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CTE Standards Unpacking
Advanced Ag Structures Technology

Course: Advanced Ag Structures Technology
Course Description: Advanced Ag Structures Technology is offered to meet more advanced needs in the agricultural structures industry, along with soft skills necessary for careers in the Agriculture, Food and Natural Resources sector. South Dakota continues to face a shortage of certified electricians, plumbers, contractors and mechanics, leaving these careers in high demand. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Algebra, geometry, trigonometry, English and human relations skills will be reinforced in the course. This class is reinforced through the FFA and Supervised Agricultural Experience (SAE) programs, the Ag Mechanics Career Development Event, and related Proficiency Experience or Internship Project. Each student will be expected to maintain an SAE.
Career Cluster: Agriculture, Food and Natural Resources
Prerequisites: Fundamental Ag Structures Technology, Recommended: Introduction to AFNR
Program of Study Application: Advanced Ag Structures Technology is the second pathway course in the Agriculture, Food and Natural Resources Program of Study, Power Systems pathway. Fundamental Ag Structures Technology is a prerequisite for Advanced Ag Structures Technology. Advanced Ag Structures Technology would be followed by a capstone experience.

<table>
<tr><td colspan="3">INDICATOR #AdS 1: Use safe practices when planning, maintaining, and constructing agricultural structures.</td></tr>
<tr><td colspan="3">SUB-INDICATOR 1.1 (Webb Level: 2 Skill/Concept): Demonstrate safe use of tools and equipment while constructing agriculture structures.</td></tr>
<tr><td colspan="3">SUB-INDICATOR 1.2 (Webb Level: 3 Strategic Thinking): Demonstrate understanding of tool repair and maintenance.</td></tr>
<tr><td>Knowledge (Factual):
-Know shop safety, first aid, and fire extinguisher use

-Tool identification and use

-Selecting and sharpening bits and blades for projects</td><td>Understand (Conceptual):
-Understand the safe use of hand, cordless, pneumatic, and power tools</td><td>Do (Application):
-Demonstrate the safe use of measurement and layout tools

-Perform maintenance and replace broken tools

Sharpen and change saw blades

Select sandpaper for various projects

-Managing air</td></tr>
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		compressors for nail guns -Charge batteries for cordless tools

Benchmarks:
Students will be assessed on their ability to:

- Pass a written safety test with 100% correct.
- Identify tools that are unsafe to use.

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):**
Math: HSN.Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	-Select the proper blade angle when sharpening tools.

INDICATOR #AdS 2: **Service and repair mechanical equipment and structures.**

SUB-INDICATOR 2.1 (Webb Level: 3 Strategic Thinking): Analyze schematics to service various systems in an ag structure.

Knowledge (Factual):	**Understand (Conceptual):**	**Do (Application):**
-Schematics for HVAC systems within a structure -Electrical systems and repair	-Methods to systematically troubleshoot equipment	-Install electrical wiring according to the NEC (GFCI, three-way switch, dimmer, etc.) -Troubleshoot electrical motors or systems

Benchmarks:
Students will be assessed on their ability to:

- Analyze the heating and cooling systems in local shop or school.

Academic Connections

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ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
Math: HSS.IC.B.6 - Evaluate reports based on data.	-Evaluate maintenance records to determine service schedule.

INDICATOR #AdS 3: **Utilize a structural plan that meets specifications and building codes.**		
SUB-INDICATOR 3.1 (Webb Level: 3 Strategic Thinking): Examine blueprints and local codes that identify required components of an ag structure.		
SUB-INDICATOR 3.2 (Webb Level: 3 Strategic Thinking): Design a construction plan for an agricultural structure.		
Knowledge (Factual): -Blueprint symbols -Drawing to scale -Identify local codes	**Understand (Conceptual):** -Read and interpret local code information -Identifying parts of a plan or blueprint for a project	**Do (Application):** -Complete a permit application -Sketch and draw projects to scale -Select materials (lumber, fasteners, siding, etc.) for an agricultural structure -Figure a bill of sale
Benchmarks: *Students will be assessed on their ability to:* • Analyze a blueprint of a structure plan to determine materials needed to complete the project. • Demonstrate the ability to read a scale plan and convert to full size.		
Academic Connections		

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ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
Math: 1) HSN.Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	-Calculate length of electrical circuit and gauge of wire based on voltage drop.
2) HSG.MG.A.1 - Use geometric shapes, their measures, and their properties to describe objects	-Identify the meanings of symbols and geometric shapes on a blueprint.

INDICATOR #AdS 4: **Use plans to guide construction of agricultural structures.**		
SUB-INDICATOR 4.1 (Webb Level: 4 Extended Thinking): Use architectural and mechanical plans to construct agricultural buildings or facilities.		
Knowledge (Factual): -Material selection -How to read building plans	**Understand (Conceptual):** -Written plans or blueprints -Proper material selection for project	**Do (Application):** -Install electrical components and fixtures -Prep and apply paint and protective coatings (paint, stain, primer, etc.) -Insulate facility -Install ventilation -Install glass, rigid plastic panels, and/or film plastic
Benchmarks: *Students will be assessed on their ability to:* • Complete a building project following the blueprint. • Install an electrical or ventilation system into an existing structure.		
Academic Connections		

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ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
Math: HSG.MG.A.1 - Use geometric shapes, their measures, and their properties to describe objects	-Identify the meanings of symbols and geometric shapes on a blueprint.

INDICATOR #AdS 5: **Apply a variety of concrete and masonry concepts to various projects.**		
SUB-INDICATOR 5.1 (Webb Level: 3 Strategic Thinking): Demonstrate concrete and masonry procedures.		
Knowledge (Factual): -Know the different uses of concrete -Know the difference between concrete and cement	**Understand (Conceptual):** -Understand the classification of concrete tools -Understand the uses of different types of masonry building materials	**Do (Application):** -Prepare a site for pouring concrete -Mix concrete -Make a form -Finish and cure concrete -Mix mortar -Build a concrete block wall -Calculate an order for ready mix concrete
Benchmarks: *Students will be assessed on their ability to:* • Conduct slump test and present findings and results. • Install concrete forms.		
Academic Connections		

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ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
Math: 1) HSG.GMD.A.3 - Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. 2) HSF.BF.A.1.A - Determine an explicit expression, a recursive process, or steps for calculation from a context.	-Calculate the proper amount of concrete required for a project. -Calculate total cost of a concrete project.

INDICATOR #AdS 6: **Investigate a variety of plumbing tools and products.**

SUB-INDICATOR 6.1 (Webb Level: 1 Recall): Identify tools and materials used for plumbing.

SUB-INDICATOR 6.2 (Webb Level: 3 Strategic Thinking): Demonstrate various plumbing techniques.

Knowledge (Factual):	**Understand (Conceptual):**	**Do (Application):**
-Know common plumbing tools -Know the common plumbing fixtures (sinks, toilets, livestock watering systems, lawn sprinkler systems, etc.)	-Understand the types of pipe, PVC, and tubing -Understand the installation of copper pipe and PVC pipe	-Demonstrate the safe use of tools -Cut tubing or PVC pipe -Install plumbing fixtures -Solder copper tubing -Flare copper tubing

Benchmarks:

Students will be assessed on their ability to:

- Install a simple plumbing project that doesn't leak.
- Analyze a plumbing schematic plan and determine the number and type of plumbing fixtures needed.

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):
Math: 1) HSN.Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. 2) HSF.IF.B.6 - Calculate and interpret the average rate of change of a function, to calculate slope.	-Calculate the amount of materials needed for a specific plumbing project. -Calculate the percentage of drop needed within a plumbing system to allow water to flow.

INDICATOR #AdS 7: **Develop employability skills related to the Power, Structural, and Technical Systems Pathway.**		
SUB-INDICATOR 7.1 (Webb Level: 2 Skill/Concept): Develop soft skills to enhance employability.		
Knowledge (Factual): -Knowledge of employability skills -Personality Assessments -Careers in metal fabrication	**Understand (Conceptual):** -Develop interviewing skills -Understand importance of punctuality and attendance -Proper verbal and nonverbal communication skills -Conflict resolution	**Do (Application):** -Design resumes -Write cover letters -Job shadow industry professionals -Complete job application -Work as a team to solve problem
Benchmarks: *Students will be assessed on their ability to:* • Participate in a mock job interview • Evaluate student's cover letter and resume		
Academic Connections		

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ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
English- 1) 9-12 W.4 - Produce writing that is appropriate for the task or audience.	-Create a cover letter and resume

Additional Resources
Ag Mechanics CDE
Home &/or Community Development E/P
Outdoor Recreation E/P
Homesite Evaluation
Land and Soils Evaluation
www.thisoldhouse.com
Google Earth
Modern Marvels: The Lumberyard
Modern Marvels: The Tool Bench
Invite an electrician to be a guest speaker
Modern Marvels: Plumbing
Read a ruler (www.rulergame.net)
Agricultural Mechanics: Fundamentals and Applications by Ray V. Herren
Utilize CAD software
www.sketchup.com