groove welds in all positions according to industry-accepted welding standards. |
| **Unit 6: Fluxed Core Arc Welding**  The unit on Fluxed Core Arc Welding (FCAW) includes the identification of the welding machine and parts along with the safe and proper use of the machines in the lab environment. This unit will incorporate the use of the machine to weld test coupons and construct welded projects. Students will understand that FCAW requires a continuously-fed consumable tubular [electrode](https://en.wikipedia.org/wiki/Electrode) containing a [flux](https://en.wikipedia.org/wiki/Flux_(metallurgy)) and a constant-[voltage](https://en.wikipedia.org/wiki/Voltage) or, less commonly, a constant-[current](https://en.wikipedia.org/wiki/Electric_current) [welding power supply](https://en.wikipedia.org/wiki/Welding_power_supply). Students will identify, explain, and demonstrate the proper AWS codes for fillet weld quality performing fillet welds in the flat, horizontal, vertical, and overhead positions to AWS code. | 20 Periods  900 Minutes | (9) The student performs flux cored arc welding principles and practices on metals. The student is expected to:  (A) use safe operating practices;  (B) employ and appraise flux cored arc welding principles;  (C) demonstrate proper set-up procedures for flux cored arc welding;  (D) appraise appropriate filler metal for base metal in flux cored arc welding;  (E) perform fillet and groove welds; and  (F) perform welds in all appropriate positions according to industry-accepted welding standards. |
| **Unit 7: Gas Tungsten Arc Welding**  Gas Tungsten Arc Welding (GTAW) is frequently referred to as TIG welding. TIG welding is a commonly used high quality welding process. TIG welding has become a popular choice of welding processes when high quality, precision welding is required. In TIG welding an arc is formed between a non-consumable tungsten electrode and the metal being welded. Gas is fed through the torch to shield the electrode and molten weld pool. If filler wire is used, it is added to the weld pool separately. Students will perform fillet and groove TIG welds in all positions on a variety of materials including carbon steel, stainless steel, pipe, and aluminum | 20 Periods  900 Minutes | (10) The student performs gas tungsten arc welding principles and practices on metals. The student is expected to:  (A) use safe operating practices;  (B) demonstrate gas tungsten arc welding principles;  (C) demonstrate proper set-up for gas tungsten arc welding;  (D) select appropriate use of filler metals for base metal in gas tungsten arc welding; and  (E) perform welds in all appropriate positions according to industry-accepted welding standards. |
| **Unit 8: Welding Fabrication Projects and Quality Assurance**  Students will identify and use welding symbols and read detailed drawings; sketches will include basic welding symbols for fillet, groove, spot, plug, flanged, and other basic welds. Students will demonstrate the use of elements within a detailed drawing and interpret welding symbols (symbols to include basic welding symbols for fillet, groove, spot, plug, flanged, and other basic welds) from a detailed drawing to fabricate a product. This unit will encompass the types of quality control systems and why quality control is essential to the production process. Students will examine and experience final production quality control and on-line quality control systems.  Students will embark on the process of selecting the proper materials to weld and the proper welding process for the welding assembly involved. Furthermore, this unit will include lessons on the importance of using the proper use of tools that ensure correct joint preparation. | 30 Periods  1,350 Minutes | (3) The student applies the concepts and skills of welding of actual work situations. The student is expected to:  (A) work independently to fabricate welded projects with minimal assistance;  (B) work collaboratively with other students to complete relevant projects; and  (C) troubleshoot equipment  (4) The student analyzes the concepts and intricacies of inspections and related codes. The student is expected to:  (A) explain weld inspection processes; and  (B) produce acceptable weldments to standards related to industry codes such as the American Welding Society (AWS), American National Standards Institute, and Canadian Welding Bureau  (11) The student performs weldment fabrications. The student is expected to:  (A) identify layout tools;  (B) perform a part layout on plate according to a blueprint;  (C) perform a layout of a pipe fitting according to a blueprint; and  (D) perform an assembly according to a blueprint |
| **Unit 9: Employability Skills**  This unit explores the professional standards and employability skills required by business and industry. Students will grow to understand that responsibility, time management, organization, positive attitude, and good character have a large impact on employability and job retention. Students will understand the professional ethics legal responsibilities pertaining to the welding industry. This unit will help students better understand the various career opportunities within the welding industry. Students will develop a career plan designed to achieve their career goals within this industry. This unit will help students better understand the various career opportunities within the welding industry. Students will focus on expanding their knowledge about the education, training, and/or certification required to obtain employment in the industry. Students will develop a career plan designed to achieve their career goals within this industry. | 15 Periods  675 Minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:  (A) express ideas to others in a clear, concise, and effective manner through written and verbal communication;  (B) convey written information that is easily understandable to others;  (C) demonstrate acceptable work ethics in reporting for duty and performing assigned tasks as directed;  (D) conduct oneself in a manner acceptable for the profession and work site such as suitable dress and polite speech;  (E) choose the ethical course of action and comply with all applicable rules, laws, and regulations;  (F) review the fine, detailed aspects of both quantitative and qualitative work process and end products  (G) evaluate systems and operations; identify causes, problems, patterns, or issues; and explore workable solutions or remedies to improve situations;  (H) follow written and oral instructions and adhere to established business practices, policies, and procedures, including health and safety rules;  (I) prioritize tasks, follow schedules, and work toward goal-relevant activities in an effective, efficient manner |