

Welding Technology 3: Design and Fabrication

Grades 11-12

Units of Credit: One Year (Elective)

Prerequisites: Welding Technology 2 and Drafting 1

Course Description:

This course is for students who want to construct and assemble projects from the materials used in the art metal, construction, and metals industries. Current industry standards are observed and practiced. Students master and apply a variety of skills including safe work habits, organization, problem solving, and practical application of welding techniques. Students engage in a variety of learning activities including lecture and note taking, research, individual projects, demonstrations, and performance tasks. Students are assessed by observing and measuring performance on tests, quizzes, assigned tasks and projects, and by the quality of work produced.

Topics:

- Welding and Personal Safety
- Care, Use, and Maintenance of Equipment
- Advanced Joint Design and Construction
- Welding Terminology
- Welding Fabrication
- Artistic Expression in Welding
- Out of Position Welding
- Advanced Oxyacetylene Welding
- Advanced Arc Welding
- Shielded Gas (MIG and TIG) Welding
- Material Cutting Processes
- Forge Welding
- Welding Career Exploration
- Welding Metallurgy
- Production Welding
- Welding Certification and Testing

NOTE: Throughout this document, learning target types are identified as knowledge (“K”), reasoning (“R”), skill (“S”), or product (“P”).

STANDARD 1: Students experience various career opportunities and assess personal career pathways.

Benchmark 1:

Explore and identify personal interests, aptitudes, and abilities and develop strategies to achieve tentative career goals.

Learning Targets (Type):

1. I can use Montana Career Information Systems (MCIS) and/or other systems or web resources to investigate and evaluate my personal interests, aptitudes and abilities. (S)
2. I can formulate tentative career goals. (R)
3. I can evaluate approaches for meeting my goals. (R)
4. I can explore opportunities related to welding technologies as they apply to continuing education and career decisions. (K,S)
5. I can apply the skills and knowledge of current equipment, materials, and processes used in related careers. (K,S)
6. I can observe and assess the career opportunities for a person with welding skills. (R,S)

Benchmark 2:

Utilize local resources to research career plans.

Learning Targets (Type):

1. I can identify local resources to develop career plans. (K)
2. I can contact my school career counselor or teacher to pursue career pathways. (S)

Benchmark 3:

Recognize the interrelationships of family, community, career, and leisure roles.

Learning Targets (Type):

1. I can describe the importance of balance between family and community in regards to career and leisure activities. (K)
2. I can compare and contrast the needs of career and leisure activities and how they relate to and/or affect family and community. (R)

STANDARD 2: Students demonstrate an understanding and apply principles of Resource Management (i.e., financial, time, personal management).

Benchmark 1:

Prepare a budget and keep financial records.

Learning Targets (Type):

1. I can research and report cost of materials and time. (R,S)
2. I can document financial inputs and outputs. (S)
3. I can identify the necessity to maintain accurate financial records. (K)
4. I can stay within a fixed budget. (S,P)
5. I can use or prepare budgets, make forecasts, keep records, make adjustments to meet objectives, and evaluate financial records. (R,S)

Benchmark 2:

Prioritize, allocate time, prepare and follow schedules to complete a project.

Learning Targets (Type):

1. I can estimate the required time to complete a project. (R)
2. I can prioritize resources, equipment and tasks. (R)
3. I can reflect upon completion. (K)
4. I can select goal-relevant activities, rank them, allocate time, and prepare and follow schedules. (R,S)
5. I can allocate and evaluate time, materials, facilities and resources to set and achieve goals. (R,S)
6. I can form organizational and time management skills as part of the problem-solving process. (R,S)

Benchmark 3:

Apply appropriate time to task.

Learning Targets (Type):

1. I can implement a time schedule for task completion. (S)

Benchmark 4:

Use physical resources wisely to accomplish a goal.

Learning Targets (Type):

1. I can identify the resources necessary to accomplish the task. (K)
2. I can maintain the tools of the trade. (S)
3. I can maximize the use of my resources. (S)

STANDARD 3: Students acquire and utilize personal and leadership skills to become successful, productive citizens.

Benchmark 1:

Demonstrate active leadership skills by participation in group activities and projects.

Learning Targets (Type):

1. I can investigate various leadership styles. (R)
2. I can apply leadership styles in group activities and projects. (R)
3. I can build upon the principles of effective group participation and leadership related to workplace hierarchy. (R,S)
4. I can incorporate teamwork and cooperative learning skills. (S)
5. I can assess skills and distribute work accordingly; evaluate performance and provide feedback toward the accomplishment of personal and team goals. (R,S)
6. I can practice various roles required as a member of an effective team while recognizing individual differences and cultural diversity. (R,S)
7. I can demonstrate and teach a learned skill including performance evaluation of self and others in this process. (R,S)

Benchmark 2:

Demonstrate positive personal and work ethics.

Learning Targets (Type):

1. I can show up for class and work on time. (S)
2. I can develop personal and work related goals. (K,P)
3. I can describe ethical behavior in the workplace. (K)
4. I can practice and evaluate positive service skills (e.g., resolving misunderstanding, consumer complaints).

Benchmark 3:

Demonstrate skills to be a productive citizen.

Learning Targets (Type):

1. I can develop professional relationships with community members. (S)
2. I can contribute to my community in a positive manner. (S,P)

Benchmark 4:

Apply self-esteem building practices.

Learning Targets (Type):

1. I can define and provide evidence of my strengths in my career interest areas. (K,S)
2. I can persevere through set backs and stay focused on my goals. (S)

Benchmark 5:

Demonstrate appreciation for diverse perspective needs and characteristics.

Learning Targets (Type):

1. I can develop a working relationship with diverse populations. (R,S)
2. I can demonstrate communication skills that contribute to positive relationships. (R,S)
3. I can work to understand diverse points of view. (R,S)

Benchmark 6:

Practice several methods of effective communication.

Learning Targets (Type):

1. I can demonstrate good listening skills. (S)
2. I can effectively communicate verbally through collaborative projects. (S,P)
3. I can develop quality written professional communications. (P)
4. I can select, analyze, and present information using a variety of methods (e.g., oral, written, graphic, pictorial, multimedia). (R,S)
5. I can communicate ideas to justify position, persuade and convince others, and responsibly challenge existing procedures and policies. (R,S)
6. I can practice and evaluate negotiating process including researching, goal setting, presenting, listening, clarifying, adjusting and compromising. (R,S)

STANDARD 4: Students acquire and demonstrate current technical skills leading to an occupation.

Benchmark 1:

Practice technical skills and procedures required for an occupation.

Learning Targets (Type):

1. I can evaluate and apply the concepts and skills related to health and safety in the workplace. (R,S)
2. I can use tools, materials, and equipment commonly employed in the welding industry in a safe and efficient manner. (K,S)
3. I can utilize correct techniques for proper handling of hazardous materials. (K,R,S)

Benchmark 2:

Practice safe and appropriate use of technology.

Learning Targets (Type):

NOT ADDRESSED IN THIS COURSE.

Benchmark 3:

Select the appropriate tools, equipment, and procedures for the task.

Learning Targets (Type):

1. I can use tools, machines, and equipment to manufacture or produce solutions to problems. (R,S)
2. I can demonstrate creativity in the use of new and emerging technologies applicable to welding fabrication. (R,S)
3. I can select and apply welding techniques based on knowledge of modern equipment and newly developed welding processes. (K,R,S)

Benchmark 4:

Manage and maintain technological tools and follow troubleshooting protocol.

Learning Targets (Type):

NOT ADDRESSED IN THIS COURSE.

Benchmark 5:

Apply technical information to a variety of sources.

Learning Targets (Type):

NOT ADDRESSED IN THIS COURSE.

STANDARD 5: Students know and demonstrate the requirements of the workplace through authentic application.

Benchmark 1:

Practice and demonstrate academic and technical skills to a workplace setting.

Learning Targets (Type):

1. I can practice, and demonstrate my technical workplace skills in my school lab. (S)
2. I can research, write and present on the technical content utilizing academic skills found in workplace settings. (S,P)
3. I can apply critical-thinking strategies to the analysis and evaluation of potential welding and fabrication assignments. (R,S)
4. I can produce projects based on designing and/or interpreting plans. (S,P)
5. I can use cross-curricular resources and knowledge to develop solutions to problems. (K,S)
6. I can design and fabricate innovative solutions and applications. (K,R,S)
7. I can apply product quality standards common to the industry. (K,S)
8. I can apply design and fabrication processes in a welding environment. (K,S)
9. I can gather, compile and analyze data from a variety of sources, and evaluate relevance and accuracy in making informed decisions in the workplace. (R,S)
10. I can organize, process, analyze, and maintain written and computerized records and other forms of information using systematic methods. (R,S)
11. I can acquire, organize, communicate, process, analyze and evaluate information from print and electronic sources. (R,S)

Benchmark 2:

Apply the concepts of entrepreneurship.

Learning Targets (Type):

1. I can explain the concepts of entrepreneurship. (K)
2. I can demonstrate the concepts of entrepreneurship through a unique project. (R,S)
3. I can present my unique project to an authentic audience. (S,P)

Benchmark 3:

Identify possible outcomes and consequences of decisions.

Learning Targets (Type):

1. I can identify possible consequences of carelessness and horseplay. (K)
2. I can explain potential outcomes of not following directions, (i.e. safety, guidelines, rubrics). (R)

Benchmark 4:

Use acceptable industry standard equipment in a school setting.

Learning Targets (Type):

1. I can successfully use acceptable industry standard equipment to produce an authentic product within budget constraints. (S,R,P)