Agriculture Construction

Agriculture

Grade(s) 10th - 12th, Duration 1 Year, 1 Credit
Elective Course

Course Overview

This course utilizes welding and other common hand and power tools in the development and construction of major metal and wood projects.

Scope And Sequence

Timeframe	Unit	Instructional Topics
8 Day(s)	Materials	1. Which Wood Would you Chose 2. Metal Matters 3. Fascinating Fasteners
45 Day(s)	Woodworking	1. Miter Saw_Copy 2. Router 3. Milling Lumber 4. Drilling 5. Table Saw 6. Joinery Methods 7. Preparing Wood for Finish 8. Finishing Wood 9. Project Construction
27 Period(s)	Arc Welding	1. The Arc Welding Process 2. Selecting Welders 3. Selecting Tools for Arc Welding 4. Selecting Electrodes 5. Providing for Safety 6. Striking and Maintaining Arcs 7. Running Beads 8. Understanding Design and Use of Welded Joints 9. Welding Joints
15 Period(s)	MIG Welding	1. GMAW Welding Process, Equipment, and Safety 2. GMAW Welding techniques and positions. 3. Prepare mild steel for GMAW 4. Welding in the flat position 5. Welding in the horizontal position 6. Welding in the vertical position 7. Welding in the overhead position.
11 Day(s)	Oxyacetylene Cutting	1. Oxyacetylene Cutting Theory, Safety, and Equipment 2. Setting Up an Oxyacetylene Torch and Selecting Cutting Tips 3. Cutting with an Oxy-fuel torch 4. Make a flame-beveled cut on mild steel plate. 5. Pierce holes in mild steel.
Ongoing	Project Construction	

Prerequisites

Ag Science II

Course Details

Unit: Materials

Duration: 8 Day(s)

Unit Description

This unit will discuss the characteristics and properties of various building materials and fasteners used the the agriculture and construction industries.

Enduring Understandings (Knowledge & Skills)

Upon completion of the unit, students will be able to demonstrate understanding of the properties and characteristics of various building materials and fasteners used in the agriculture and construction industries.

Summative Assessment

Unit Exam and Project.

Topic: Which Wood Would you Chose

Duration: 3 Period(s)

Topic Description (short)

This topic will discuss the characteristics and properties of wood and wood engineered products used in the agriculture and construction industry.

Learning Targets
1. Explain the difference between a hardwood and softwood
2. Explain the difference between dimensional and engineered lumber
3. Convert nominal board sizes to actual dimensions.
4. Interpret a lumber grade stamp
5. Identify various defects affecting a piece of lumbers grade.
6. Calculate the number of board feet in a given piece of lumber.
7. Explain the difference between the four milling options on hardwood lumber.
8. Demonstrate the 3 sawing techniques for logs and explain how each affects the behavior of the finished wood board.
9. Identify various engineered sheet goods and explain their ideal uses.
10. Explain how wood interacts with changes in humidity.

Formative Assessment
Identification Quiz and Guided Notes.

Topic: Metal Matters **Duration:** 3 Period(s)

Topic Description (short)
This unit will ask the student to identify and categorize the various types of metal, shapes, and sizes used in the agriculture and construction industries.

Learning Targets
1. Identify the various types of metals used.
2. Identify by shape, the various types of mild steel used in the construction industry.
3. Identify proper measurements when placing an order for steel including; width, height, thickness, inside and outside diameter, pounds/foot, and length.
4. Explain common uses for different shapes of metal

Formative Assessment
Guided Notes and Evaluation

Topic: Fascinating Fasteners **Duration:** 2 Period(s)

Topic Description (short)
This topic will include discussion on the various fasteners used in the agriculture and construction industries.

Learning Targets
1. Identify common uses of fasteners in agricultural structures.
2. Identify types of wood fasteners.
3. Explain the process for using screws and identifying their size and shape.
4. Explain the process for sizing nails.
5. Identify fasteners used for joining wood to metal.
6. Explain how bolts are sized and graded.

Formative Assessment
Evaluation

Unit: Woodworking **Duration:** 45 Day(s)

Topic: Miter Saw_Copy **Duration:** 1 Period(s)

Topic Description (short)
Upon completion of this unit, the student will be able to use the miter saw to make accurate and repeatable cross, bevel, miter, and combination cuts.

Learning Targets
1. Adjusting the stop block to ensure repeatable cuts
2. Safety
3. Cross cuts
4. Miter Cuts
5. Bevel Cuts
6. Combination Cuts

Formative Assessment
Safety Test and Activity

Materials and Resources
Miter Saw

Wood

Topic: Router

Duration: 2 Period(s)

Topic Description (short)
Upon completion of this topic, the student will be able to safely operate a router and utilize a router table.

Learning Targets
1. Router safety
2. Types of routers, parts, setups, and accessories.
3. Changing the bit in a router
4. Selecting the appropriate speed on the router
5. Setting the height of cut on the router
6. Adjusting the router table

Formative Assessment
Router safety exam.

Materials and Resources
Router
Router table
Wood
Router bits

Topic: Milling Lumber

Duration: 3 Period(s)

Topic Description (short)
Upon completion of this topic, the student will be able to mill a rough sawn piece of lumber flat and square.

Learning Targets
1. Utilize the miter saw safely to cut a piece of lumber to rough length and factoring for snipe.
2. Safely use the jointer to mill one face flat.
3. Safely use the planer to mill the opposite face parallel with the first.
4. Safely use the jointer to mill a perpendicular edge square to the face of the piece of lumber.
5. Safely use the table saw to rip the board to a desired width.
6. Checking for Square

Formative Assessment
Activity and Jointer, Planer, and Table Saw Safety Exam.

Materials and Resources
Wood
Jointer
Planer
Table Saw

Topic: Drilling

Duration: 3 Period(s)

Topic Description (short)
Upon completion of this unit, the student will be able to identify the parts, pass a safety test over operating procedures, and demonstrate the use of the drill press, cordless drill, and cordless impact driver to drill appropriate size holes and countersinks in wood.

Learning Targets
1. Selecting the appropriate speed and torque setting for the task at hand
2. Selecting the appropriate bit for the task at hand
3. Drilling square
4. Changing bits

Formative Assessment
Safety test and activity

Materials and Resources
Drill Press
Drill Bits
Cordless Drill
Cordless Impact Driver
Wood
Screws
Countersink

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Grade(s) 10th - 12th, Duration 1 Year, 1 Credit
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Topic: Table Saw **Duration:** 4 Period(s)

Topic Description (short)
The table saw is the most dangerous piece of equipment in our shop. Upon completion of this unit, the student will be able to safely utilize the table saw to make various types of cuts.

Learning Targets
1. Selecting the appropriate blade and changing blades.
2. Making Rip cuts
3. Making Cross cut
4. Making Dado's and Rabbets
5. Cutting Miters and Bevels
6. Adjusting the height of cut
7. Cutting tenons.

Formative Assessment
Safety Test and Evaluation

Topic: Joinery Methods **Duration:** 12 Period(s)

Topic Description (short)
Upon completion of this unit the student will be able to join wood using various methods.

Learning Targets
1. Complete an edge or butt joint referencing 90 degrees with sufficient glue squeeze out, clamping square, drilling square, pre-drilling & countersinking, and filling with a plug.
2. Complete a butt joint using pocket screws and a pocket hole machine.
3. Complete a butt joint using dowels and a Dowling jig
4. complete a butt joint using loose tenons and the Festool Domino cutter
5. Glue up a panel
6. Create reinforced miter joints
7. Create a dado, rabbet, and groove joint using a router and a table saw
8. Create a mortise and tenon joint using a router and table saw
9. create a half lap joint using the table saw
10. Create a dovetail joint using the dovetail jig and router
11. Create a box joint using the table saw

Formative Assessment
Activity Sheets

Topic: Preparing Wood for Finish **Duration:** 2 Period(s)

Topic Description (short)
Upon completion of this unit, the student will be able to use a Rotex and random orbital sander as well as hand sand wood through the grits to a finish ready surface.

Learning Targets
1. Sanding theory
2. Using the rotex sander
3. Using the ETS sander
4. Hand sanding

Formative Assessment
Activity

Topic: Finishing Wood **Duration:** 4 Period(s)

Topic Description (short)
Upon completion of this topic, the student will be able to finish wood using wipe-on and spraying methods.

Learning Targets
1. Types of finish
2. Wipe-on techniques
3. Spraying techniques

Formative Assessment
Activity

Topic: Project Construction **Duration:** 15 Period(s)

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Unit: Arc Welding

Duration: 27 Period(s)

Unit Description

This unit will instruct students on the arc welding process.

Enduring Understandings (Knowledge & Skills)

Upon completion of this unit, the student will be able to weld 5 types of joints on mild steel in all four positions.

Academic Vocabulary

see attached glossary:

https://drive.google.com/drive/folders/1eyR1fsvvuh59TkyG_AyQikr8QqA8rcnu

Summative Assessment

Welding Activity and Exam

Topic: The Arc Welding Process

Duration: 2 Period(s)

Topic Description (short)

The purpose of this lesson is to give the student an overview of the welding process.

Learning Targets

1. Arc Welding Process
2. How Welds are Tested
3. Identifying Welding Equipment

Formative Assessment

Evaluation

Topic: Selecting Welders

Duration: 1 Period(s)

Topic Description (short)

There are many different types and sizes of welders. Each one is designed for specific performance qualities. Upon completion of this section, the student will be able to describe common types of welders and to identify their advantages and disadvantages.

Learning Targets

1. Types of Welders and How They Work
2. Polarity for DC Welders
3. Duty Cycle

Formative Assessment

Evaluation

Topic: Selecting Tools for Arc Welding

Duration: 1 Period(s)

Topic Description (short)

Upon completion of this section, the student will be able to select the proper tools for most welding jobs.

Learning Targets

1. Identify various hand tools used for holding work while welding.
2. Identify various hand tools used for striking work.
3. Identify various hand tools used for prepping metal to weld.
4. Identify various hand tools used for holding work while welding.
5. Identify various hand tools used for measuring, marking, and laying out welding work.

Formative Assessment

Identification Quiz

Materials and Resources

- Adjustable pliers
- Ball Peen Hammer
- C-clamp
- Center Punch
- Chipping Hammer
- Cold Chisel
- Combination Square
- Double Cutting File
- Hacksaw
- Metal Tape
- Soapstone Marker
- Tongs

- Tool box
- Vise-grip Pliers
- Weldor's Vise-grip Pliers
- Wire Brush

Topic: Selecting Electrodes **Duration:** 3 Period(s)

Topic Description (short)
Upon completion of this topic, the student will be able to select the proper electrode for a particular welding job.

Learning Targets
1. Identifying the electrode
2. Kind of metal
3. Thickness of the metal
4. Welding position
5. type of Welding Current Available

Formative Assessment
Evaluation

Topic: Providing for Safety **Duration:** 1 Period(s)

Topic Description (short)
Upon completion of this topic, the student will be able to state reasons for safety, select the approved personal safety clothing and equipment and perform a weldor's safety check.

Learning Targets
1. Accepting Responsibility for Safety
2. Selecting Personal Protective Clothing and Equipment
3. Completing the Weldor's Safety Check

Formative Assessment
Safety Test

Topic: Striking and Maintaining Arcs **Duration:** 3 Period(s)

Topic Description (short)
Upon completion of this section and with practice, the student will be able to strike and maintain arcs without any trouble or assistance from the teacher.

Learning Targets
1. Striking the Arc
2. Maintaining the Arc

Formative Assessment
Evaluation

Materials and Resources
Arc Welders
Electrodes
Welding Coupons

Topic: Running Beads **Duration:** 4 Period(s)

Topic Description (short)
In this topic, the student will practice running beads on a piece of mild steel plate lying on a flat surface. The skills mastered in this topic will also enable to the student to learn weaving, padding and tacking techniques.

Learning Targets
1. Running Practice Beads
2. Common Welding Problems
3. Weaving
4. Padding
5. Tacking

Formative Assessment
Evaluation

Materials and Resources
Arc Welders
Electrodes

Welding Coupons

Topic: Understanding Design and Use of Welded Joints **Duration:** 2 Period(s)

Topic Description (short)
Upon completion of this topic, the student will be able to identify and prepare joints for welding as well as interpret basic welding symbols.

Learning Targets
1. Butt Joints
2. T-joints
3. Lap Joints
4. Corner Joints
5. Edge or Flange Joints
6. Interpret simple welding symbols

Formative Assessment
Identification Quiz

Materials and Resources
Arc Welders
Electrodes
Welding Coupons

Topic: Welding Joints **Duration:** 10 Period(s)

Topic Description (short)
On completion of this topic, the student will be able to weld all joints in all positions.

Learning Targets
1. Practicing Flat Welding Techniques
2. Practicing Vertical Welding Techniques
3. Practicing Horizontal Welding Techniques
4. Practicing Overhead Welding Techniques

Formative Assessment
Evaluation and Chapter Questions

Materials and Resources
Arc Welders
Electrodes
Welding Coupons

Unit: MIG Welding **Duration:** 15 Period(s)

Unit Description
After completing this unit, the student will show competency by mastering the activities on the job sheets and by scoring at least 85% on the written test.

Enduring Understandings (Knowledge & Skills)
The student will use the GMAW process to produce all 5 joints in all 4 positions.

Summative Assessment
Practical and Theoretical Exam

Materials and Resources (optional)
Mig Welders and Coupons

Topic: GMAW Welding Process, Equipment, and Safety **Duration:** 4 Period(s)

Topic Description (short)
This topic covers the process, equipment, and safe practices used in GMAW welding.

Learning Targets
1. Describe the Gas Metal Arc Welding (GMAW) process.
2. Discuss the difference between short-circuit, globular and spray transfer methods of GMAW welding.
3. Describe GMAW machine, electrical and wire feeder controls with their functions.
4. Solve problems about roll adjustment requirements for wire feeders.
5. Determine the preventative requirements for wire feeders.
6. Select AWS classifications for electrode wires.
7. Explains short-circuit electrode wires and their characteristics.
8. Discuss the rules of thumb for GMAW electrode wire selection.

9. Determine the guidelines for storing spools of electrode wire.
10. Describe GMAW guns and their maintenance requirements.
11. Identify parts of a GMAW gun tip and their functions.
12. Distinguish the steps in assembling contact tips, gas diffusers, nozzles, and insulators.
13. Describe electrode extension and its function in GMAW
14. Discuss GMAW shielding gases and their applications.

Formative Assessment
Written Exam, Safety Exam, Activity 2 (Selecting the Appropriate Wire Speed and Amperage for your Task), Lesson 3 Written Exam

Topic: GMAW Welding techniques and positions.
Duration: 2 Period(s)

Topic Description (short)
Students will perform various welding techniques using the GMAW process.

Learning Targets
1. Differentiate between GMAW welding techniques and their characteristics.
2. Determine techniques for properly ending a GMAW weld.
3. Discuss techniques for position welding with GMAW.
4. Determine conditions that require special attention with GMAW.
5. Discuss possible causes and corrective actions for factors that control the quality of GMAW welds.
6. Describe flow meters and their use in GMAW.
7. Discuss flow rates for GMAW shielding gases.
8. Determine guidelines for troubleshooting GMAW problems.

Formative Assessment
written exam.

Topic: Prepare mild steel for GMAW
Duration: 1 Period(s)

Topic Description (short)
The student will prepare a piece of mild steel to be welded using the GMAW process.

Learning Targets
1. Safe use of proper tools
2. Workpiece preparation
3. Joint preparation

Formative Assessment
Job Sheet 1

Materials and Resources
- Mild steel as selected by instructor
- Joint design as specified by instructor
- Portable grinder and sanding equipment
- Pliers and clamps
- Clean shop rags
- Wire brush
- personal safety clothing and glasses

Topic: Welding in the flat position
Duration: 2 Period(s)

Topic Description (short)
The student will use short-circuit transfer to weld to specifications a fillet weld T-joint on mild steel in the flat position.

Learning Targets
1. Equipment setup
2. electrical adjustments
3. electrode extension
4. Welding technique
5. Crater and fill technique
6. Cleaning and inspection

Formative Assessment
Job Sheet 2 & Job Sheet 3

Materials and Resources
- GMAW machine with accessories
- Wire and shielding gas to specifications
- Wire-cutting pliers and wire brush

- Mild steel as selected by instructor
- Personal safety clothing and safety glasses

Topic: Welding in the horizontal position **Duration:** 2 Period(s)

Topic Description (short)
The student will use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the horizontal position.

Learning Targets
1. Equipment setup and adjustments
2. Electrode extension
3. Welding technique
4. Crater and fill technique
5. Cleaning and inspection
6. Bend test

Formative Assessment
Job Sheet 4 & 5

Materials and Resources
- GMAW machine with accessories
- Wire and shielding gas to specifications
- Wire-cutting pliers and wire brush
- Mild steel as selected by instructor
- Personal safety clothing and safety glasses

Topic: Welding in the vertical position **Duration:** 2 Period(s)

Topic Description (short)
The student will use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the vertical position.

Learning Targets
1. Equipment setup and adjustments
2. Electrode extension
3. Welding technique
4. Crater and fill technique
5. Cleaning and inspection
6. Bend test

Formative Assessment
Job Sheet 6

Materials and Resources
GMAW machine with accessories
Wire and shielding gas to specifications
Wire-cutting pliers and wire brush
Mild steel as selected by instructor
Bend test machine
Personal safety clothing and safety glasses

Topic: Welding in the overhead position. **Duration:** 2 Period(s)

Topic Description (short)
Students will use short-circuit transfer to weld to specifications a V-groove butt joint on mild steel in the overhead position.

Learning Targets
1. Equipment setup and adjustments
2. Electrode extension
3. Welding technique
4. Crater and fill technique
5. Cleaning and inspection
6. bend test

Formative Assessment
Job sheet 7

Materials and Resources
- GMAW machine with accessories
- Wire and shielding gas to specifications
- Wire-cutting pliers and wire brush

- Mild steel as selected by instructor
- Bend test machine

Unit: Oxyacetylene Cutting

Duration: 11 Day(s)

Unit Description

Oxyacetylene cutting is still a very widespread process. Many people use this process to cut steel and other metals because it is relatively inexpensive and the equipment needed for oxyacetylene cutting is portable. Manufacturers also use this process for automated welding.

Enduring Understandings (Knowledge & Skills)

After completing this unit, students will show mastery by completing the activities on the Job Sheets and scoring at least 85% on the Written Test.

Academic Vocabulary

Slag
Kerf
Drag line
Oxidizing flame
Neutral X
Reducing X to 2X
Carburizing

Summative Assessment

After completing this unit, students will show the following competencies by mastering the activities on the job sheets and at least 85% on the Written Test.

Materials and Resources (optional)

Cutting torch units
Guided notes
Practice Metal

Topic: Oxyacetylene Cutting Theory, Safety, and Equipment

Duration: 3 Period(s)

Topic Description (short)

This topic will prepare students to cut using the oxyacetylene torch. Cutting theory, safety, and equipment will be discussed.

Learning Targets

1. State the advantages of oxyacetylene cutting.
2. Discuss safety requirements for oxyacetylene cutting.
3. Explain safety rules for the oxyacetylene workplace.
4. Discuss personal safety requirements.
5. Identify the parts of an oxyacetylene tank and torch.
6. Differentiate between hoses and their characteristics.
7. Identify parts of an oxyacetylene cutting torch and cutting attachment.
8. Describe the types of mixers and their purposes.
9. Discuss basic safety rules of oxyacetylene cylinders and gases.

Formative Assessment

Guided Notes found here:

file:///C:/Users/twenterj/Downloads/Guided%20Notes.pdf

Quiz over parts

Materials and Resources

Cutting Units
Marker Tags
Poster Board
Colored Pencils

Topic: Setting Up an Oxyacetylene Torch and Selecting Cutting Tips

Duration: 2 Period(s)

Topic Description (short)

This topic will discuss the correct procedure for setting up the torch to make a cut.

Learning Targets

1. Interpret a chart of oxyacetylene flame characteristics and uses.
2. Discuss guidelines for flame adjustment.
3. Explain characteristics and causes of backfire and flashback.
4. Determine the steps in setting up cylinders and regulators.
5. Determine the steps in purging oxygen and fuel gas regulators.
6. Explain the procedures for final steps in setting up-oxy-fuel equipment.
7. Describe cutting tip design.

8. Discuss the guidelines for tip selection.

Formative Assessment
Assignment Sheet 1 - Setup, adjust cutting flame, and shut down oxyacetylene cutting equipment

file:///C:/Users/twenterj/Downloads/AS%201.pdf

Materials and Resources
Cutting Torches

Topic: Cutting with an Oxy-fuel torch **Duration:** 2 Period(s)

Topic Description (short)
Students will use the oxy-acetylene torch to cut a straight line.

Learning Targets
1. Discuss the guidelines for cleaning cutting tips.
2. Match tip cleaning tools with their uses.
3. Discuss the rules for tip use.
4. Select true statements about guidelines for metal preparation for oxyacetylene cutting.
5. Determine the steps for properly starting a cut
6. Explain techniques for restarting a cut.
7. Explain techniques for cutting straight lines.
8. Determine the techniques for controlling kerf and drag.
9. Discuss elements of good and bad cuts.

Formative Assessment
Assignment Sheet 2 - Make 90° cuts and restart a cut on mild steel

https://docs.google.com/document/d/1rECOoKQM5G0vP1SVHVgvuAgbPrcgwELcamA56wv-bD4/edit

Materials and Resources
Welding Coupons
Cutting Torch Units

Topic: Make a flame-beveled cut on mild steel plate. **Duration:** 2 Day(s)

Topic Description (short)
Students will use the cutting torch to make a beveled cut.

Learning Targets
Same as previous topic.

Formative Assessment
Assignment Sheet 3 - Make a flame-beveled cut on mild steel plate.

https://docs.google.com/document/d/1BTkDBnDlfNe-f3DCOn7wNQ790shUch40sCZj198Ffrs/edit

Materials and Resources
same as previous topic.

Topic: Pierce holes in mild steel. **Duration:** 2 Period(s)

Topic Description (short)
Students will use the cutting torch to pierce holes in mild steel.

Learning Targets
Same as previous topic.

Formative Assessment
Assignment Sheet 4 pierce holes in mild steel.

https://docs.google.com/document/d/1UXGnWC5hrgyas302ZHSV42JIy1JqFVZO244IItWIS_A/edit

Materials and Resources
same as previous topic.

Unit: Project Construction **Duration:** Ongoing

Unit Description
Demonstrate an understanding of the skills and procedures necessary to build a project by selecting an appropriate project; devising elevation

drawings, a bill of materials, and a plan of procedure for the project; and applying their plan to complete the project within the allotted time.

Enduring Understandings (Knowledge & Skills)

1. List the safety procedures for project construction
2. Select project and design a project plan
3. Develop a bill of materials and a projected cost list.
4. List tools needed to complete a project and list safety precautions
5. Determine the time frame for completion of a project
6. Interpret a project construction plan.
7. Lay out and prepare materials for cutting
8. Determine construction design for proper hitching and balancing
9. Determine construction design for legal specifications: width, length, weight, etc.
10. Identify and correct project defects by approved methods
11. Perform assembly procedures
12. Describe why a project should have a finish.
13. Determine actual cost of materials and labor for project.
14. Use hand and power tools in completing a project.

Summative Assessment

Project construction