

STRANDS AND STANDARDS

METALWORKING 1



Course Description

This is an entry-level course in Metalworking. Through demonstrations, lectures, research and practical experiences is designed to introduce the student to a broad experience in the use of; equipment, tools, materials, processes and techniques of metalworking trades. This is a one- semester course of instruction.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.10.00.00.085
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	N/A
Test Weight	N/A
License Area of Concentration	CTE &/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Machine Tool or Welding
Endorsement 2	
Endorsement 3	

STRAND 1

Student will participate in personal and leadership development activities through SkillsUSA or another appropriate career and technical student organization.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team

Standard 3

Student will use critical thinking and problem-solving skills.

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.

Standard 4

Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- File a regular written report on progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Student will participate in work-place readiness activities.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Write a resume including a list of demonstrated skills.
- Write a letter of application.
- Complete a job application.
- Participate in an actual or simulated job interview.

Standard 2

Student will participate in a work-based learning experience outside the classroom.

- Student will plan and implement a work-based learning experience aligned with their career goal.

STRAND 3

Students will be able to understand safe practices in a metals shop.

Standard 1

Follow safety manuals and all safety regulations and requirements.

Standard 2

Use protective equipment.

- Wear protective safety clothing as recommended by OSHA, UOSHA, and the Utah State Risk Management Office.
- Maintain and use appropriate protective guards and equipment on machinery.
- Locate and properly use protective equipment.
- Use lifting aids when necessary.

Standard 3

Maintain a clean and safe work environment.

- Keep work areas clean.
- Clean machine and hand tools when work is completed.
- Put tools away when work is finished.
- Keep aisles clear of equipment and materials.
- Perform preventive maintenance as required.
- Understand chemical hazards and the use of Material Safety Data Sheets (MSDS).
- Keep storage rooms well organized and free of clutter.

Standard 4

Request a courtesy UOSHA or State Risk Management inspection at least every 2 years.

- Keep accurate records of and take appropriate action on their findings.
- Make a copy of their findings available to your administration.

Standard 5

Each student should earn a score of 100% on a required safety exam relating to general shop safety and each machine tool he/she will be operating.

STRAND 4

Students will be able to apply mathematical concepts.

Standard 1

Perform basic arithmetic functions.

- Add, subtract, multiply, and divide whole numbers.
- Add, subtract, multiply, and divide fractions.
- Add, subtract, multiply, and divide decimals.
- Use a ruler or measuring tape to measure within a sixteenth (1/16) of an inch.

Standard 2

Convert fractions to decimal equivalents.

- Convert fractions to decimal equivalents.
- Convert decimal values to nearest fraction equivalent.
- Use Decimal Equivalent Chart for conversions.

Standard 3

Convert metric to inch measurements.

- Convert inch dimensions to metric.
- Convert metric dimensions to inch.
- Use metric/inch conversion chart.

STRAND 5

Students will be able to interpret engineering drawings.

Standard 1

Review blueprints.

- Identify types of lines within a drawing.

Standard 2

Identify basic layout of drawings.

- Identify types of lines within a drawing.
- Identify item number symbols.
- Identify general note symbols.
- List the essential components found in the title block.
- Locate bill of materials on a drawing.

Standard 3

Identify basic types of drawings.

- Identify orthographic views.
- Identify positions of views (top, front, side, and auxiliary).
- Visualize one or more views from a given view.
- Identify isometric views.
- Determine the scale of the view or section.

STRAND 6

Students will understand the relationship of metals, machines, and processes.

Standard 1

Explain how metals are classified.

- Describe the properties and characteristics of many different metals.

Standard 2

Identify how metals and alloys are developed for specific applications.

STRAND 7

Students will understand metal forming operations and processes using both hand tools and machines.

Standard 1

Sheet-metal operations and processes.

- Explain the need for patterns and stretch-outs.
- Use the different methods for pattern development.
- Cut and bend sheet metal using several different tools.
- Identify and use a variety of sheet metal tools.
- Make hems, edges, and seams in sheet metal.
- Bend sheet metal into three-dimensional shapes using machines.
- Join sheet metal sections with rivets and other mechanical fasteners.
- Apply sheet metal safety rules.

Standard 2

Forging operations and processes.

- Identify the tools used in hand forging.
- Demonstrate several forging techniques.
- Bend, draw out, and upset metal by hand forging.
- Practice hand forging safety rules.
- Explain industrial forging processes.

Standard 3

Gas welding and SMAW operations and processes.

- Describe the basic welding processes.
- Identify the parts of a gas welding outfit.
- Recognize basic weld joints.
- Safely light, adjust, and use a gas torch.
- Select the correct rod and flux for a job.
- Prepare a joint for gas welding.
- Explain the difference between welding and brazing.
- Dress properly and use safety precautions when welding.
- List various components of SMAW system.
- Select the proper electrode for the job.
- Perform basic SMAW operations.

Standard 4

Foundry operations and processes.

- Explain various casting techniques.
- Explain the sand-casting process.
- Demonstrate the correct way to make a silicon mold with pewter.
- Demonstrate the correct way to make a green sand casting with aluminum.
- Describe simple patterns, split patterns, and match plate patterns.
- Heat and pour molten metal safely.
- Use a pyrometer.
- Follow safe casting procedures.

Standard 5

Metal machining operations and processes.

- Explain the operation of typical grinding machines.
- Adjust and prepare a grinding machine for operation.
- Select and safely use the correct drill and drilling machine for a given job.
- Make safe setups on a drill press.
- Calculate cutting speeds.
- Understand drill size classifications.
- Properly drill, countersink, counter bore, and tap steel.
- Select proper coolant for drilling select materials.
- Identify various types of drilling machines.
- Properly use a hand hack saw.
- Describe the operation of the three-principle metal-cutting power saws.
- Mount work properly for sawing.
- Safely operate a power saw.
- Describe how a lathe works.
- Identify the various parts of a lathe.
- Sharpen lathe cutting tools.
- Safely setup and operate a lathe using various work-holding devices.
- Practice proper safety precautions when operating metal cutting machines.

Performance Skills

Understand safe practices in a metals shop.

- Maintain a clean and safe work environment.
- Each student should earn a score of 100% on a required safety exam relating to general shop safety and each machine tool he/she will be operating.

Apply mathematical concepts.

- Convert fractions to decimal equivalents.
- Convert metric to inch measurements.

Interpret engineering drawings.

- Interpret information located in the title block and bill of materials.

Understand metal forming operations and processes using both had and machine tools.

- Sheet-metal operations and processes.
- Forging operations and processes.
- Welding operations and processes.
- Foundry operations and processes.
- Metal machining operations and processes.