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CTE Standards Unpacking
Fundamental Ag Structures Technology

Course: Fundamental Ag Structures Technology
Course Description: Fundamental Ag Structures Technology offers basic skills needed to be successful in the agricultural structures industry, such as the safe use of hand tools and power tools, drafting of structural plans, concrete and electrical fundamentals. The course will also incorporate soft skills necessary for careers in the Agriculture, Food and Natural Resources sector. South Dakota continues to face a shortage of certified electricians, plumbers and contractors, 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. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. 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 a SAE.
Career Cluster: Agriculture, Food and Natural Resources
Prerequisites: Recommended: Introduction to AFNR
Program of Study Application: Fundamental Ag Structures Technology is a first pathway course in the Agriculture, Food and Natural Resources Program of Study, Power Systems pathway. Fundamental Ag Structures Technology is preceded by a Cluster course and is recommended to be taken prior to participation in Advanced Ag Structures Technology.

<table>
<tr><td colspan="3">INDICATOR #AgS 1: Use safe practices associated with agriculture 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>Knowledge (Factual):
-Shop safety, first-aid, fire extinguisher use

-Recognize dangers associated with ag structures

-The tools used in building ag structures</td><td>Understand (Conceptual):
-The benefits of portable pneumatic and cordless tools

-Understand the general shop safety rules and proper behavior in shop</td><td>Do (Application):
-Demonstrate proper use of hand, power, pneumatic and cordless tools

-Demonstrate how to safely and correctly change and install cutting blades on power tools</td></tr>
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Benchmarks:
Students will be assessed on their ability to:

- Complete written safety tests with 100% correct.
- Demonstrate how to safely operate hand and power tools used in structures construction.

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):**
English: 9-12.SL.4-Presenting information to convey a clear and distinct perspective.	-Students will gather information to deliver a presentation on the safety measures necessary to work in the shop.

INDICATOR #AgS 2: **Develop plans for an agriculture structure project.**

SUB-INDICATOR 2.1 (Webb Level: 3 Strategic Thinking): Use computer skills or drafting tools to develop sketches and plans for an ag structure.

Knowledge (Factual):	**Understand (Conceptual):**	**Do (Application):**
-Drawing to scale -Reading a ruler -Drafting and Computer Assisted Design (CAD) skills	-Understand importance of proper symbol decoding and use in blueprints	-Create a project plan -Convert scaled measurements -Create a list of materials for a specific project

Benchmarks:
Students will be assessed on their ability to:

- Create a project plan either using hand drafting or a CAD program.
- Interpret a project plan

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: HSG.CO.D.12 - Make formal geometric constructions with a variety of tools and methods	-Create a project plan either using hand drafting or a CAD program.

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INDICATOR #AgS 3: **Examine various materials required for an agricultural structure.**		
SUB-INDICATOR 3.1 (Webb Level: 2 Skill/Concept): Investigate the differences in materials needed to assemble an ag structure.		
SUB-INDICATOR 3.2 (Webb Level: 3 Strategic Thinking): Demonstrate knowledge of structural materials by developing a supply list, along with cost estimates for a given project.		
Knowledge (Factual): -Lumber grading -Classify and identify fasteners used in an agricultural structure -Know different types of siding -Know types of roofing materials	**Understand (Conceptual):** -Understand building materials to use based on climate -Understand what materials to use base on projected use of the structure	**Do (Application):** -Calculate board feet -Create a list of materials
Benchmarks: *Students will be assessed on their ability to:* • Identify different types of sheathing materials. • Properly install a variety of fasteners. • Calculate cost of project from given bill of materials.		
Academic Connections		
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard): Math: HSG.GMD.A.3 - Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	**Sample Performance Task Aligned to the Academic Standard(s):** -Calculate the number of board feet necessary to complete a given project	

INDICATOR #AgS 4: **Construct an agriculture structure.**
SUB-INDICATOR 4.1 (Webb Level: 4 Extended Thinking): Assemble components of a structure.
SUB-INDICATOR 4.2 (Webb Level: 4 Extended Thinking): Create a complete agriculture structure by combining individually constructed components.

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Knowledge (Factual):	**Understand (Conceptual):**	**Do (Application):**
-Reading a ruler -Safety -Safe hand tool and power tool use -Proper materials and fasteners	-Selection of siding and shingles for a completed building -Investigation of insulation types -Sequencing of construction components to accomplish finished project	-Construct a rafter -Build a wall -Frame a door -Side a building -Shingle a roof -Construct a floor joist -Attach a wall to a floor joist -Connect a wall to a rafter -Install doors and windows

Benchmarks:
Students will be assessed on their ability to:

- Construct a small building such as a storage shed using agricultural structure principles.
- Complete rafter layout and assembly.

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) HSG.CO.D.12 - Make formal geometric constructions with a variety of tools and methods	-Draw a plan that will be used to complete a given project
2) HSN.Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	-Complete a project within a given amount of measurement errors

INDICATOR #AgS 5: **Demonstrate electrical principles.**		
SUB-INDICATOR 5.1 (Webb Level: 2 Skill/Concept): Explain basic electrical terms and principles.		
SUB-INDICATOR 5.2 (Webb Level: 3 Strategic Thinking): Use applicable instruments to demonstrate knowledge of basic electricity.		
SUB-INDICATOR 5.3 (Webb Level: 3 Strategic Thinking): Demonstrate wiring and electrical applications.		
Knowledge (Factual): -Ohm's Law -Define watts, amps, and volts -Explore the history of electricity	**Understand (Conceptual):** -Differentiate between watts, amps, volts and ohms -How to identify wiring materials	**Do (Application):** -Calculate voltage drop -Properly use a multimeter -Wire a single switch -Wire the circuit breaker -Wire a wall
Benchmarks: *Students will be assessed on their ability to:* • Demonstrate how to correctly wire a simple light switch. • Demonstrate how to correctly wire a 3-way switch. • Analyze a wiring diagram and identify what electrical devices will be needed.		
Academic Connections		
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard): Math: 1) HSA.CED.A.4 - Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.	**Sample Performance Task Aligned to the Academic Standard(s):** -Rearrange Ohm's law V = IR to highlight resistance R.	

INDICATOR #AgS 6: **Analyze properties and conditions of building site prior to construction.**
SUB-INDICATOR 6.1 (Webb Level: 2 Skill/Concept): Explain legal land descriptions and plat maps.
SUB-INDICATOR 6.2 (Webb Level: 3 Strategic Thinking): Examine geographical characteristics of building site.

SUB-INDICATOR 6.3 (Webb Level: 3 Strategic Thinking): Operate surveying equipment.		
Knowledge (Factual): -Zoning laws -Soil types and structure -Slope of land -Identify types of levels -Complete a topographic survey	**Understand (Conceptual):** -Evaluate local townships -How soil structure and type effects soil quality -Soil Permeability as it relates to the water table -Determining underground cables and lines	**Do (Application):** -Use land measurement equipment -Calculate land area and convert to acres -Read a leveling rod -Calculate slope

Benchmarks:
Students will be assessed on their ability to:

- Evaluate a site to determine land capability.
- Set up and adjust a level.

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 (presented symbolically or as a table) over a specified interval.	-Properly label the reading of the leveling rod to a desired level of accuracy. -Determine the slope of a given area of land by manually or with tools.

INDICATOR #AgS 7: **Analyze various concrete and masonry concepts.**
SUB-INDICATOR 7.1 (Webb Level: 1 Recall): Identify tools and materials used in concrete and masonry projects.

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Knowledge (Factual):	**Understand (Conceptual):**	**Do (Application):**
-Know the different uses of concrete -Know the difference between concrete and cement	-Classification of concrete tools -Understand the uses of different types of masonry building materials	-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.
- Install concrete forms

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.	-Calculate an order for ready mix concrete for a given area.

Additional Resources

- Agricultural Mechanics and Technical Systems. Goodheart – Wilcox, 2017, ISBN: 978-1-63126-255-5
- Agricultural Mechanics: Fundamentals & Applications (7th Edition), Cengage Learning, 2015, ISBN-10: 128505895X
- Step by Step Guide Book on Home Wiring. Step by Step Guide Book Company, ISBN: 0961920106
- Modern Marvels Video: "The Tool Bench: Hand Tools"
- Modern Marvels Video: " The Tool Bench: Power Tools".
- Modern Marvels Video: "Plumbing"
- Modern Marvels Video: "Concrete"

- Missouri Center for Career Education - http://www.missouricareereducation.org/project/agstructure2012