# Scope & Sequence

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| Course Name: Welding II **TSDS PEIMS Code:** 13032400 | | | **Course Credit:** 2.0  **Course Requirements:** This course is recommended for students in grades 11-12.  **Prerequisites:** Welding I.  **Recommended Prerequisites:** Algebra I or Geometry.  **Recommended Corequisites:** Welding II Lab. |
| **Course Description:** Welding II builds on the knowledge and skills developed in Welding I. Students will develop advanced welding concepts and skills as related to personal and career development. Students will have opportunities to reinforce, apply, and transfer knowledge and skills to a variety of settings. | | | |
| **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** | 350 Periods  15,750 Minutes  262.5 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**  **130.364 Knowledge and skills** |
| **Unit 1: Academic Knowledge and Skills for Manufacturing**  This unit will include lessons on terminology and skills that are associated with mathematics and science knowledge specifically pertaining to welding. Students will focus on understanding, interpreting, analyzing and knowing how to correctly use units of measure, mathematics concepts, and science principles in order to solve problems. | 35 Periods  1,575 Minutes | (3) The student applies academic skills to the requirements of welding. The student is expected to:  (A) demonstrate mathematical skills to estimate costs;  (B) explain the impact of accurate readings of measuring devices on cost estimates;  (C) justify the selection of a tool to make accurate measurements;  (D) compute measurements such as area, surface area, volume, and perimeter;  (E) solve problems using whole numbers, fractions, mixed numbers, and decimals;  (F) apply right triangle relationships using the Pythagorean Theorem; and  (G) select a mathematical formula for estimation |
| **Unit 2: 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. | 35 Periods  1,575 Minutes | (4) 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  (2) The student explores the employability characteristics of a successful worker in the global economy. The student is expected to:  (F) apply knowledge and skills related to health and safety in the workplace as specified by appropriate governmental regulations |
| **Unit 3: Welding Tools, Equipment, Technology, and Materials**  During this unit, students will learn about the types of technology integrated into the welding industry. Students will understand how computerized systems increase businesses’ effectiveness and completing workplace tasks with accuracy and efficiency. Students will identify and describe trends in the use of emerging technology in the welding industry, including the use of automated welding machines such as numerical control, computer numerical control, and robotics-controlled machines. | 30 Periods  1,350 Minutes | (4) The student knows the functions and applications of the tools, equipment, technologies, and materials used in welding. The student is expected to:  (D) evaluate the performance impact of emerging technologies in welding;  (F) investigate the use of automated welding machines such as numerical control, computer numerical control, and robotics-controlled welding machines  (6) The student applies the concepts and skills of welding to perform tasks. The student is expected to:  (C) troubleshoot equipment |
| **Unit 4: 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/or Chemtane 2® equipment. Students will demonstrate lighting, adjusting, and making cuts. Students will be able to identify and understand some common hazards during the cutting process. Students will demonstrate the skills required to perform various cuts on various materials, including steel, aluminum, and stainless steel. | 35 Periods  1,575 Minutes | (8) The student performs advanced cutting processes on carbon steels. The student is expected to:  (A) observe safe operating practices;  (B) apply safe handling of compressed gases; and  (C) perform cutting processes according to accepted welding standards. |
| **Unit 5: 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. | 35 Periods  1,575 Minutes | (9) The student performs shielded metal arc welding on metals. The student is expected to:  (A) employ safe operating practices; and  (B) demonstrate skills required to make 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. | 35 Periods  1,575 Minutes | (10) The student performs flux cored metal arc welding. The student is expected to:  (A) use safe operating practices;  (B) perform fillet and groove welds; and  (C) 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 | 35 Periods  1,575 Minutes | (11) The student performs gas tungsten arc welding on metals. The student is expected to:  (A) employ safe operating practices;  (B) perform fillet and groove welds in all positions; and  (C) perform welds on metals such as carbon steel, stainless steel, pipe, and aluminum 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. | 40 Periods  1,800 Minutes | (5) The student illustrates welding joint design, symbols, and welds. The student is expected to:  (A) use knowledge of engineering drawings to complete an advanced project; and  (B) evaluate projects using engineering drawing specifications.  (6) The student applies the concepts and skills of welding to perform tasks. The student is expected to:  (A) work independently in fabricating welded projects;  (B) work collaboratively with other students to complete a real-world application item  (7) The student analyzes the concepts and intricacies of inspections related to welding codes. The student is expected to:  (A) inspect the welding projects of team members;  (B) select codes for weld inspections; and  (C) critique and evaluate the weldments of team members |
| **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. | 35 Periods  1,575 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;  (J) analyze how teams function; and  (K) evaluate employers' work expectations to measure project success |
| **Unit 10: Career & Professional Development**  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. | 35 Periods  1,575 Minutes | (2) The student explores the employability characteristics of a successful worker in the global economy. The student is expected to:  (A) determine academic knowledge and skills required for postsecondary education;  (B) identify employers' expectations to foster positive customer satisfaction;  (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;  (D) evaluate progress toward personal career goals;  (E) communicate effectively with others in the workplace to clarify objectives |