

# AGRI-SCIENCE II

## Overview

Agri-Science II students continue to work with introductory units building on basic skills learned in Agri-Science I. During the first semester the students will be exposed to units in soils, animal handling, shop safety, and greenhouse management.

By the end of second semester Agri-Science II students will have developed a far better understanding of agriculture and be able to make informed decisions about the choices of classes that best suit their career interests and needs. Students work with their SAE advisors to determine the best course of study.

All students who are interested in pursuing Animal Science should take both the Animal Nutrition and Animal Reproduction units. These units will prepare them for working with small animals and livestock and provide them with the necessary background to appropriately raise and manage domestic animals.

**Title:** Agri-Science II Supervised Agricultural Experience (SAE)

**Unit Overview:** SAE is a vital aspect of agricultural education. During Agri-Science I students begin to develop a plan for supervised work experience relating to their interests and career goals. All Agri-Science students must have an approved SAE program in place by July 1 at the start of the Agri-Science II year.

SAE advisors work with individual students, parents, work-site mentors, and employers to ensure student activities are appropriate, meet student needs, and are in compliance with state labor laws. All students work with their SAE advisors to complete the Universal Structured Work-Based Learning Plan. In addition, some students must complete the Connecticut Department of Labor forms LED 75-1 (Workplace Learning Experiences for Minor Students in Hazardous Occupations) or the LED 31-23 (Workplace Learning Experiences for Minor Students Ages 14 or 15 in Non-Hazardous Occupations), or Unpaid Work Experience forms.

**Suggested Time:** On-going

**Ledyard High School Expectations for Student Learning:**

Read and write critically and effectively for a variety of purposes  
Speak clearly and communicate ideas accurately in a variety of settings  
Demonstrate critical thinking skills

**Agriculture, Food, and Natural Resources Standards:**

**CS.01.01.03.c.** Implement an effective project plan.

**CS.01.04.05.a.** Practice self-discipline.

**CS.02.03.03.b.** Develop skills required for a specific career.

**CS.02.04.02.c.** Implement effective problem solving strategies.

**CS.03.01.01.b.** Select the appropriate form of technical and business writing or communication for a specific situation.

**CS.03.02.03.b.** Practice ethical behaviors.

**CS.07.04.01.c.** Apply general workplace safety precautions/procedures.

**CS.08.01.01.c.** Use tools and equipment appropriately to complete a specific task.

**ABS.03.01.01.a** Maintain production and agri-business records

**Common Core State Standards**

**RST.9-10.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics

**WHST.9-10.1.e** Provide a concluding statement or section that follows from or supports the argument presented.

**WHST.9-10.2a** Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g. headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension

**WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience

Objectives	Required Activities/ Suggested Activities	AFNR Standards/CCSS
Develop an appropriate work experience	<ul style="list-style-type: none"> <li>• Develop work experience activities/projects in line with career goals</li> <li>• Write SMART goals for SAE improvement over the year</li> </ul>	CS.01.01.03.c, CS.01.04.05.a., CS.02.03.03.b., CS.07.04.01.c., CS.08.01.01.c.
Complete appropriate work experience forms utilizing AFNR standards	<ul style="list-style-type: none"> <li>• Identify key skills necessary to complete the Structured Work-Based Learning Form</li> <li>• Complete appropriate CT Departments of Labor and Education forms for student work experience</li> </ul>	CS.02.03.03.b., WHST.9-10.4
Demonstrate effective and appropriate work skills	<ul style="list-style-type: none"> <li>• Work safely and effectively</li> <li>• Document safe handling of equipment, plants, and animals</li> </ul>	CS.01.04.05.a., CS.03.01.01.b., CS.07.04.01.c., CS.08.01.01.c.
Develop and maintain clear records	<ul style="list-style-type: none"> <li>• Document time spent in activities, skills learned, income, and expenses</li> <li>• Keep all SAE records in a well-organized binder</li> <li>• Provide evidence of work using photographs, videos, and journals</li> <li>• Meet with SAE advisor weekly during the school year and at least once during the summer</li> </ul>	CS.01.04.05.a., CS.02.04.02.c., CS.03.01.01.b., ABS.03.01.01.a WHST.9-10.4

Demonstrate improvement in career skills	<ul style="list-style-type: none"> <li>• Provide evidence of work using photographs, videos, and journals</li> <li>• Write an annual summary of activities</li> <li>• Complete local, state, and national degree and award applications</li> </ul>	CS.01.01.03.c., CS.01.04.05.a., CS.02.03.03.b., CS.08.01.01.c., CS.02.04.02.c., CS.03.01.01.b., CS.07.04.01.c., WHST.9-10.1.e, WHST.9-10.2a, WHST.9-10.4
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**Vocabulary:**

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|---|---|
| <ul style="list-style-type: none"> <li>• 501(c)(3)</li> <li>• Community Service</li> <li>• Entrepreneurship</li> <li>• Expenses</li> <li>• Hazardous Occupations</li> <li>• Income</li> <li>• Liability</li> <li>• Non-Profit Entity</li> </ul> | <ul style="list-style-type: none"> <li>• Paid Placement</li> <li>• Placement</li> <li>• SAE</li> <li>• Scope</li> <li>• Structured Work-Based Learning Plan</li> <li>• Volunteer</li> <li>• Work-site Mentor</li> </ul> |
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**Assessments:**

- Weekly record checks
- Monthly and annual summaries
- On-site visits by advisor
- SAE rubrics

**Resources/Materials:**

- ASTE Standards
- Binder and record sheets
- SDE/SDOL employment forms

**Title:** Agri-Science II Speech

**Unit Overview:** In order to meet state requirements for continued leadership training, each Agri-Science II student will write and present a 6 – 8 minute speech on a current agricultural topic. Students will work with their SAE advisors to develop their speeches and present them prior to the end of the first semester.

**Suggested Time:** Agri-Science II speeches are developed concurrently with scheduled classwork during the fall semester.

**Ledyard High School Expectations for Student Learning:**

Read and write critically and effectively for a variety of purposes  
Speak clearly and communicate ideas accurately in a variety of settings  
Demonstrate critical thinking skills

**Agriculture, Food, and Natural Resources Standards:**

- CS.01.01.03.a.** Exhibit good planning skills for a specific task or situation.
- CS.01.05.01.c.** Articulate current issues that are important to the local, state, national and global communities.
- CS.02.02.02.b.** Apply the skills required to present oneself appropriately in various settings.
- CS.02.04.01.c.** Demonstrate critical and creative thinking skills while completing a task.
- CS.03.01.01.b.** Select the appropriate form of technical and business writing or communication for a specific situation.
- CS.03.01.03.b.** Deliver a business presentation for a peer group (e.g., class presentation).

**Common Core State Standards:**

- RST.9-10.1** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions
- RST.9-10.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics
- WHST.9-10.1.a** Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and creating organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence
- WHST.9-10.1.b** Develop claims(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.
- WHST.9-10.1.e** Provide a concluding statement or section that follows from or supports the argument presented.
- WHST.9-10.2a** Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g. headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension

- WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience
- WHST.9-10.5** Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
- WHST.9-10.8** Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
- SL.9-10.4** 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.
- SL 9-10.6** Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

<b>Objectives</b>	<b>Required Activities/ Suggested Activities</b>	<b>AFNR Standards/CCSS</b>
Select an appropriate agricultural topic	<ul style="list-style-type: none"> <li>Select a current topic of importance to U.S. agriculture.</li> </ul>	CS.01.01.03.a. CS.01.05.01.c.
Identify and select appropriate resources	<ul style="list-style-type: none"> <li>Identify up to date and valid print and on-line resources</li> <li>Submit a list of resources for review</li> </ul>	CS.02.04.01.c RST.9-10.4 WHST.9-10.8
Write a 6 – 8 minute speech	<ul style="list-style-type: none"> <li>Write and submit a speech draft for peer or advisor review</li> <li>Edit speech based on peer and advisor reviews</li> <li>Cite sources appropriately</li> <li>Take a clear stand on an current agricultural issue</li> <li>Present differing viewpoints on an issue clearly and without bias</li> </ul>	CS.01.01.03.a. CS.01.05.01.c. CS.02.04.01.c. CS.03.01.01.b. RST.9-10.4 WHST.9-10.1.a WHST.9-10.1.b WHST.9-10.1.e WHST.9-10.2a WHST.9-10.4 WHST.9-10.5 WHST.9-10.8
Make a presentation to peers	<ul style="list-style-type: none"> <li>Deliver 6 – 8 minute speech</li> </ul>	CS.02.02.02.b CS.03.01.03.b. SL.9-10.4 SL.9-10.4

Answer questions relating to speech topic	<ul style="list-style-type: none"> <li>• Answer questions relating to speech for two minutes</li> </ul>	CS.02.02.02.b CS.03.01.03.b. SL.9-10.4 SL.9-10.4
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**Vocabulary:**

- Vocabulary varies with topics

**Assessments:**

- Topic and source selection
- Draft(s) and speech
- Speech presentation
- Speech process evaluation

**Resources/Materials:**

- Agri-Science II speech rubric
- On-line and print resources
  - Agricultural Research
  - Connecticut Wildlife
  - Florist Review Magazine
  - American Nurseryman
  - US Department of Agriculture [www.usda.gov](http://www.usda.gov)
  - Cooperative State Research Education and Extension Service [www.geography.org/sustainable](http://www.geography.org/sustainable)
  - Farm Service Agency [www.fsa.usda.gov](http://www.fsa.usda.gov)
  - Food Nutrition Service [www.fns.usda.gov](http://www.fns.usda.gov)
  - Food Safety Inspection Service [www.fsis.usda.gov/Consumers\\_ & Educators/index.aps](http://www.fsis.usda.gov/Consumers_&_Educators/index.aps)
  - National Resource Conservation Service [www.nrcs.usda.gov](http://www.nrcs.usda.gov)
  - Agricultural Research Service [www.ars.usda.gov/ar](http://www.ars.usda.gov/ar)
  - CT Department of Environmental Protection [www.deep.state.ct.us](http://www.deep.state.ct.us)
  - CT Department of Agriculture [www.ct.gov/DOAG](http://www.ct.gov/DOAG)
  - CT Cooperative Extension [www.extension.uconn.edu](http://www.extension.uconn.edu)
  - UCONN [www.canr.uconn.edu](http://www.canr.uconn.edu)
  - Southern Region Aquaculture Center <http://srac.tamu.edu/index.cfm?catid=24>
  - Science Daily [www.sciencedaily.com](http://www.sciencedaily.com)

**Title:** Introduction to Greenhouse Management

**Unit Overview:**

This unit provides an introduction to greenhouses and their use in production of horticultural crops. Students will learn how various types of greenhouse structures function as well as their advantages and disadvantages. Students will have the opportunity to learn about greenhouse controls and watering systems and will use the school facility for seed starting, transplanting, fertilizing, and plant propagation.

**Suggested Time:** 22 – 23 days

**Ledyard High School Expectations for Student Learning:**

Read and write critically and effectively for a variety of purposes

Employ problem solving skills effectively

Demonstrate critical thinking skills

**Agriculture, Food, and Natural Resources Standards:**

**CS.06.02.01.a.** Use proper safety practices/personal protective equipment.

**ESS.05.01.01.a.** Identify conventional energy sources and list conservation measures to reduce energy consumption.

**PS.02.01.01.a.** Describe the qualities of light that affect plant growth.

**PS.02.01.02.b.** Determine the optimal air, temperature and water conditions for plant growth.

**PS.02.03.04.b.** Calculate the amount of fertilizer to be applied and calibrate equipment to apply the prescribed amount of fertilizer.

**PS.03.01.03.a.** Describe optimal conditions for asexual propagation and demonstrate techniques used to propagate plants by cuttings, division, separation and layering.

**PS.03.02.01.b.** Inspect propagation material for evidence of pests or disease.

**PS.03.02.04.b.** Monitor the progress of plantings and determine the need to adjust environmental conditions.

**PS.03.02.05.a.** Explain the reasons for controlling plant growth.

**PS.03.03.01.b.** Identify major local weeds, insect pests and infectious and noninfectious plant diseases.

**PS.03.03.03.a.** Describe pest control strategies associated with integrated pest management.

**PST.04.03.01.a.** Identify criteria in selecting materials in agricultural construction/ fabrication.

**Common Core State Standards:**

**RST.9-10.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics

**WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience



Objectives	Required Activities/ Suggested Activities	AFNR Standards/CCSS
Interpret information provided on a Material Safety Data Sheet or chemical warning label and draw appropriate conclusions for safe handling, storage, and disposal	<ul style="list-style-type: none"> <li>• Work safely and efficiently in greenhouse, potting room, and in the lab when using fertilizers and soil test kits</li> <li>• Read and interpret an MSD sheet for a commonly used greenhouse chemical</li> </ul>	CS.06.02.01.a RST.9-10.4, WHST.9-10.4
Identify and correctly use appropriate growing media for specific plants and uses	<ul style="list-style-type: none"> <li>• Transplant seedlings and mature plants using the appropriate containers and media</li> </ul>	PS.03.02.04.b
Correctly calculate the appropriate amount of fertilizer to use for a specific crops	<ul style="list-style-type: none"> <li>• Read and interpret fertilizer application information</li> <li>• Calculate the appropriate dosage of slow-release and water-soluble fertilizers</li> <li>• Justify in writing the appropriate fertilizer rate for specific crop types</li> </ul>	CS.06.02.01.a., PS.02.03.04.b., PS.03.02.04.b., RST.9-10.4, WHST.9-10.4
Compare and contrast greenhouse structures for growing crops, sustainability, and efficiency	<ul style="list-style-type: none"> <li>• Compare and contrast various greenhouse styles</li> </ul>	ESS.05.01.01.a., PS.02.01.01.a., PS.02.01.02.b., PST.04.03.01.a., RST.9-10.4, WHST.9-10.4
Identify insect pests common to greenhouse culture	<ul style="list-style-type: none"> <li>• Identify common insect pests on poinsettia crops: white fly, fungus gnat, and thrips</li> <li>• Determine a course of action for preventing disease and insect infestation in the greenhouse without the use of chemicals</li> </ul>	PS.03.01.03.a. PS.03.02.01.b. PS.03.02.04.b. PS.03.02.05.a. PS.03.03.01.b. PS.03.03.03.a. WHST.9-10.4
Select the appropriate water breaker for a specific crop and correctly water plants	<ul style="list-style-type: none"> <li>• Water greenhouse crops correctly</li> </ul>	CS.06.02.01.a., ESS.05.01.01.a
Successfully propagate plants using stem and leaf cuttings	<ul style="list-style-type: none"> <li>• Identify and select appropriate leaves and stems for propagation purposes</li> <li>• Select appropriate media to use in plant propagation</li> </ul>	PS.03.01.03.a., PS.03.02.01.b.
Compare fertilization and pest control methods used in the Agri-Science facility to those used in commercial greenhouse production	<ul style="list-style-type: none"> <li>• Determine a course of action for preventing disease and insect infestation in the greenhouse without the use of chemicals</li> </ul>	PS.03.01.03.a., PS.03.02.04.b., PS.03.02.05.a., PS.03.03.03.a. WHST.9-10.4

### **Vocabulary:**

- Cell pack
- Exhaust fan
- Flat
- Fungus gnat
- Growing media
- Hoop house
- Insect monitoring card
- Integrated Pest Management (IPM)
- Leaf cutting
- Material Safety Data Sheet (MSDS)
- Perlite
- Polyethylene
- Propagation
- Recirculating fan
- Ridge vent
- Sanitation
- Shading system
- Slow-release fertilizer
- Stem cutting
- Thrips
- Vermiculite
- Water breaker
- Water-soluble fertilizer
- White fly

### **Assessments:**

- Quizzes
- Unit test
- Class participation/lab activities
- Class assignments

### **Resources/Materials:**

- Text: Working in Horticulture. Richardson/Moore. Glencoe, 1991
- Supplemental materials from Cooperative Extension and Instructional Materials Service
- Water-soluble and slow-release fertilizers
- Various growing and rooting media, flats, cell packs
- Rooting hormone
- Stock plants
- Holdridge Farm Nursery (farm) – field trip

**Title:** Introduction to Soil Science

**Unit Overview:**

This unit provides an introduction to soils; their composition and value as a natural resource. A clear understanding of types of soils and their uses and limitations is critical for all aspects of agriculture. Students will learn about the development of soils, soil nutrients, testing, and analysis. Emphasis will be placed on sound stewardship and sustainability.

**Suggested Time:** 22 – 23 days

**Ledyard High School Expectations for Student Learning:**

Employ problem solving skills effectively  
Demonstrate critical thinking skills

**Agriculture, Food, and Natural Resources Standards:**

- CS.06.02.01.a.** Use proper safety practices/personal protective equipment.
- CS.08.01.01.c.** Use tools and equipment appropriately to complete a specific task.
- ESS.01.01.01.a.** Identify sample types and sampling techniques, explain the importance of unbiased sampling and collect samples.
- ESS.03.02.01.a.** Explain the process of soil formation through weathering.
- ESS.03.02.02.b.** Relate the activities of microorganisms in soil to environmental service systems.
- ESS.03.02.03.a.** Explain how the physical qualities of the soil influence the infiltration and percolation of water.
- ESS.06.02.01.a.** Demonstrate proper use and maintenance of hand tools.
- PS.02.03.01.a.** Identify the essential nutrients for plant growth and development and their major functions.
- PS.02.03.02.a.** Discuss the influence of pH and cation exchange capacity on the availability of nutrients.
- PS.02.03.03.a.** Collect soil and plant tissue samples for testing and interpret the test results.
- PS.02.03.04.a.** Identify fertilizer sources of essential plant nutrients, explain fertilizer formulations and describe different methods of fertilizer application.

**Common Core State Standards:**

- RST.9-10.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics
- WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience

Objectives	Required Activities/ Suggested Activities	AFNR Standards/CCSS
Work safely and effectively in laboratory and field situations	<ul style="list-style-type: none"> <li>• Interpret information provided on a Material Safety Data Sheet or chemical warning label and draw appropriate conclusions for safe handling, storage, and disposal</li> </ul>	CS.06.02.01.a RST.9-10.4 WHST.9-10.4
Identify, describe, and explain the importance of soil horizons.	<ul style="list-style-type: none"> <li>• Locate and name various soil profiles and determine the environmental factors influencing their development</li> <li>• Describe the ways in which soils are formed</li> <li>• Explain the relationship between soil horizons, root development, and nutrient uptake by plants</li> </ul>	ESS.03.02.01.a ESS.03.02.03.a WHST.9-10.4
Describe the qualities of soil necessary for plant growth	<ul style="list-style-type: none"> <li>• Identify macro and micro nutrients</li> <li>• Describe how pH affects plant growth and how it can be regulated in soil</li> <li>• Describe the functions and benefits of soil life</li> </ul>	ESS.03.02.02.b. PS.02.03.01.a. PS.02.03.02.a. WHST.9-10.4
Investigate methods utilized to improve soil quality	<ul style="list-style-type: none"> <li>• Compare various methods of improving soil quality: planting cover crops, minimum tillage, composting, and organic amendments</li> <li>• Construct and maintain a compost pile</li> <li>• Compare and contrast chemical and organic fertilizers in terms of application and environmental impact</li> <li>• Read and interpret fertilizer labels</li> </ul>	CS.06.02.01.a CS.08.01.01.c. ESS.03.02.03.a ESS.06.02.01.a. PS.02.03.02.a. PS.02.03.04.a. RST.9-10.4 WHST.9-10.4
Identify means of preventing and controlling erosion	<ul style="list-style-type: none"> <li>• Compare soil erosion preventative measures with respect to application and effectiveness</li> </ul>	ESS.03.02.03.a
Determine soil quality based on soil test results and suggest appropriate amendments	<ul style="list-style-type: none"> <li>• Correctly sample soil to test for pH, N, P, K, and texture</li> <li>• Interpret soil test results in terms of nutrient content and make fertilizer recommendations</li> <li>• Develop a plan for protection and maintenance of healthy soil</li> <li>• Determine the soil texture class of a sample using the soil texture triangle</li> <li>• Write a letter to the owner of a soil sample reviewing the analysis of the sample and recommended amendments</li> </ul>	CS.06.02.01.a CS.08.01.01.c. ESS.01.01.01.a PS.02.03.01.a. PS.02.03.02.a. PS.02.03.03.a. PS.02.03.04.a. RST.9-10.4 WHST.9-10.4

**Vocabulary:**

- Aquiclude
- Aquifer
- Bedrock
- Erosion
- Fertilizer
- Fertilizer
- Groundwater
- Infiltration

- Macronutrients
- Micronutrients
- MSDS
- pH
- Precipitation
- Soil amendment
- Soil horizons
- Soil texture

- Soil texture triangle
- Subsoil
- Surface water
- Tilt
- Topsoil
- Transpiration

### **Assessments:**

- Quizzes
- Unit test
- Class participation/lab activities
- Lab reports
- Class assignments

### **Resources/Materials:**

- Text: Working in Horticulture. Richardson/Moore. Glencoe, 1991
- Supplemental materials from Cooperative Extension and Instructional Materials Service
- Soil test kits for pH, texture, Nitrogen, Phosphorus, and Potassium
- Soil texture triangles

**Title:** Animal Handling

**Unit Overview:** Students will study the safe handling of reptiles, companion animals and livestock and use the equipment necessary to safely handle these animals. Students will learn the appropriate ways to approach animals and explore the skills needed for their species specific care and management. Students will gain insight into the identification and control of animal diseases and parasites. They will apply the skills and knowledge of this course to maintain animal housing and to feed, lead, transfer and control animals.

**Suggested Time:** 22-23 days

**Ledyard High School Expectations for Student Learning:**

Employ problem solving skills effectively

**Agriculture, Food, and Natural Resources Standards:**

- AS.02.01.02.a** Identify major animal species by common and scientific names
- AS.03.01.02.a** Identify common diseases, parasites and physiological disorders that affect animals
- AS.03.01.05.a** Identify and describe zoonotic diseases
- AS.06.01.01.b** Outline safety procedures for working with animals by species
- AS.08.02.01.a** Identify optimal environmental conditions for animals
- CS.02.02.02.c** Present oneself appropriately in various settings
- CS.06.02.01.a.** Use proper safety practices/personal protective equipment.
- CS.08.01.01.c.** Use tools and equipment appropriately to complete a specific task.

**Common Core State Standards:**

- RST.9-10.4** Determine the meaning of symbols, key terms and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics
- WHST.9-10.2a** Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting, graphics and multimedia when useful to aiding comprehension.
- WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose and audience

Objectives	Required Activities/ Suggested Activities	AFNR Standards/CCSS
Utilize proper animal handling skills such as using appropriate equipment, humanely leading the animal and wearing appropriate footwear/clothing.	<ul style="list-style-type: none"> <li>• Demonstrate safe handling skills for Agri-Science animals</li> <li>• Create an animal handling portfolio for five species handled in class.</li> </ul>	AS.02.01.02.a AS.06.01.01.b CS.02.02.02.c CS.06.02.01.a. CS.08.01.01.c. WHST.9-10.2a WHST.9-10.4
Identify the appropriate equipment to use while handling animals.	<ul style="list-style-type: none"> <li>• Select the appropriate animal restraint when leading an animal outside or removing an animal from a cage.</li> </ul>	AS.06.01.01.b CS.02.02.02.c CS.08.01.01.c.
Demonstrate the methods of reptile, companion and livestock handling.	<ul style="list-style-type: none"> <li>• Halter and lead livestock outdoors.</li> <li>• Pick up and restrain a reptile and companion animal.</li> </ul>	AS.06.01.01.b CS.02.02.02.c CS.06.02.01.a. CS.08.01.01.c.
Distinguish between optimal living conditions for a variety of animal species.	<ul style="list-style-type: none"> <li>• Create an appropriate stall or cage for school animals.</li> </ul>	AS.06.01.01.b AS.08.02.01.a
Categorize and differentiate between zoonotic diseases and parasites.	<ul style="list-style-type: none"> <li>• Use a Venn diagram to compare and contrast zoonotic diseases and parasitic infections.</li> </ul>	AS.03.01.02.a AS.03.01.05.a RST.9-10.4 WHST.9-10.4
Demonstrate how to properly clean an animal stall, cage or pasture.	<ul style="list-style-type: none"> <li>• Clean animal stalls, cages and pasture as needed.</li> </ul>	AS.08.02.01.a CS.06.02.01.a. CS.08.01.01.c.
Identify the key terms and other domain-specific words for animals.	<ul style="list-style-type: none"> <li>• Write a sentence using each animal handling term appropriately.</li> </ul>	AS.02.01.02.a AS.03.01.02.a RST.9-10.4 WHST.9-10.4
Demonstrate proper feeding, watering, health care, cleaning and handling of animals.	<ul style="list-style-type: none"> <li>• Feed, water, provide care, clean stalls and handle school animals.</li> </ul>	AS.06.01.01.b AS.08.02.01.a CS.02.02.02.c CS.06.02.01.a. CS.08.01.01.c.

## Vocabulary:

Aggressive behavior	Dehorn	Gilt	Mixed breed dog
American Kennel Club	Diurnal	Gosling	Molting
Autotomy	Docking	Greasy fleece	Monogamous
Avian	Doe	Guard hair	Mutton
Bacteria	Dog	Halter	Mycobacteria
Barrow	Down	Heifer	Needle teeth
Bitch	Drake	Heliotherms	Neuter
Blanket	Drenching	Hembra	Nocturnal
Blind spot	Dry cow	Hemipenes	Nose twitch
Boar	Duckling	Hen	Orphaned puppy
Bovine	Dysecdysis	Herd	Ovine
Broiler	Ecdysis	Hob	Oviparous
Browse	Ectotherms	Hoglets	Parasite
Brucellosis	Encephalitis	Horse	Pasteurization
Buck	Episodically	Huacaya	Physical restraint
Bull	Equine	Huarizo	Pig
Calf	Equitation	Instinctual behavior	Piglet
Camelid	Ewe	Jill	Polled
Canine	Farrier	Joey	Polyphyodontic
Capon	Farrowing	Kid	Pony
Caprine	Fear biting	Kidding	Porcine
Carding	Feeder pig	Lagomorph	Poultry
Carnivore	Fight or flight	Lamb	Preferred Optimum
Caseous	Filly	Lambing	Temperature
Cecotrophs	Fleece weight	Layer	Probe
Chammy	Floating	Leptospirosis	Prolific
Chemical restraint	Foal	Litter	Pullet
Cock	Foaling	Lunge line	Puppy
Cow	Forager	Macho	Quill
Cria	Fungus	Mare	Rabies/Hydrophobia
Crimp	Fur slip	Meat-type hog	Ram
Culling	Gaggle	Medulla	Restraint pole
Dam	Gait	Milk fever	Riding horse
De-beak	Gelding	Milking parlor	Ringworm



Rodent  
Sarcoptic Mange  
Salmonellosis  
Scabies  
Scruff  
Sire  
Slam feeding  
Sow  
Spay

Specific pathogen free  
Squeeze chute  
Stallion  
Steer  
Stomatitis  
Stud  
Stud horse  
Syndactylism  
Tail docking

Tom  
Toxoplasmosis  
Training  
Udder  
UV Light  
Virus  
Viviparous  
Weaning  
Wet tail

Wether  
Whelp  
Whelping box  
Wool  
Zone  
Zoonotic disease

### **Assessments:**

- Quiz
- Unit test
- Hands-on evaluation
- Class assignments
- Class participation / lab activity rubric
- Animal handling portfolio

### **Resources/Materials:**

- Exotic, Reptile, Companion and Livestock Animals
- Bedding, feed and restraints
- Handouts: Cleaning Animal Compartments, Handling Farm Animals, Animal Behaviors, Zoonotic Diseases, Handling and Restraining Animals, Common Safety Restraints for Animals, Alpaca, Beef/Dairy, Poultry, Sheep/Goat, Reptile, Companion Animal, Dogs, Equine, Pigs

**Title:** Animal Nutrition

**Unit Overview:**

Animal Nutrition is essential for the health and well-being of animals. Students will become knowledgeable about the nutrients, animal feeds and supplements, digestive tracts, feeding recommendations and storage of feed for exotic animals, reptiles, companion animals and livestock. Students will feed the school animals, observe their daily intake of feed and water and check their health. Students will balance rations using the Pearson Square, complete a feed cost comparison, a maintenance energy requirement, calculate dry matter, and interpret feed labels. They will apply the skills and knowledge of this course to maintain proper animal health for exotic animals, reptiles, companion animals and livestock.

**Suggested Time:** 45 days

**Ledyard High School Expectations for Student Learning:**

Employ problem solving skills effectively

**Agriculture, Food, and Natural Resources Standards:**

**CS.01.01.01.b** Demonstrate the ability to complete a task without assistance

**CS.02.02.02.c** Present oneself appropriately in various settings

**CS.02.03.03.b** Develop skills required for a specific career

**AS.02.02.06.a** Describe the functions of the animal body systems and system components

**AS.02.03.01.a** Identify ways an animal's health can be affected by anatomical and physiological disorders

**AS.04.01.01.a** Compare and contrast common types of feedstuffs and the roles they play in the diets of animals

**AS.04.01.02.c** Formulate animal feeds based on nutritional requirements, using feed ingredients for maximum nutrition and optimal economic production

**Common Core State Standards:**

**RST.9-10.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.

**WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose and audience

Objectives	Required Activities/ Suggested Activities	AFNR Standards/CCSS
Calculate feed costs and nutritional requirements.	<ul style="list-style-type: none"> <li>• Read a given scenario and compare and contrast feed costs</li> <li>• Read a given scenario and determine dry matter and maintenance energy requirements for animals.</li> </ul>	CS.01.01.01.b CS.02.03.03.b AS.04.01.02.c RST.9-10.4 WHST.9-10.4
Recognize the connection between appropriate management and healthy animals.	<ul style="list-style-type: none"> <li>• Analyze photos of animals and categorize them as healthy or unhealthy.</li> </ul>	CS.02.03.03.b AS.02.03.01.a AS.04.01.01.a
Identify and describe the six basic food nutrients including the composition and their function.	<ul style="list-style-type: none"> <li>• Describe the ways animals utilize nutrients.</li> <li>• Compare and contrast between a roughage and a concentrate.</li> </ul>	AS.02.02.06.a AS.04.01.01.a RST.9-10.4 WHST.9-10.4
Formulate feed rations.	<ul style="list-style-type: none"> <li>• Balance a ration using the Pearson Square for growth, maintenance, production, reproduction, fattening and work.</li> <li>• Explain the importance of a balanced ration for animals.</li> </ul>	AS.04.01.02.c CS.02.03.03.b WHST.9-10.4
Describe and evaluate the ruminant, non-ruminant and cecal fermenter digestive tracts.	<ul style="list-style-type: none"> <li>• Create an animal digestive system which includes: digestive system parts, how food passes through the digestive tract, how food breaks down with the acids and enzymes based on the types of feed the animal consumes.</li> </ul>	AS.02.01.02.a AS.02.02.06.a AS.04.01.01.a
Interpret feed labels.	<ul style="list-style-type: none"> <li>• Recommend an animal feed based on feed label interpretation.</li> <li>• Evaluate a feed label for its effectiveness and use.</li> <li>• Determine if the feed is a concentrate, roughage or a supplement based on a label.</li> </ul>	CS.01.01.01.b AS.04.01.01.a RST.9-10.4

Work safely in the animal lab.	<ul style="list-style-type: none"> <li>• Feed animals according to their nutritional requirements.</li> <li>• Monitor and replenish water supply as directed using the appropriate water container.</li> <li>• Demonstrate proper hygiene and sanitation.</li> <li>• Properly store animal feed in specified bins.</li> </ul>	CS.02.02.02.c CS.02.03.03.b
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**Vocabulary:**

Abomasum	Ad lib	Alfalfa	Average daily gain	Balanced ration	Bloat
Bolus	Bunker silo	By-product	Cecum	Cloaca	Colic
Colostrum	Concentrate	Creep feed	Crop pasture	Crude fiber	Complete ration
Crude protein	Cud	Defecation	Dehydration	Diarrhea	Diet
Digestion	Digestive tract	Emaciation	Enrich	Fattening	Essential amino acid
Feces	Feedstuff	Filler	Finishing	Forage crop	Displaced abomasum
Forage seeds	Fortified	Gizzard	Free-choice feeding	Free-ranging	Feed conversion ratio
Green chop	Hair ball	Hay	Guaranteed analysis	Hay belly	Hardware disease
Haylage	Herbivore	Ingest	Keratin	Lactation	Maintenance ration
Loose hay	Malabsorption	Malnutrition	Masticate	Milk replacer	Monogastric
Night stool	Nutrient	Obesity	Nonessential amino acid	Omasum	Omnivore
Palatability	Pasture rotation	Ration	Pelleted feed	Rate of growth	Ration of maintenance
Regurgitate	Roughage	Ruminant	Rumen magnet	Saliva	Silo
Starter	Stool	Supplement	Sweetfeed	Turgor	Total digestible nutrients
Urea	Vigor	Watering	Wean	Reticulum	Rumen
Peristalsis	Paunch	Honeycomb	Many plies	Starvation	Carbohydrate
Lipid	Mineral	Protein	Therapeutic diet	Herbivore	Carnivore

**Assessments:**

- Quizzes
- Unit Test
- Hands-On Laboratory Activities
- Class Assignments
- Nutrition Project

**Resources/Materials:**

- Handouts
- Calculators
- Variety of animal species
- Bedding, feed, hay
- Basic nutrient samples
- Animal quarters disinfectant
- Guest speakers

**Title:** Agricultural Maintenance – Electrical and Plumbing

**Unit Overview:** Agricultural Maintenance is an introduction to the basics of maintaining electrical and plumbing systems typical of agricultural and residential structures. An emphasis is placed on safety and following code in electrical and plumbing installations.

**Suggested Time:** 45 days

**Ledyard High School Expectations for Student Learning:**

Read and write effectively for a variety of purposes

Employ problem solving skills effectively

**Agriculture, Food, and Natural Resources Standards:**

- CS.06.02.01.a.** Use proper safety practices/personal protective equipment.
- CS.08.01.01.c.** Use tools and equipment appropriately to complete a specific task.
- PST.03.04.01.a.** Apply the meaning and measurement of electricity, including amperage, voltage and wattage.
- PST.03.04.01.b.** Assess and install electrical circuits, including conductors, insulators and controls.
- PST.03.04.02.a.** Identify the kinds and applications of electricity, including direct and alternating current.
- PST.03.04.02.b.** Interpret electrical system symbols and diagrams.
- PST.04.04.01.b.** Install and/or repair pipes and plumbing equipment and fixtures.
- PST.04.04.02.c.** Install and/or repair electrical wiring components and fixtures following appropriate codes and standards.
- PST.05.01.01.b.** Use volt and amp meters and continuity testers to demonstrate electricity principles.
- PST.05.02.01.a.** Recognize common electrical symbols.

**Common Core State Standards**

- RST.9-10.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
- WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience

Objectives	Required Activities/ Suggested Activities	AFNR Standards/CCSS
Work safely and efficiently in an agricultural shop environment.	<ul style="list-style-type: none"> <li>• Maintain a clean and safe shop environment.</li> <li>• Demonstrate procedures for maintaining a safe shop such as cleaning equipment and surroundings as well as determining and eliminating potential workplace hazards.</li> <li>• Describe the kinds of injuries that can occur from contact with electrical wires and from non-electrical hazards of electrical circuits.</li> <li>• Disconnect and lock-out electrical circuits in preparation for service.</li> <li>• Read a scenario of an electrical accident and write a paragraph describing the factors that contributed to the accident and preventive measures that should be put in place to prevent reoccurrences.</li> </ul>	CS.06.02.01.a CS.07.01.01.b CS.08.02.01.a PST.02.01.03.a RST.0-10.4 WHST.9-10.4
Select hand tools appropriate to a given task.	<ul style="list-style-type: none"> <li>• Use lineman's pliers, diagonal cutters and wire strippers to cut and prepare wire for installation.</li> <li>• Use pipe cutters, reamers and brushes to prepare copper pipe for installation.</li> </ul>	CS.06.02.01.a CS.08.01.01.c PST.01.03.01.b
Compare and contrast AC and DC electrical current.	<ul style="list-style-type: none"> <li>• Sketch the voltage-time curve of DC and AC current.</li> <li>• Identify sources of AC and DC current.</li> <li>• Construct a chemical voltaic cell and measure its voltage output under no-load conditions.</li> </ul>	PST.03.04.01.a PST.03.04.02.a PST.05.01.01.b
Describe the characteristics of electrical conductors and insulators	<ul style="list-style-type: none"> <li>• Use a multi-meter or continuity tester to classify substances as conductors, semiconductors or insulators.</li> </ul>	PST.03.04.01.a PST.05.01.01.b

<p>Use Ohm's and Kirchhoff's laws to analyze electrical circuits.</p>	<ul style="list-style-type: none"> <li>• Use Ohm's law to calculate voltage, current or resistance in simple electrical circuits.</li> <li>• Analyze series, parallel and series-parallel networks of sources, conductors and resistors using Ohm's and Kirchhoff's laws.</li> </ul>	<p>PST.03.04.01.a PST.03.04.02.b</p>
<p>Measure voltage, current and resistance using a multi-meter.</p>	<ul style="list-style-type: none"> <li>• Use a multi-meter to measure the voltage from dry cells, storage batteries and AC sources.</li> <li>• Use a multi-meter to measure the resistance of varying lengths of materials such as a graphite pencil line or steel wire.</li> </ul>	<p>PST.05.01.01.b PST.05.02.01.a</p>
<p>Perform calculations of electrical power and work.</p>	<ul style="list-style-type: none"> <li>• Measure voltage and current in an electrical circuit and calculate power consumption of the circuit.</li> <li>• Measure voltage at the end of an extension cord to determine the power losses in the cord for a given application.</li> <li>• Read a power meter and calculate power consumption.</li> <li>• Interpret information provided in electrical bills to project electricity costs.</li> <li>• Interpret information on the power consumption of different types of lighting and billing rates to project savings from changing to a more efficient form of lighting.</li> <li>• Write an argumentative paragraph using data to justify a choice between two options – LED versus incandescent lighting, 12 gauge versus 16 gauge, etc.</li> <li>• Construct or repair a table lamp.</li> <li>• Assemble an electrical service panel.</li> </ul>	<p>RST.9-10.4 WHST.9-10.4</p>
<p>Interpret circuit diagrams composed of current sources, conductors, loads and controls.</p>	<ul style="list-style-type: none"> <li>• Identify the schematic diagram of common circuit components.</li> <li>• Draw schematic diagrams of simple electric circuits.</li> <li>• Determine the function of an electrical circuit shown in a schematic diagram.</li> </ul>	<p>PST.03.04.01.b. PST.03.04.02.b. PST.05.02.01.a.</p>



	<ul style="list-style-type: none"> <li>• Construct a simple circuit based on a schematic diagram.</li> </ul>	
Wire common electrical supply and lighting circuits according to code.	<ul style="list-style-type: none"> <li>• Identify and describe the function of SPST, DPST switches and dimmers in lighting circuits.</li> <li>• Identify the meaning of wire color codes used in AC wiring.</li> <li>• Identify the meaning of screw color codes on controls, outlets and sockets used in AC wiring.</li> <li>• Compare and contrast the results of circuit faults in circuits with and without proper grounding protection.</li> <li>• Wire SPST and 3-way lighting circuits with current entering at different points in the circuit (at the switch, at the light, etc.)</li> <li>• Design and wire a circuit that will achieve a stated objective.</li> <li>• Solder electrical connections.</li> <li>• Use a multi-meter in continuity mode to analyze circuits prior to applying power.</li> </ul>	CST.08.01.01.c PST.03.04.01.a PST.03.04.01.b PST.04.04.02.c
Select appropriate wire and cable for use in a variety of applications	<ul style="list-style-type: none"> <li>• Read multi-conductor wire and cable markings to determine the number and size of conductors and application categories for a multi-conductor electrical wire.</li> <li>• Use tables of standards to select wire sizes appropriate to different applications and locations.</li> </ul>	PST.03.04.01.b. RST.9-10.4.
Select circuit breakers, fuses and ground fault circuit interrupters for different applications.	<ul style="list-style-type: none"> <li>• Compare and contrast the purpose and function of circuit breakers, fuses and ground fault circuit interrupters.</li> <li>• Correctly wire a GFCI duplex outlet in series with a standard duplex outlet to provide ground fault protection to the entire circuit.</li> </ul>	CS.08.01.01.c. PST.03.04.01.b. PST.04.04.02.c.

Compare and contrast common types of pipe used for water and heating in agricultural and residential settings.	<ul style="list-style-type: none"> <li>Evaluate or select plastic pipe for different applications based upon identifying information on the pipe and industry recommendations of maximum ratings temperature and pressure ratings.</li> </ul>	PST.04.04.01.b. RST.9-10.4
Identify commonly used plumbing fittings and describe their functions.	<ul style="list-style-type: none"> <li>Identify commonly used plumbing fittings and describe how and where they are used.</li> </ul>	PST.04.04.01.b
Cut and join copper and PVC pipe.	<ul style="list-style-type: none"> <li>Join PVC pipe with solvent cement.</li> <li>Sweat-solder fittings on copper pipe.</li> </ul>	PST.04.04.01.b
Install plumbing fixtures and fittings	<ul style="list-style-type: none"> <li>Create a plumbing exercise combining different types of pipe similar to the one in Figure 32-32 of Agricultural Mechanics.</li> <li>Install a sink, toilet or other fixture on a mock-up of a kitchen, bathroom, etc...</li> <li>Replace the flush mechanism in a toilet tank.</li> </ul>	PST.04.04.01.b

**Vocabulary:**

- |  |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li>AC</li> <li>Ampere</li> <li>Battery</li> <li>Capillary action</li> <li>Cardiac Fibrillation</li> <li>Cell</li> <li>Circuit Breaker</li> <li>Conductor</li> <li>Coulomb</li> <li>Current</li> <li>Current</li> <li>DC</li> <li>Diagonal Cutters</li> <li>Diode</li> <li>Duplex Outlet</li> <li>Electromotive Force (EMF)</li> <li>Float</li> </ul> | <ul style="list-style-type: none"> <li>Float</li> <li>Flush Valve</li> <li>Flux</li> <li>Fuse</li> <li>Gasket</li> <li>Ground Fault</li> <li>Ground Fault Circuit Interrupter (GFCI)</li> <li>Hot Wire</li> <li>Insulator</li> <li>Insulator</li> <li>Lineman's Pliers</li> <li>Load</li> <li>Neutral / Cold Wire</li> <li>Node</li> <li>Ohm</li> <li>Overflow Tube</li> </ul> | <ul style="list-style-type: none"> <li>Potentiometer</li> <li>P-Tube</li> <li>Resistance</li> <li>Resistor</li> <li>Safety Ground</li> <li>Semiconductor</li> <li>Single-Pole Double Throw (SPDT) / 3-Way Switch</li> <li>Single-Pole Single Throw (SPST) Switch</li> <li>Solder</li> <li>Source</li> <li>Tank</li> <li>Voltage</li> <li>Wire Gauge</li> <li>Wire Strippers</li> </ul> |
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### **Assessments:**

- Quizzes
- Design assessments
- Lab activities
- Class assignments

### **Resources/Materials:**

- Electrical Wiring. Duncan/ Wren. AAVIM, 1999
- Wiring Basic and Advanced Projects, Creative Homeowner, 2001.
- Agricultural Mechanics: Fundamentals and Application. Cooper. Delmar, 1995.
- Materials from CL&P website,  
[http://www.cl-p.com/Home/CustomerService/AboutYourBill/About\\_Your\\_Bill/?MenuID=4294984960](http://www.cl-p.com/Home/CustomerService/AboutYourBill/About_Your_Bill/?MenuID=4294984960), copies of electric bills
- Pegboard wiring boards, zip ties, receptacle and junction boxes, 3 and 4 wire #12 wire, plugs with flex cables
- PVC and copper pipe and fittings, solvent cement, solder, flux, propane torches
- Screwdrivers, needle-nose pliers, wire strippers, razor knives, lineman's pliers
- Multi-meters
- Miscellaneous small resistors and power supplies for low-voltage circuits.

**Title:** Metal Fabrication

**Unit Overview:** This unit provides an introduction to the skills needed by students to safely work with metals in an agricultural shop. An emphasis is placed on developing skills for cold metal work and shielded metal arc welding of mild steel.

**Suggested Time:** 45 days

**Ledyard High School Expectations for Student Learning:**

Read and write effectively for a variety of purposes  
Employ problem solving skills effectively

**Agriculture, Food, and Natural Resources Standards:**

- CS.06.02.01.a.** Use proper safety practices/personal protective equipment.
- CS.07.01.01.b.** Use appropriate personal protective equipment for a given task.
- CS.08.01.01.b.** Set up/adjust tools and equipment related to complete a specific task.
- CS.08.01.02.a.** Follow operating instructions related to specific tools and equipment needed to complete a task.
- CS.08.02.01.a.** Use the appropriate procedures for the use and operation of specific tools and equipment.
- PST.01.03.01.b.** Select, maintain and use hand and power tools in service, construction and fabrication.
- PST.02.01.03.a.** Maintain the cleanliness and appearance of power units and equipment to assure functionality.
- PST.02.02.01.b.** Perform start-up and shut-down procedures on power units and equipment as specified in technical manuals.
- PST.02.02.02.b.** Demonstrate safe practices and regulations in the operation of power units and equipment.
- PST.03.04.02.a.** Identify the kinds and applications of electricity, including direct and alternating current.
- PST.04.04.01.a.** Construct and/or repair with wood and metal.
- PST.04.04.07.a.** Identify kinds and characteristics of metal materials.
- PST.04.04.07.b.** Distinguish welding processes, positions, and materials preparation.
- PST.04.04.07.c.** Construct and/or repair metal structures and equipment using welding fabrication procedures, including those associated with SMAW, GMAW, GTAW, fuel-oxygen and plasma arc torch methods.
- PST.05.02.03.a.** Identify hazards and safety practices in planning, installing and using electricity.

**Common Core State Standards:**

- RST.9-10.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics
- WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience

<b>Objectives</b>	<b>Required Activities/ Suggested Activities</b>	<b>AFNR Standards/CCSS</b>
Work safely and efficiently in a metalworking shop.	<ul style="list-style-type: none"> <li>• Maintain a clean and safe shop environment.</li> <li>• Demonstrate procedures for maintaining a safe metal fabrication shop such as cleaning equipment and surroundings as well as determining and eliminating potential workplace hazards.</li> </ul>	CS.06.02.01.a CS.07.01.01.b CS.08.01.02.a CS.08.02.01.a PST.02.01.03.a
Employ personal protective equipment and other safety equipment to maintain safety in the metal fabrication shop.	<ul style="list-style-type: none"> <li>• Identify the hazards associated with the use of metal fabrication equipment such as power tools, arc welding machines and oxy-fuel torches.</li> <li>• Identify the causes and symptoms of burns associated with exposure to welding arc.</li> <li>• Describe and demonstrate use of procedures and personal protective equipment to minimize the risk of injury from exposure of workers and bystanders to a welding arc.</li> <li>• Disassemble and re-assemble a welding mask identifying key components and their functions.</li> <li>• Inspect a welding mask and correct any defects.</li> <li>• Select appropriate welding lens shades for various metalworking tasks such as brazing, cutting and welding.</li> <li>• Read a scenario of a welding accident and write a brief essay describing the factors that</li> </ul>	CS.06.02.01.a CS.07.01.01.b. PST.02.02.02.b PST.05.02.03.a RST.9-10.4 WHST.9-10.4

	<p>contributed to the accident and preventive measures that should be put in place to prevent reoccurrences.</p>	
<p>Demonstrate safe practice in the selection and use of hand tools used in the metal fabrication shop.</p>	<ul style="list-style-type: none"> <li>• Use a scratch awl and center punch to mark metal for cutting or drilling.</li> <li>• Use a hack saw to cut rod, bar or angle stock.</li> <li>• Use cold chisels, metal snips, wire cutters and bolt cutters to cut metal.</li> <li>• Determine the size and thread pitch of a bolt using a thread gage.</li> <li>• Use threading die and die stock to thread rod for a specified size and pitch.</li> <li>• Use tables of fractional bit sizes for tap diameter and pitch to determine the drill bit size needed to prepare a hole for tapping.</li> <li>• Use taps and tap wrench to tap specified threads in mild steel, aluminum or plastic.</li> <li>• Select the appropriate tools and sizes to fasten nuts and bolts.</li> </ul>	<p>CS.06.02.01.a CS.08.01.01.b CS.08.01.02.a PST.01.03.01.b</p>
<p>Demonstrate safe practice in the selection and use of power tools used in the metal fabrication shop.</p>	<ul style="list-style-type: none"> <li>• Cut bar, angle stock and rod on a metal-cutting band saw.</li> <li>• Use a drill press to drill in steel or aluminum.</li> <li>• Use bench and pedestal grinder to bevel metal in preparation for welding.</li> <li>• Use an angle grinder to shape metal in preparation for welding and to remove excess metal from welds.</li> </ul>	<p>CS.06.02.01.a CS.08.01.01.b CS.08.01.02.a PST.01.03.01.b PST.02.02.02.b PST.05.02.03.a</p>
<p>Interpret information about physical and thermal characteristics of metals to make informed decisions when working with metal.</p>	<ul style="list-style-type: none"> <li>• Identify different metals encountered in the agricultural shop by visual and physical properties.</li> <li>• Compare and contrast the physical characteristics such as ductility, malleability and machinability of different metals encountered in agricultural practice.</li> </ul>	<p>PST.04.04.07.a. PST.04.04.07.ab RST.9-10.4 WHST.9-10.4</p>

	<ul style="list-style-type: none"> <li>• Compare and contrast various steel alloys according to composition, working properties and common applications.</li> <li>• Use data from tables of metal properties to calculate expansion and contraction of metal when heated and cooled.</li> <li>• Demonstrate techniques to tack and control heat on work pieces to minimize deformation of metal when being heated.</li> <li>• Forge a simple shape such as an eyelet or hook from round stock.</li> </ul>	
<p>Employ SMAW technologies to fabricate and repair metal objects.</p>	<ul style="list-style-type: none"> <li>• Draw a SMAW welding circuit, identifying and describing the function of the various components.</li> <li>• Inspect SMAW machines and equipment for defects such as frayed cables and loose connections. Make repairs as needed.</li> <li>• Select welding electrodes for a given application according to polarity, electrode size, AWS electrode codes and tables of electrode characteristics.</li> <li>• Perform tack, butt, lap and fillet welds on mild steel in flat position using SMAW. Complete written weld reports for each weld performed, including a brief analysis of the process, results of this weld and strategies to improve similar welds in the future.</li> <li>• Calculate welding duty-cycle to operate a welding machine within the manufacturer's specifications.</li> <li>• Construct a simple welding project.</li> <li>• Analyze and evaluate the quality of sample welds.</li> <li>• Write a paragraph describing the weld, observations and recommendations to improve.</li> </ul>	<p>CS.08.01.01.b  CS.08.02.01.a  PST.02.02.01.b  PST.03.04.02.a  PST.04.04.01.a  PST.04.04.07.b  PST.04.04.07.c  PST.05.02.03.a  RST.9-10.4  WHST.9-10.4</p>

Employ gas-fuel technologies such as oxy-acetylene to heat, cut and braze metal.	<ul style="list-style-type: none"> <li>• Demonstrate and describe techniques for safely handling fuel and oxygen cylinders.</li> <li>• Set up an oxy-acetylene welding station for safe operation. Demonstrate appropriate techniques to inspect for leaks.</li> <li>• Adjust an oxy-acetylene torch to produce carburizing, neutral and oxidizing flames.</li> <li>• Use a cutting torch to cut mild steel.</li> <li>• Use a welding torch to braze mild steel.</li> </ul>	PST.04.04.07.b PST.04.04.07.c RST.9-10.4
Read and write welding symbols to perform and specify welds.	<ul style="list-style-type: none"> <li>• Identify components of AWS welding symbols and their use.</li> <li>• Interpret AWS welding symbols on a sketch of a metal working project, describing the weld and how it will be executed.</li> <li>• Use appropriate welding symbols to describe welds in welding reports.</li> </ul>	PST.04.04.07.b RST.9-10.4 WHST.9-10.4
Describe and differentiate between SMAW, GMAW, FCAW and GTAW welding.	<ul style="list-style-type: none"> <li>• Compare and contrast equipment and techniques used in SMAW, GMAW, FCAW and GTAW welding.</li> <li>• Use GMAW or FCAW to perform tack, butt, lap and fillet welds on mild steel in flat position</li> </ul>	PST.04.04.07.b RST.9-10.4

**Vocabulary:**

- |                               |                 |                                    |               |
|-------------------------------|-----------------|------------------------------------|---------------|
| • 1 <sup>st</sup> degree burn | • Anneal        | • Carburizing Flame                | • Current     |
| • 2 <sup>nd</sup> degree burn | • Anvil         | • Case Harden                      | • Cylinder    |
| • 3 <sup>rd</sup> degree burn | • Arc           | • Cast Iron                        | • DC          |
| • AC                          | • AWS           | • Center Punch                     | • Density     |
| • Acetylene                   | • Bench Grinder | • Chisel                           | • Drill Bit   |
| • Alloy                       | • Bevel         | • Coefficient of thermal expansion | • Drill Press |
| • Aluminum                    | • Blind Spot    | • Cold Chisel                      | • Ductility   |
| • Ampere                      | • Brass         | • Conjunctiva                      | • Edge Joint  |
| • Angle Grinder               | • Bronze        | • Copper                           | • Electrode   |
| • Angle Stock                 | • Butt Weld     |                                    |               |



- Electrode holder / Stinger
- FCAW
- File
- File card
- Filler rod
- Fillet weld
- Flashback
- Flat bar
- Flux
- Gauge
- Galvanize
- GMAW
- GTAW
- Hack saw
- Harden
- Infrared
- Lap joint
- Lens
- Malleability
- Metal fume disease
- Mild steel
- Ohm
- Oxide
- Oxidizing Flame
- Pedestal Grinder
- Porosity
- Rectifier
- Regulator
- Resistance
- Retina
- Reverse polarity
- Round bar
- Scratch awl
- Shade
- Slag
- Slag inclusion
- SMAW
- Stainless steel
- Metal stamp
- Straight polarity
- Tack weld
- Tap
- Tap wrench
- Thread pitch
- Hex bolt
- Nut
- Washer
- Tee weld
- Temper
- Tool steel
- Torch
- Transformer
- Ultimate tensile strength
- Ultraviolet
- Unit weight
- Voltage
- Weld face
- Weld fusion
- Weld pool
- Weld toe
- Welder's flash
- Work piece clamp / ground clamp
- Zinc

### **Assessments:**

- Quizzes
- Skill assessments
- Lab activities
- Class assignments

### **Resources/Materials:**

- Agricultural Mechanics: Fundamentals and Applications. Cooper. Delmar, 1987.
- Metal Fabrication Technology for Agriculture. Jeffus. Delmar, 2004.
- Welding. Wall Mountain Company, 1996.
- Oxy-Acetylene Welding. Wall Mountain Company, 1998.
- New Lessons in ARC WELDING. The Lincoln Electric Company. 2011.
- Welding Electrodes, Welding Wire, Brazing Rods, Flux, Mild Steel Structural Stock, Fuel Gasses and Oxygen, Shield Gas
- Lenses with shades of 10-12, welding gloves, welding aprons, head protection.
- Visors for grinding, grinding and cutting disks for angle-grinders,
- Cutting Oil

**Title:** Horticulture II

**Unit Overview:**

Horticulture II is a two-part unit that provides students with a basic introduction to floral art by giving them the opportunity to learn and apply the principles of floral design. Students will learn the basic styles of design: bud vase, round mound, and triangular and practice appropriate handling of floral materials.

Students will also apply the skills and knowledge they acquired in Introduction to Greenhouse Management through the culture of flowering plant, vegetable and herb seedlings for use in gardens. Students will have multiple opportunities to practice seeding, transplanting, watering, and organizing crops for spring sales and plantings. If time allows students will apply design principles to garden designs.

**Suggested Time:** 45 days

**Ledyard High School Expectations for Student Learning:**

Employ problem solving skills effectively

**Agriculture, Food, and Natural Resources Standards:**

**CS.06.02.01.a.** Use proper safety practices/personal protective equipment.

**ABS.04.01.02.a.** Identify financial concepts associated with production and profit.

**PS.01.01.02.b.** Identify agriculturally important plants by common names.

**PS.02.01.02.b.** Determine the optimal air, temperature and water conditions for plant growth.

**PS.02.02.01.b.** Describe the physical characteristics of growing media and explain the influence they have on plant growth.

**PS.03.01.02.a.** Demonstrate sowing techniques and provide favorable conditions for seed germination.

**PS.03.01.03.a.** Describe optimal conditions for asexual propagation and demonstrate techniques used to propagate plants by cuttings, division, separation and layering.

**PS.03.02.03.b.** Apply preplant treatments required of seeds and plants and evaluate the results.

**PS.03.02.04.b.** Monitor the progress of plantings and determine the need to adjust environmental conditions.

**PS.03.02.05.b.** Demonstrate proper techniques to control and manage plant growth through mechanical, cultural or chemical means.

**PS.03.03.01.b.** Identify major local weeds, insect pests and infectious and noninfectious plant diseases.

**PS.03.03.03.a.** Describe pest control strategies associated with integrated pest management.

**PS.03.04.01.b.** Describe sustainable agriculture practices and compare the ecological effects of traditional agricultural practices with those of sustainable agriculture.

**PS.04.01.01.b.** Explain design elements of line, form, texture and color and express the visual effect each has on the viewer.

**PS.04.01.02.c.** Create and implement designs by following established principles of art.

**Common Core State Standards:**

**RST.9-10.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics

**WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience

Objectives	Required Activities/ Suggested Activities	AFNR Standards/CCSS
Utilize proper planting techniques such as spacing, planting depth, and fertilizing	<ul style="list-style-type: none"> <li>• Transplant seedlings and plugs and label appropriately</li> <li>• Spaced potted plant to ensure full access to sun and allow for full lateral branch development</li> </ul>	CS.06.02.01.a. PS.03.03.03.a. PS.03.02.04.b.
Select and use the appropriate water breaker for watering plants at various stages of growth	<ul style="list-style-type: none"> <li>• Identify the various water breakers and their uses in the greenhouse</li> <li>• Select the appropriate water breaker and use it to water selected items in the greenhouse</li> </ul>	CS.06.02.01.a. PS.01.01.02.b.
Identify maintenance needs and address issues	<ul style="list-style-type: none"> <li>• Identify those maintenance issues most critical for the current crop</li> <li>• Demonstrate basic greenhouse maintenance such as sanitation, pest control, heat and light control</li> </ul>	CS.06.02.01.a. PS.01.01.02.b.
Demonstrate proper panting and transplanting techniques for the greenhouse	<ul style="list-style-type: none"> <li>• Read and interpret wholesale and retail seed packets and start seeds appropriately</li> <li>• Select appropriate growing media and cell pack sizes for specific use</li> </ul>	PS.02.01.02.b. PS.02.02.01.b. PS.03.01.02.a. PS.03.02.03.b. PS.03.02.04.b. PS.03.02.05.b. RST.9-10.4

Select plants for gardens based on information from seed packets and plant labels	<ul style="list-style-type: none"> <li>• Create a vegetable or flower garden plan for home or school considering environmental conditions</li> <li>• Start seeds of selected plants based on planting schedules and garden goals</li> </ul>	PS.02.01.02.b. PS.03.02.05.b. PS.03.03.03.a. PS.03.04.01.b. PS.04.01.02.c. RST.9-10.4, WHST.9-10.4
Successfully propagate stock plants	<ul style="list-style-type: none"> <li>• Select appropriate plant material for asexual propagation and prepare cuttings and media for rooting</li> <li>• Select the appropriate rooting hormone to use with various propagation materials</li> </ul>	PS.02.02.01.b. PS.03.01.03.a. PS.03.02.04.b. PS.03.02.05.b
Apply color in floral design	<ul style="list-style-type: none"> <li>• Create a color wheel and use it to select appropriate flowers for use in designs</li> <li>• Identify color harmonies used in floral arrangements</li> </ul>	PS.04.01.02.c. WHST.9-10.4
Demonstrate proper handling of cut flowers	<ul style="list-style-type: none"> <li>• Unwrap, prep, condition and store flowers appropriately to ensure long life</li> <li>• Create a bud vase, mug arrangement (triangle), and round mound arrangement</li> </ul>	PS.02.01.02.b. PS.03.03.03.a. PS.04.01.02.c.
Calculate the wholesale cost for floral materials	<ul style="list-style-type: none"> <li>• Differentiate between wholesale cost and retail price</li> <li>• Determine the wholesale cost of materials used in floral designs</li> </ul>	ABS.04.01.02.a. RST.9-10.4 WHST.9-10.4
Demonstrate basic floral design techniques by creating floral designs in various styles	<ul style="list-style-type: none"> <li>• Create a bud vase, mug arrangement (triangle), and round mound arrangement</li> <li>• Demonstrate proper wiring and taping techniques for creating corsages and boutonnieres</li> <li>• Create a monochromatic arrangement, corsage, or boutonniere</li> </ul>	PS.03.03.03.a. PS.04.01.02.c.

## **Vocabulary:**

### Floral Design

- Analogous color harmony
- Balance and Stability
- Complementary Color Harmony
- Conditioning
- Harmony/Unity
- Mechanics
- Monochromatic Color Harmony
- Orientation
- Proportion and Scale
- Rhythm
- Symmetry
- Tint
- Tone
- Unit cost
- Wholesale
- Wiring and Taping

### Greenhouse & Garden

- Botrytis
- Cutting (stem and leaf)
- Damping Off
- Days to maturity
- Determinate
- Disease Resistance
- Fertilizer Ratios
- Germination
- Growing Media
- Hybrid
- Indeterminate
- Retail
- Rooting Hormone
- Sanitation
- Seeding
- Seedling
- Shade
- Shading
- Sowing
- Spacing
- Sustainability
- Thinning
- Transplant
- Water breaker
- Wholesale

**Assessments:**

- Quizzes
- Design assessments
- Lab activities
- Class assignments

**Resources/Materials:**

- Floriculture: Designing & Merchandising, Griner
- Floral design rubric
- Floral design materials: floral foam, flower food, bunch cutters, design bowls, bud vases, assorted flowers and greens
- Greenhouse growing materials: seeds, plugs, growing media, water soluble and slow release fertilizers, cell packs, flats
- On-line and print seed catalogs

**Title:** Introduction to Re-Circulating Systems

**Unit Overview:**

This unit covers the basic design and management practices of closed aquaculture systems. Students learn essential techniques in maintaining a healthy environment for finfish and other aquatic organisms used in aquaculture production. Practical applications such as measuring water quality, basic plumbing, weight measurements and maintenance of production systems are used in many areas of the class to support instruction. Students further apply principles of filtration and water quality by planning, constructing and assessing a small scale model of a functional re-circulating system.

**Suggested Time:** 45 days

**Ledyard High School Expectations for Student Learning:**

Read and write critically and effectively for a variety of purposes

Employ problem solving skills effectively

Demonstrate critical thinking skills

**Agriculture, Food, and Natural Resources Standards:**

- CS.01.01.01.c.** Work independently and in group settings to accomplish a task.
- CS.07.04.01.c.** Apply general workplace safety precautions/procedures.
- CS.08.01.01.c.** Use tools and equipment appropriately to complete a specific task.
- CS.08.01.02.b.** Demonstrate appropriate operation, storage, and maintenance techniques for tools and equipment.
- AS.01.01.01.a.** Identify the origin, significance, distribution and domestication of animal species.
- AS.02.01.01.a.** Explain the importance of the binomial system of nomenclature.
- AS.02.03.02.c.** Develop efficient procedures to produce consistently high quality animals, well suited for their intended purposes.
- AS.02.01.02.a.** Identify major animal species by common and scientific names.
- AS.03.01.01.b.** Perform simple health-check evaluations on animals.
- ESS.01.01.01.b.** Determine the appropriate sampling techniques needed to generate statistical analysis data, and prepare valid chemical laboratory samples according to instruction.
- ESS.03.02.02.b.** Relate the activities of microorganisms in soil to environmental service systems.
- ESS.03.03.01.b.** Describe characteristics of water that influence the biosphere and sustain life.
- ESS.03.03.06.c.** Install and maintain pumps and associated delivery system.

**ESS.04.02.01.b.** Evaluate environmental hazards created by different types of solid waste, solid waste accumulation and solid waste disposal.

**PST.01.03.01.a.** Identify and demonstrate safe use and maintenance of measurement and layout tools.

**PST.04.01.01.a.** Identify symbols and drawing techniques used to develop plans and sketches.

**Common Core State Standards:**

**RST.9-10.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics

**WHST.9-10.2a.** Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multi-media when useful to aiding comprehension

**WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience

<b>Objectives</b>	<b>Required Activities/ Suggested Activities</b>	<b>AFNR Standards/CCSS</b>
Identify aquaculture equipment and components and describe their functions.	<ul style="list-style-type: none"> <li>Identify and describe in writing the function of aquaculture equipment</li> </ul>	CS.08.01.02.b. WHST.9-10.4
Identify aquaculture production species and define their role in aquaculture	<ul style="list-style-type: none"> <li>Identify and describe in writing the role and uses of aquaculture production species</li> <li>Identify common aquaculture species by scientific name</li> <li>Use morphological features of finfish to identify and differentiate among species</li> <li>Compare production species water parameters and tolerance ranges</li> </ul>	AS.01.01.01.a. AS.02.01.01.a. AS.02.01.02.a RST.9-10.4 WHST.9-10.4
Identify and describe the functioning of the three components of a re-circulating system	<ul style="list-style-type: none"> <li>Label and define the components of a re-circulating system.</li> <li>Trace the water path and water movement through the lab re-circulating systems</li> </ul>	ESS.03.03.01.b ESS.04.02.01.b. RST.9-10.4 WHST.9-10.4
Demonstrate appropriate maintenance and equipment use for a re-circulating systems	<ul style="list-style-type: none"> <li>Demonstrate appropriate maintenance techniques for a functioning re-circulating system containing production fish</li> <li>Demonstrate proper use, care and sanitation of aquaculture equipment</li> </ul>	PST.01.03.01.a. CS.08.01.01.c AS.03.01.01.b WHST.9-10.2a WHST.9-10.4



	<ul style="list-style-type: none"> <li>• Develop and use a task list for cleaning and maintenance of re-circulating systems</li> </ul>	
Safely and accurately test and analyze various water parameters using water tests and visual inspection to determine water quality and the impact on fish health	<ul style="list-style-type: none"> <li>• Safely perform water tests according to instruction and classroom guidelines</li> <li>• Sample and test water parameters such as Ammonia, Nitrite, pH, and Dissolved Oxygen using water test kits</li> <li>• Determine and record specific chemical levels based on water test results</li> <li>• Assess water quality by recording and analyzing results of the water tests</li> <li>• Discuss environmentally sound practices for disposal of waste water and water testing chemicals.</li> <li>• Locate, read and interpret specific information from MSDS's regarding water testing reagents</li> <li>• Locate and use proper safety equipment/attire while water testing and/or working in the aquaculture lab</li> </ul>	<p>ESS.01.01.01.b.  AS.03.01.01.b  CS.07.04.01.c  AS..02.03.02.c.  CS.0.8.01.01.c..  ESS.04.02.01.b  RST.9-10.4  WHST.9-10.4</p>
Propose appropriate treatment for re-circulating system based on water test results and assessments	<ul style="list-style-type: none"> <li>• Propose in writing specific actions that should be taken to improve the quality of water based on water analysis</li> </ul>	<p>ESS.03.03.01.b.  ESS.04.02.01.b.  WHST.9-10.2a  WHST.9-10.4</p>
Identify the components, order, and parameter levels of the Nitrogen cycle.	<ul style="list-style-type: none"> <li>• Describe and diagram the Nitrogen cycle and its role in biological filtration</li> <li>• Test for all forms of Nitrogen in a re-circulating system</li> <li>• Analyze Nitrogen test results to conclude, in writing, biological filtration and cycling in a re-circulating system</li> </ul>	<p>ESS.03.03.01.b.  ESS.04.02.01.b.  WHST.9-10.2a  WHST.9-10.4</p>

<p>Compare and contrast biological filtration vs. other forms of filtration in a re-circulating system.</p>	<ul style="list-style-type: none"> <li>• Determine biological filtration through water tests.</li> <li>• Describe biological filtration and the water parameters that affect the functioning of a biofilter.</li> </ul>	<p>ESS.03.02.02.b WHST.9-10.4</p>
<p>Plan, design, construct and assess a functioning model re-circulating system for freshwater production fish based on a teacher designed rubric</p>	<ul style="list-style-type: none"> <li>• Design and sketch a plan for a model re-circulating system</li> <li>• Use proper tools and materials to follow plan</li> <li>• Journal and assess procedures and results of the planning, designing, and construction of a model re-circulating system.</li> </ul>	<p>CS.01.01.01.c. ESS.03.03.06.c PST.01.03.01.a. PST.04.01.01.a ESS.03.03.01.b RST.9-10.4 WHST.9-10.2a WHST.9-10.4</p>

**Vocabulary:**

- Airlift
- Ammonia
- Binomial Name
- Biofilter
- Biological Filtration (Biofiltration)
- Biomedia
- Bulkhead Fitting
- Chemical Filtration
- Clarifier
- Coupling
- Cycling
- Dissolved Oxygen
- Filter Fiber
- Gasket
- Gravity Fed
- Mechanical Filtration
- MSDS
- Nitrate
- Nitrite
- Nitrobactor
- Nitrogen
- Nitrosomonas
- Production Aquaculture
- Production/Culture Tank
- PVC
- Re-Circulating System
- Settling Tank
- Siphon
- Stand Pipe
- Submersible Pump

### **Assessments:**

- Re-Circulating System Construction Rubric
- Re-Circulating Systems Maintenance Assessments
- Class Participation Rubric
- Assignments: Water Testing, Components, Forces, Production Species, Nitrogen Cycle, Nitrogen Graph, and Water Analysis
- Quizzes: Nitrogen Cycle, Water Testing, Re-Circulating Systems, Production Species
- Water analysis – Water Testing Safety Rubric and Water Assessment Rubric
- Journal Sections 1-10
- Unit Test

### **Resources/Materials:**

- Aquatic Systems Engineering: Devices and How they Function
- Fundamentals of Aquaculture: Step by Step Guide to Commercial Aquaculture
- Text: Aquaculture Science, Second Edition. Parker. Delmar, 2002
- Production Tanks
- Production Fish – Catfish (*Ictalurus punctatus*), Tilapia (*Oreochromus niloticus*), Koi (*Cyprinus carpio*), and Comet Goldfish (*Carassius auratus*)
- Re-Circulating Systems Equipment and Materials
- Plumbing Tools
- PVC plumbing materials/adhesives
- Submersible pumps, aerators, tubing and airstones
- Water Testing Safety Equipment and Kits
- Journals

**Title:** Animal Reproduction

**Unit Overview:**

This unit provides fundamental knowledge of the anatomy and physiology of mammalian and avian reproductive systems. Topics addressed include comparison of healthy and abnormal reproductive performance and current trends in reproductive management toward herd/flock improvement and profit.

**Suggested Time:** 45 days

**Ledyard High School Expectations for Student Learning:**

Read and write critically and effectively for a variety of purposes  
Employ problem solving skills effectively

**Agriculture, Food, and Natural Resources Standards:**

- AS.02.02.03.b.** Detail the processes of meiosis and mitosis in animal growth, development, health and reproduction.
- AS.02.02.05.a.** Describe the properties, locations, functions and types of animal organs.
- AS.05.01.01.b.** Describe the functions of major organs in the male and female reproductive systems.
- AS.05.02.01.b.** Summarize factors that lead to reproductive maturity.
- AS.05.02.02.b.** Evaluate reproductive problems that occur in animals.
- AS.05.03.01.b.** Explain the advantages of using genetically superior animals in the production of animals and animal products.
- AS.05.03.02.b.** Explain the processes of natural and artificial breeding methods.
- AS.05.03.03.a.** Explain the use of quantitative breeding values (e.g., EPDs) in the selection of genetically superior breeding stock.
- AS.05.03.04.b.** Explain the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer.
- AS.05.03.05.b.** Explain the materials, methods and processes of artificial insemination.

**Common Core State Standards:**

- RST.9-10.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics
- WHST.9-10.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience

Objectives	Required Activities/ Suggested Activities	AFNR Standards/CCSS
Recognize the value of selective breeding in a livestock program.	<ul style="list-style-type: none"> <li>In a brief paragraph, explain the ways in which an understanding of animal reproduction and selective breeding practices is important in modern agricultural practice.</li> </ul>	AS.05.03.03.a AS.05.03.01.b. WHST.9-10.4
Locate and indicate the function of the organs of the male and female reproductive tracts.	<ul style="list-style-type: none"> <li>Identify organs and anatomical features of bovine, porcine and avian male and female reproductive tracts from drawings.</li> <li>Describe the physiology of the organs of male and female reproductive tracts.</li> <li>Identify organs and anatomical features of male and female reproductive tract samples from a packing house.</li> </ul>	AS.02.02.05.a. AS.05.01.01.b.
Illustrate the steps in the formation and development of male and female gametes.	<ul style="list-style-type: none"> <li>Diagram and described the sequence of events in spermatogenesis.</li> <li>Diagram and described the sequence of events in oogenesis.</li> <li>Diagram and describe the estrous cycle including a description of the process of ovulation and estrus.</li> </ul>	AS.02.02.03.b. AS.05.01.01.b. AS.05.02.01.b. RST.9-10.4 WHST.9-10.4
Differentiate between natural service and artificial insemination.	<ul style="list-style-type: none"> <li>Compare and contrast natural service and artificial insemination as methods for breeding livestock. Describe the advantages and limitations of both.</li> <li>Differentiate between fertilization and conception.</li> </ul>	AS.05.03.02.b. AS.05.03.04.b. RST.9-10.4 WHST.9-10.4
Summarize the stages of embryo and fetal development in livestock.	<ul style="list-style-type: none"> <li>Arrange descriptions of the fundamental stages of embryo and fetal development in sequential order.</li> <li>Describe the difference between monotoccus/ polytoccus animals.</li> </ul>	AS.05.01.01.b. WHST.9-10.4

Identify abnormalities in parturition and suggest corrective measures in dystocia situations.	<ul style="list-style-type: none"> <li>• Describe normal parturition.</li> <li>• Define dystocia</li> <li>• Describe in writing possible solutions to abnormal birthing positions.</li> </ul>	AS.05.02.02.b. WHST.9-10.4
Employ prudent care of mother and offspring following parturition.	<ul style="list-style-type: none"> <li>• List elements of postpartum care, explaining their importance for animal health.</li> </ul>	AS.05.02.02.b.

**Vocabulary:**

- Allele
- Artificial insemination
- Dominant
- Dystocia
- Estrous cycle
- Estrus
- Fertilization
- Gamete
- Gene
- Heterozygous
- Homozygous
- Monotoccus
- Natural service
- Ovulation
- Ovulation
- Parturition
- Polytoccus
- Postpartum
- Recessive
- Selective breeding

**Assessments:**

- Quizzes and tests
- Special project
- Lab activities
- Class assignments

**Resources/Materials:**

- Ensminger; Animal Science
- Cullison; Livestock Management; 2012
- Guest speaker
- Male and female reproductive tracts from packing house

