

STRANDS AND STANDARDS

MACHINING 1



Course Description

This course is the first in a sequence that will use technical knowledge and skills to plan and manufacture projects using machine lathes, mills, drill presses, and other equipment in safe working conditions to promote the manufacturing industries.

Intended Grade Level	10-12
Units of Credit	0.5
Core Code	40.10.00.00.072
Concurrent Enrollment Core Code	40.10.00.13.072
Prerequisite	None
Skill Certification Test Number	580
Test Weight	0.5
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Machine Tool
Endorsement 2	N/A
Endorsement 3	N/A



STRAND 1

Students will be able to understand safe practices and professional machine shop procedures.

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.

Standard 3

Follow safe operating procedures for hand and power machine tools.

- Identify and understand safe machine operating procedures.
- Demonstrate safe machine operations at all times.

Standard 4

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 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.

Performance Skill

Understand safe practices and professional machine shop procedures.

- Follow safety manuals and all safety regulations and requirements.
- Use protective equipment.
- Follow safe operating procedures for hand and power machine tools.
- 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.

STRAND 2

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.

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

Calculate speeds and feeds for machining.

- Given appropriate reference materials, calculate RPM for various metals and tools.

Standard 4

Locate basic machining points from a Datum Point.

- Identify points using the Cartesian coordinate system.
- Identify points using the absolute dimensioning system
- Identify points using the incremental dimensioning system.

Performance Skill

Apply mathematical concepts.

- Perform basic arithmetic functions.
- Convert fractions to decimal equivalents.
- Calculate speeds and feeds for machining.
- Locate basic machining points from a Datum Point.

STRAND 3

Students will be able to interpret engineering drawings and control documents.

Standard 1

Identify basic layout of drawings.

- Identify types of lines within a drawing.

Standard 2

Identify basic types of drawings.

- Identify orthographic views.
- Identify positions of views (top, front, side, and auxiliary).
- Identify and describe the purpose of orthographic (three views) drawings.

- Identify and describe the purpose of isometric drawings.
- Identify and describe the purpose of exploded isometric drawings.
- Identify and describe the purpose of assembly drawings.
- Determine the scale of the view or section.
- Check for revisions and describe the current specifications.
- Recognize out-of-date blueprints and know appropriate related procedures.

Performance Skill

Interpret engineering drawings and control documents.

- Identify basic layout of drawings.
- Identify basic types of drawings.

STRAND 4

Students will be able to properly perform measurement/inspection.

Standard 1

Select proper measurement tools as they best relate to part characteristics and specified accuracy.

- Discuss how measurement tool selection can contribute to part accuracy/inaccuracy.
- Demonstrate proper manipulation and care of precision measuring tools.

Standard 2

Apply proper measuring techniques.

- Discuss factors affecting accurate measurement (dirt, temperature, improper measuring, tool calibration, etc.).
- Demonstrate how to check calibration of various precision instruments.

Standard 3

Accurately perform measurements with hand-held instruments.

- Read a tape measure to 1/16".
- Read a micrometer to .001".
- Read a steel rule.
- Read a dial/digital caliper to .001".

Performance Skill

Properly perform measurement/inspection.

- Select proper measurement tools as they best relate to part characteristics and specified accuracy.
- Apply proper measuring techniques.
- Accurately perform measurements with hand-held instruments.

STRAND 5

Students will be able to understand planning, hand tools, and recognize different manufacturing materials and processes.

Standard 1

Prepare and plan for machining operations.

- Read and interpret blueprints.
- Plan machining operations, write a plan of procedure.

Standard 2

Demonstrate proper use of hand tools.

- Select the most appropriate hand file and properly demonstrate its use.
- Correctly identify and use hand taps.
- Demonstrate the proper use of thread-cutting dies.
- Identify common hand tools and describe their basic applications.

Standard 3

Identify common materials and explain basic properties.

- Discuss the classification systems for metals.
- Describe general characteristics for carbon steels, tool steels, stainless steels, structural steels, cast irons, aluminum, and other commonly used metals.

Performance Skill

Understand planning, hand tools, and recognize different manufacturing materials and processes.

- Prepare and plan for machining operations.
- Demonstrate proper use of hand tools.
- Identify common materials and explain basic properties.

STRAND 6

Students will be able to understand and demonstrate the use of drilling and grinding machines and band saws.

Standard 1

Demonstrate proper use of drilling machines.

- Proper setup and operation of drill presses.
- Demonstrate the proper cleaning and care of the drill press.
- Identify standard drills and reamers.
- Properly set up a drill press and drill a hole.

Standard 2

Demonstrate proper use of grinding abrasive machines.

- Identify common types of grinding machines and discuss the major differences and applications.

- Discuss the variety and describe the proper selection and application of grinding fluids.
- Demonstrate the proper use and care of bench and pedestal grinders.

Standard 3

Demonstrate proper use of band saws.

Performance Skill

Understand and demonstrate the use of drilling and grinding machines and band saws.

- Demonstrate proper use of drilling machines.
- Demonstrate proper use of grinding abrasive machines.
- Demonstrate proper use of band saws.

STRAND 7

Students will be able to understand and demonstrate the use of milling machines.

Standard 1

Demonstrate proper use of a vertical milling machine.

- Demonstrate the proper setup, operation, care, cleaning, and lubrication of the vertical milling machine.
- Correctly identify common cutters and explain their basic applications.
- Identify and demonstrate the proper use of all controls and adjustments on the vertical milling machine.
- Properly set up the milling machine and demonstrate the use of an edge finder. Locate a point within .001".
- Select the proper cutter and work holding device, demonstrate their proper installation and setup to machine a part (This may include end mills, flycutter, etc.).
- Having properly installed a drill chuck and an appropriate work holding device, demonstrate how to locate and drill a hole.
- Demonstrate the ability to use the Machinery Handbook as a reference for milling.

Performance Skill

Understand and demonstrate the use of milling machines.

- Demonstrate proper use of a vertical milling machine.

STRAND 8

Students will be able to understand and demonstrate the use of metal lathes.

Standard 1

Demonstrate proper use of metal lathes.

- Demonstrate the proper cleaning, lubrication, and care of the metal lathe.
- Identify common parts and demonstrate the proper use of basic controls and adjustments on the engine lathe.

- Identify and demonstrate the proper installation and application of standard tools and tool holders for the lathe.
- Identify common chucks and demonstrate proper procedure for changing and installing them.
- Demonstrate proper procedure for facing one end of a part.
- Demonstrate proper setup and procedure for center drilling parts.
- Demonstrate proper setup and procedure while drilling a hole.
- Demonstrate proper setup and technique for power tapping a through hole on a metal cutting lathe.
- Demonstrate proper setup and procedure for turning a part to diameter.
- Demonstrate proper setup and procedure for turning a 90 degree shoulder.
- Using the compound rest demonstrate the proper setup and procedure for turning a diameter and a taper.
- Demonstrate proper setup and procedure for turning between centers. (Optional)
- Demonstrate proper setup and procedure while single point cutting threads to standard pitch diameter and shape specifications.
- Demonstrate the proper procedure for grinding a HSS cutter bit.

Performance Skill

Understand and demonstrate the use of metal lathes.

- Demonstrate proper use of metal lathes.

STRAND 9

Students will understand the importance of career readiness skills as it relates to the workplace and outlined in the SkillsUSA Framework – Level 1.

Standard 1

Understand and demonstrate the attitude of cooperation.

- Develop awareness of cultural diversity and equality issues.
- Demonstrate effective communication with others.
- Apply team skills to a group project.
- Identify and apply conflict resolution skills.

Standard 2

Understand and demonstrate the ability of being resourceful and innovative.

- Discover self-motivation techniques and establish short-term goals.
- Measure/modify short-term goals.
- Review a professional journal and develop a three- to five-minute presentation.

Standard 3

Plan for your future career.

- Complete a self-assessment and identify individual learning styles.
- Define future occupations.
- Identify the components of an employment portfolio.

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- List proficiency in program competencies.
- Complete a survey for employment opportunities.
- Create a job application.
- Assemble your employment portfolio.
- Employability skills: evaluate program comprehension.

Standard 4

Understand and demonstrate the ability to manage a project.

- Apply team skills to a group project.
- Observe and critique a meeting.
- Demonstrate business meeting skills.
- Explore supervisory and management roles in an organization.
- Identify and apply conflict resolution skills.
- Demonstrate evaluation skills.
- Manage a project and evaluate others.

Skill Certificate Test Points by Strand

Test Name	Test #	Number of Test Points by Strand									Total Points	Total Questions
		1	2	3	4	5	6	7	8	9		
Machining 1	580	7	7	8	6	6	14	3	8	4	63	51