# Scope & Sequence

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| Course Name: Introduction to Welding **TSDS PEIMS Code:** 13032250 | | | **Course Credit:** 1.0  **Course Requirements:** This course is recommended for students in grades 9-12.  **Prerequisites:** None.  **Recommended Prerequisites or Corequisite:** Algebra I. |
| **Course Description:** Introduction to Welding will provide an introduction to welding technology with an emphasis on basic welding laboratory principles and operating procedures. Students will be introduced to the three basic welding processes. 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. Introduction to Welding will provide students with the knowledge, skills, and technologies required for employment in welding industries. Students will develop knowledge and skills related to welding 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 will 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. | |
| **Unit Number, Title, and Brief Description** | **# of Class Periods\***  (assumes 45-minute periods)  Total minutes per unit | **TEKS Covered**  **130.362 (c) 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. | 20 Periods  900 Minutes | (5) The student applies academic skills in relationship to welding. The student is expected to:  (A) demonstrate mathematical skills related to welding;  (B) demonstrate technical writing skills related to welding;  (C) apply accurate readings of measuring devices;  (D) accurately use appropriate tools to make measurements;  (E) solve problems using whole numbers, fractions, mixed numbers, and decimals;  (F) perform conversions between fractions and decimals; and  (G) perform conversions between standard units and metric units | |
| **Unit 2: Workplace Regulations, Safety & Compliance**  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. | 20 Periods  900 Minutes | (3) The student evaluates the function and application of the tools, equipment, technologies, and materials used in welding. The student is expected to:  (A) employ welding equipment according to safety standards;  (B) identify and properly dispose of environmentally hazardous materials used in welding;  (C) explain the importance of recycling materials used in welding;  (D) choose appropriate personal protective equipment; and  (E) evaluate skills related to health and safety in the workplace as specified by appropriate governmental regulations  (2) The student explores the characteristics of a successful worker in the global economy. The student is expected to:  (F) apply knowledge and skills to health and safety in the workplace as specified by appropriate governmental regulations  (6) The student applies the concepts and skills of welding projects. The student is expected to:  (B)understand welding codes such as American Petroleum Institute (API) 1104 and American Welding Society (AWS) D1.1; | |
| **Unit 3: Welding Fundamentals**  Students will identify and use welding symbols and read detailed drawings; sketches will include basic welding symbols for fillet welds, groove welds, and other basic welds. Students will demonstrate the use of elements within a detailed drawing and interpret welding symbols from a detailed drawing. Additionally, students will be able to identify and use the basic weld types, weld joints, and weld positions. | 15 Periods  675 Minutes | (4) The student compares and contrasts welding joint design, material symbols, and welds. The student is expected to:  (A) demonstrate knowledge of welding sketches; and  (B) identify types of welds such as fillet, groove, spot, plug, and flanged | |
| **Unit 4: 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 equipment. Students will demonstrate lighting, adjusting, and making cuts with oxy-fuel. Explain some common hazards in oxy-fuel cutting. | 20 Periods  900 Minutes | (7) The student performs oxy-fuel cutting processes on carbon steels. The student is expected to:  (A) use safe operating practices;  (B) perform safe handling of compressed gases;  (C) identify components of oxy-fuel gas cutting;  (D) demonstrate proper set-up procedures for the oxy-fuel process;  (E) identify the factors affecting the oxy-fuel cutting of base metals; and  (F) demonstrate proper cutting techniques such as piercing, straight line, and bevel | |
| **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 basic 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. | 25 Periods  1,125 Minutes | (8) The student performs shielded metal arc welding principles and practices on metals. The student is expected to:  (A) use safe operating practices;  (B) demonstrate knowledge of welding currents;  (C) apply shielded metal arc welding principles;  (D) demonstrate proper set-up procedure for shielded metal arc welding;  (E) determine appropriate electrodes for base metal in shielded metal arc welding;  (F) perform fillet and groove welds in all positions; and  (G) prepare joints for welding | |
| **Unit 6: 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. | 25 Periods  1,125 Minutes | (9) The student performs gas metal arc welding principles and practices. The student is expected to:  (A) use safe operating practices;  (B) apply gas metal arc welding principles;  (C) demonstrate proper set-up procedure for gas metal arc welding;  (D) use appropriate equipment setup for base metal in gas metal arc welding; and  (E) perform fillet and groove welds using gas metal arc welding with various metal transfer processes | |
| **Unit 7: Welding Project Design**  This unit will include lessons on the important welding assembly and the proper use of tools that ensure correct joint preparation. Also, students will be able to select the proper welding process for the welding assembly involved in a welded project. | 20 Periods  900 Minutes | (6) The student applies the concepts and skills of welding projects. The student is expected to:  (C) work independently to fabricate a variety of welded projects with minimal assistance; and  (D) work collaboratively with other students | |
| **Unit 8: 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. Utilizing technology, students will research the education and training needs, labor market information, salaries and other elements to inform their career development. | 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) demonstrate acceptable work ethics in reporting for duty and performing assigned tasks as directed;  (C) conduct oneself in a manner acceptable for the profession and work site such as suitable dress and polite speech;  (D) choose ethical courses of action such as following applicable rules, laws, and regulations;  (E) review detailed aspects of both quantitative and qualitative work processes and end products;  (F) evaluate systems relative to causes, problems, and patterns to improve operational situations;  (G) adhere to business practices such as policies, procedures, and health and safety rules; and  (H) use time wisely by prioritizing tasks and following schedules in an efficient manner  (2) The student explores the characteristics of a successful worker in the global economy. The student is expected to:  (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; and  (D) evaluate progress toward personal career goals | |
| **Unit 9: 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. | 15 Periods  675 Minutes | (2) The student explores the 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; and  (E) communicate effectively with others in the workplace to clarify objectives  (6) The student applies the concepts and skills of welding projects. The student is expected to:  (A) explore careers in welding | |