south dakota DEPARTMENT OF EDUCATION
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CTE Standards Unpacking
Machine Tool Technology

Course: Machine Tool Technology
Course Description: Machine Tool Technology students will be exposed to basic machining processes, safety, math skills, and machining operations. The desire is for the student to succeed at a basic level through fabrication of various required projects.
Career Cluster: Manufacturing
Prerequisites: Algebra 1 Recommended
Program of Study Application: Machine Tool Technology is a pathway course in the Manufacturing cluster Machining pathway. This course follows a cluster course and is a prerequisite for Advanced Machine Tool Technology.

<table>
<tr><td colspan="3">INDICATOR #MT 1: Demonstrate knowledge of safety and essential academic concepts in Machine Tool</td></tr>
<tr><td colspan="3">SUB-INDICATOR 1.1 (Webb Level:1 Recall): Explain and show knowledge of machine shop operations and tool safety procedures consistent with Occupational Safety and Health Administration (OSHA) standards</td></tr>
<tr><td colspan="3">SUB-INDICATOR 1.2 (Webb Level: 2 Skills/Concept): Introduce concepts of basic mathematics, blueprint reading, science, and communications used in machine tool processes.</td></tr>
<tr><td colspan="3">SUB-INDICATOR 1.3 (Webb Level: 1 Recall): Understand basic CNC programming and processes.</td></tr>
<tr><td>Knowledge (Factual):
-Proper knowledge of machine operations

-Occupational Safety and Health Administration (OSHA)

-CNC programming codes

-Mathematical formulas for machine tooling</td><td>Understand (Conceptual):
-Usage of personal protective equipment

-Hazards in the machining lab

-Machine functions, processes and uses

-CNC code interpretation</td><td>Do (Application):
-Interpreting measuring equipment

-Utilization of specific machining measuring equipment

-Conversions of fractions to decimals

-Calculate machining formulas

-Identify and differentiate line types and tolerances of views of blueprints

-Programming with CNC codes</td></tr>
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Benchmarks:
Students will be assessed on their ability to:

- Completion of a manufactured part
- Safe demonstration of tooling selection

Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
PS1-3 Make observations and measurements to identify materials based on their properties.	-Students will make various measurements based on observations of equipment
N-Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	-Students will determine a level of accuracy for their measurements
N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	-Students will analyze blueprints with accurate and consistent measurements

INDICATOR #MT 2: **Show proper machine use and functions, utilizing problem solving skills to resolve machining issues**		
SUB-INDICATOR 2.1 (Webb Level: 3 Strategic Thinking): Demonstrate knowledge of terminology, tools, methods of measurement, and material layout.		
SUB-INDICATOR 2.2 (Webb Level: 2 Skill/Concept): Demonstrate problem solving skills in basic lathe and milling setups and operations.		
Knowledge (Factual):	**Understand (Conceptual)**	**Do (Application):**
-Trouble shooting techniques	-Importance of tool utilization	-Measure and document parts
-Machine functions	-Identifying various operation of machining	-Demonstrate proper layout methods using blueprints or working drawings
-Machine shop terminology	-Role of problem solving skills in the functions and use of machines.	
-Milling and Lathe set up		

Benchmarks:
Students will be assessed on their ability to:
- Completion of a milling and lathe production part

Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
PS 2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials. G-MG.1 Modeling with Geometry Use geometric shapes, their measures, and their properties to describe objects	-Students will cite evidence of how molecular structures affect the design of materials. -Students will analyze blueprints with geometric principals

INDICATOR #MT 3: **Apply proper ethical standards to machining skills and processes**

SUB-INDICATOR 3.1 (Webb Level:2 Skills/Concept): Identify and demonstrate professional practices used in the machine shop.

Knowledge (Factual):	**Understand (Conceptual):**	**Do (Application):**
-Appropriate personal hygiene -Business policies and procedures/practices	-Personal appearance has an impact at the workplace -Importance of business policies and company handbooks	-Complete soft skills Assessment http://www.keytrain.com/softskills.asp -Interview local Human Resource officer

Benchmarks:
Students will be assessed on their ability to:
- Role play appropriate and inappropriate actions in the workplace
- Present findings from interviewer

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Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
SL.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.	-Role play for interviewing for a job
LS 2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity	-Compare / contrast of good vs bad outcomes

INDICATOR #MT 4: **Explore Careers in the Manufacturing cluster**		
SUB-INDICATOR 4.1 (Webb Level: 1 Recall): Identify machine tool related career pathways.		
Knowledge (Factual): -Career opportunities and pathways in manufacturing. -Appropriate apprenticeships	**Understand (Conceptual):** -Education needed for specific career -Importance of Industry certification -Potential job outlook based on location	**Do (Application):** -Research potential career interests -Interview potential employers or post secondary program specialists -Create Personal Learning Plan: www.sdmylife.com

Benchmarks:
Students will be assessed on their ability to:

- Create a list of career opportunities that are linked to career match maker section of www.sdmylife.com
- Presentation on career choice

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Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard): SL.2. Integrate multiple sources of information presented in diverse formats and media	**Sample Performance Task Aligned to the Academic Standard(s):** -Through the interview process student will form a presentation on career choices.

Additional Resources

Please list any resources (e.g., websites, teaching guides, etc.) that would help teachers as they plan to teach these new standards.

Lake Area Tech (https://www.lakeareatech.edu/)
Mitchell Tech (https://www.mitchelltech.edu/)
Western Dakota Tech (https://www.wdt.edu/)
South Dakota Industry