Curriculum: Foundations of Plant and Soil Science

Curricular Unit: Careers

Instructional Unit: A. **Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society**

Standard Alignments (Section 2)

MGGLE: CD.7.B (Gr. 11)
SSCLE: ECP.4.A
National AFNR Standards: CS.03.01.01a,b ; CS.03.01.02.a,b
Knowledge: (CA) 1,4,7 (SS) 6
CCSS: 11-12.WHST.4; 11-12.WHST.5; 11-12.WHST.6
NETS: 1b; 6a,b
Performance: 1.4, 1.8, 1.10, 2.1

Unit (Section 3)

Learning Targets:

- Use basic technical and business writing skills
- Select the appropriate form of technical and business writing or communication for a specific situation
- Describe the various types and uses of resumes
- Prepare a resume

Instructional Strategies:

- Students will:
  - use iPads on a daily basis, including using an instructional platform such as:
    - Edmodo
    - Google Classroom
  - work and add production items to Missouri Connections web portfolio
- Evaluation and discussion, along with student production of:
  - sample resumes
  - job applications
  - cover letters
  - thank you letters
- Guest speaker from the agribusiness industry on interview skills and what they are looking for in an interview if hiring high school help

Board Approved 8-3-15

Assessments/Evaluations:

- Formative:
  - Activities individually and in groups analyzing:
    - sample cover letters
    - job applications
    - resumes
    - thank you letters
  - Instructor feedback and comments on summative pieces in development stage
- Summative – assessed using a scoring guide:
  - Cover letters
  - Job application
  - Resumes
  - Thank you letters

Sample Assessment Questions:

- Give a copy of one of the following: a resume, cover letter, job app, and/ or thank you letter.
  - What are 2 strengths of the given document?
  - What are 2 suggestions you would give them to improve the document?
  - What is the purpose of a cover letter?

Instructional Resources/Tools:

- Nichols Career Center handbook on *Getting Hired*
- Guest speaker on interviewing
- English instructor
- Sample:
  - cover letters
  - resumes
  - job applications
  - thank you letters

  found online appropriate for use

Cross Curricular Connections:

- ELA:
  - Technical reading
  - Technical writing
  - Career research

Depth of Knowledge (Section 5)

DOK: 4

Board Approved 8-3-15

Curriculum: Foundations of Plant and Soil Science

Curricular Unit: Leadership

Instructional Unit: B. Acquire the skills necessary to positively influence others and the agriculture industry

Standard Alignments (Section 2)

MGGLE: PSD.2.A (Gr. 9); PSD.2.B (Gr. 11)
SSCLE: PPGS.2.A (Government)
HEGLE: HME.4.A
National AFNR Standard: CS.01.02.01a; CS.01.06.01b
Knowledge: (CA) 1,3
CCSS: 9-10.SL.1; 9-10.SL.4
NETS: 1a; 2b
Performance: 1.2, 4.3

Unit (Section 3)

Learning Targets:

- Demonstrate proper parliamentary procedure
- Identify techniques used to work with and manage team members with varying strength and weaknesses
- Develop a plan that includes specific goals for leadership and personal growth
- Identify styles and characteristics of effective leadership

Instructional Strategies:

- Students will use iPads on a daily basis, including using an instructional platform such as:
  - Edmodo
  - Google Classroom
- Leadership style inventories
- Small group tasks and team building activities
- Teacher-led discussion on individual goal setting using the SMART method
- Guest speaker: Current or former FFA officer to talk about what leadership means to them and how they use it

Assessments/Evaluations:

- Formative:
  - Reflection sheets on leadership activities
  - Teacher observation of activities
  - Student set SMART Goals
- Summative: Leadership quiz

Board Approved 8-3-15

Sample Assessment Questions: • Write a SMART goal that related to something physical. • Define leadership.
Instructional Resources/Tools: • Leadership assessment tool and resources • SMART Goal App • Leadership definition PowerPoint (from current Ag 2 curriculum)

Cross Curricular Connections:
 	
• Social Studies: Process of government
• Health:
  • Decision making
  • Problem solving
• English: Technical writing

Depth of Knowledge (Section 5)

DOK: 2

Curriculum: Foundations of Plant and Soil Science

Curricular Unit: Plant Identification

Instructional Unit: C. **Identify and classify plants used for various agriculture and food items**

Standard Alignments (Section 2)

SCCLE: SC4.1.B (Biology)
National AFNR Standards: PS.01.01.01a-c; PS.01.01.02a,b
Knowledge: (CA) 6 (SC) 3
CCSS: 9-10.SL.1; 9-10.SL.2; 9-10.SL.4
NETS: 1c
Performance: 1.10, 3.4

Unit (Section 3)

Learning Targets:

- Classify agricultural plants according to the hierarchical classification system, life cycles, plant use and as monocotyledons or dicotyledons
- Describe the morphological characteristics used to identify agricultural plants
- Identify agriculturally important plants by common names

Instructional Strategies:

- Students will use iPads on a daily basis, including using an instructional platform, such as:
  - Edmodo
  - Google Classroom
- Classroom discussion/activities :
  - Identification of specific plants and look fors
  - Monocot vs. dicots
  - Sectors of plant science
  - Plant life cycles
- Mini projects/activities including "Plant ID" section taught to a group or whole class
- Possible guest speaker: Crop speaker speaking about what and how they use different plants
- Students will create a:
  - "new plant" including required information on it's identification
  - video or visual to aid in remembering plant ID

Board Approved 8-3-15

Assessments/Evaluations:

- Formative:
  - Bell questions and exit activities to check knowledge
  - Plant ID question and answer
  - Teacher observation
- Summative:
  - Visual to remember part of plant ID scored using scoring guide
  - Creating Plant of the Future scored on scoring guide
- Written assessment

Sample Assessment Questions:

- _____ is a herbaceous plant that is grown for its edible parts such as leaves, stems, seeds or roots.
  a. A grain crop
  b. A legume
  c. A vegetable
  d. A fruit
- _____ are non-woody plants that have parallel veins in their leaves.
  a. Grasses
  b. Legumes
  c. Sucrose
  d. Fibers crops
- TRUE or FALSE: A forage is a nitrogen fixating plant.
- TRUE or FALSE: Pomology is the science of producing fruits.

Instructional Resources/Tools:

- IML Plant Science curriculum
- MyCAERT curriculum reference
- NAAE Communities of Practice

Cross Curricular Connections:

- Science: Biology – plant classification and traits
- English: Technical reading

Depth of Knowledge (Section 5)

DOK: 4

Curriculum: Foundations of Plant and Soil Science

Curricular Unit: Plant Anatomy and Physiology

Instructional Unit: D. **Explain the parts and functions of plant cells, tissues and parts as well as key processes happening in plants**

Standard Alignments (Section 2)

GLE/CLE: SC3.3.D; SC4.1.C (Biology)
National AFNR Standards: PS.01.02.02b; PS.01.02.03a,b; PS.01.02.04a,b; PS.01.02.05a,b; PS.01.02.06a; PS.01.03.01b; PS.01.03.02a,b
Knowledge: (CA) 6 (SC) 5
CCSS: 9-10.SL.1; 9-10.SL.2; 9-10.SL.4
NETS: 6b
Performance: 1.3, 2.1

Unit (Section 3)

Learning Targets:

- Identify plant cells, tissues, and organelles including morphology and functions (Roots, Stems, Leaves, Flowers, Seeds and Fruit)
- Describe the processes of translocation
- Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis
- Explain cellular respiration and its importance to plant life

Instructional Strategies:

- Students will use iPads on a daily basis, including using an instructional platform such as:
  - Edmodo
  - Google Classroom
- Classroom discussion/activities:
  - Cell basics
  - Plant anatomy
  - Leaves and tissues
  - Types of plant cells
  - Flower dissection to look at flower parts
  - Microscopes: Prepared slides

- Mini projects/activities include:
  - Cell Cookie – Build and label a plant cell using a giant sugar cookie and candy
  - Leaf tissue anatomy
  - Flower structure coloring
  - Labeling plant parts
  - Roots vs. shoots
  - Making Play Doh flowers
- Videos: Used for review/re-teaching
- "Building on their Plant of the Future" from Unit C: *Super Plants* – students will build a plant cell model and a full scale model of their plant and present it to the class, explaining:
  - parts/functions
  - what makes it unique

Assessments/Evaluations:

- Formative:
  - Cell cookie and presentation
  - Lab reports
  - Self evaluation
  - Peer evaluation
  - Group evaluation
  - Teacher observations
- Summative:
  - "Building on their Plant of the Future" from Unit C: Super Plants – students build a plant cell model and a full scale model of their plant and present it to the class, explaining parts/functions and what makes it unique
  - Written assessment

Sample Assessment Questions:

- Which organelle would you expect to find in plant cells but not animal cells?
  a. mitochondria
  b. chloroplast
  c. ribosome
  d. smooth endoplasmic reticulum
- Which two of the following are transport tissues in plants?
  a. Xylem and phloem
  b. Leaves and roots
  c. Xylem and roots
  d. Leaves and phloem
- The main function of the leaf in a flowering plant is to:
  a. pollinate the plant.
  b. support the plant.
  c. make food during photosynthesis.
  d. produce seed for sexual reproduction.

Board Approved 8-3-15

Instructional Resources/Tools:

- IML Plant Science curriculum
- MyCAERT curriculum reference
- NAAE Communities of Practice
- Leaf tissue models (in cabinet in classroom)
- Flower model with labeled parts (see Carl's room)
- Microscopes and prepared slides
- Dissecting kits and trays

Cross Curricular Connections:

- ELA:
  - Research
  - Speaking/presentation
  - Reading and following complex multistep procedures (labs)
- Math:
  - Measurement
  - Graphing
- Fine Arts: 3D modeling
- Science: Biology – plant reproduction

Depth of Knowledge (Section 5)

DOK: 3

Curriculum: Foundations of Plant and Soil Science

Curricular Unit: Plant Reproduction

Instructional Unit: E. Create a management plan for growing an agriculture plant for various uses

Standard Alignments (Section 2)

SCCLE: SC3.3.A-D (Biology)
National AFNR Standards: PS.03.01.01a,b; PS.03.02.01a; PS.03.02.02a; PS.03.03.01a,b
Knowledge: (CA) 6 (SC) 5
CCSS: 9-10.SL.1; 9-10.SL.2; 9-10.SL.4
NETS: 6b
Performance: 1.3, 2.1

Unit (Section 3)

Learning Targets:

- Explain pollination, cross-pollination and self-pollination of flowering plants
- Diagram the process of plant fertilization
- Demonstrate sowing techniques and provide favorable conditions for seed germination
- Identify the difference between monocots and dicots, including planting and techniques
- Demonstrate asexual plant propagation methods on best-use plants

Instructional Strategies:

- Students will use iPads on a daily basis, including using an instructional platform, such as:
  - Edmodo
  - Google Classroom
- Classroom discussion/ activities:
  - Introduction to DNA/genetics
  - Asexual and sexual reproduction in plants
  - Punnett squares
  - Planting and growing different seeds
- Mini projects/activities include:
  - Evolution of a plant species (e.g., How is corn different now than when Indians used it?)
  - Germination lab
  - Various asexual plant propagation methods

Board Approved 8-3-15

- Video: Differences in Pollination
- Possible guest speaker: Lincoln University researcher to focus on plant genetics and reproduction
- Students will create an informational brochure with required information on how to grow plants to produce seeds through asexual methods

Assessments/Evaluations:

- Formative:
  - Lab reports
  - Self evaluation
  - Peer evaluation
  - Teacher observations
  - Feedback on in class activities
- Summative:
  - Brochure on growing a seed – assessed using a scoring guide
  - Written assessment

Sample Assessment Questions:

- Sally has asked you what she should plant in her garden. Select one plant to tell her about. She needs to know the plant name, the temperate requirement, how deep to plant and how far to space her plants. What would you tell her?
- When does fertilization happen?
  a. When the pollen gets on the pollinator
  b. When the pollen is deposited on the stigma
  c. When the pollen reaches the ova or egg
  d. When the pollen is made on the anther
- The _____ of the flower becomes the fruit.
  a. Anther
  b. Bud
  c. Ovary
  d. Petal

Instructional Resources/Tools:

- IML Plant Science curriculum
- MyCAERT curriculum reference
- NAAE Communities of Practice
- "Garden Genetics" NSTA Press Book
- Various online research/resources

Cross Curricular Connections:

- ELA:
  - Research
  - Speaking/presentation
  - Reading:
    - and following complex multistep procedures (labs)
    - in content area
- Science: Biology – plant reproduction

Board Approved 8-3-15

Depth of Knowledge (Section 5)

DOK: 3

Curriculum: Foundations of Plant and Soil Science

Curricular Unit: Environmental Factors' Effect on Plants

Instructional Unit: F. **Identify and explain how various environmental changes affect specific plants**

Standard Alignments (Section 2)

SCCLE: SC3.3.A-D (Biology)
National AFNR Standards: PS.02.01.01a; PS.02.01.02a; PS.03.03.01a,b;
Knowledge: (CA) 6
CCSS: 9-10.SL.1; 9-10.SL.2; 9-10.SL.4; 9-10.RST.3; 9-10.WHST.6; 9-10.WHST.7; 9-10.WHST.8
NETS: 1c
Performance: 1.10, 3.4

Unit (Section 3)

Learning Targets:

- Describe the qualities of light that affect plant growth
- Describe the effects of air, temperature, and water on plant metabolism and growth
- Identify types of plant pests and disorders
- Identify major local weeds, insect pests and infectious and noninfectious plant diseases
- Describe life cycles and damage caused by plant pests and diseases
- Identify the elements which are necessary for plant growth

Instructional Strategies:

- Students will use iPads on a daily basis, including using an instructional platform such as:
  - Edmodo
  - Google Classroom
- Classroom discussion/activities:
  - Types and categories of pests
  - Pest lifecycles
- Mini projects/activities:
  - Labs altering plant environments
  - "How a specific natural element affects plants" mini presentation from student groups
  - Specific nutrient research presentation
  - Mystery pest activity
- Videos for clarification and reinforcement when needed

Board Approved 8-3-15

- Possible guest speaker:
  - IPM specialist from Lincoln or another University
  - Weed specialist from the Conservation Department
- Students will create:
  - an Integrated Pest Management Plan for a specific pest to plants
  - a guide for a farmer on factors needed to grow a plant crop

Assessments/Evaluations:

- Formative:
  - Lab reports
  - Self evaluation
  - Peer evaluation
  - Teacher observations
  - Mystery pest feeds
  - Feedback on in-class activities
- Summative:
  - Assessed using a scoring guide:
    - Integrated Pest Management Plan
    - Crop Production Guide for a new farmer
  - Written assessment

Sample Assessment Questions:

- A poinsettia blooms in the fall when light time is shortened making this a _____ plant.
  a. long day
  b. warm season
  c. cool season
  d. short day
- What elements are vital to plants but come in abundance from the atmosphere?
  a. C, H, O
  b. N, P, K
  c. Ca, Mg, S
  d. B, Fe, Zn
- Matching: Managing pests (5 points)_____

_____1. Genetic control	A. Utilizing pesticides
_____2. Chemical control	B. Altering DNA to resist
_____3. Cultural control	C. Using natural enemies
_____4. Biological control	D. Physical removal of pest
_____5. Mechanical control	E. Make unsuitable environment

Board Approved 8-3-15

Instructional Resources/Tools:

- Curriculum:
  - IML Plant Science
  - Greenhouse Mgt.
- MyCAERT curriculum reference
- NAAE Communities of Practice
- University of MO Extension publications
- Various online research/resources

Cross Curricular Connections:

- ELA:
  - Research
  - Speaking/presentation
  - Reading:
    - and following complex multistep procedures (labs)
    - in content area
- Science – Environmental factors':
  - affect on plants
  - interactions between species

Depth of Knowledge (Section 5)

DOK: 4

Curriculum: Foundations of Plant and Soil Science

Curricular Unit: Soil Formation

Instructional Unit: G. **Describe what and how various soils were made**

Standard Alignments (Section 2)

SCCLE: SC5.1.A-C (Earth & Space Science)
National AFNR Standards: ESS.03.02.01a; ESS.03.02.02a,b; ESS.03.02.03a
Knowledge: (SC) 6
CCSS: 9-10.SL.1; 9-10.SL.2; 9-10.SL.4
NETS: 1c
Performance: 1.3

Unit (Section 3)

Learning Targets:

- Explain the process of soil formation
- Describe the biodiversity found in soil and the contribution of biodiversity to the physical and chemical characteristics of soil
- Relate the activities of microorganisms in soil environmental service systems
- Explain how the physical qualities of the soil influence the infiltration and percolation of water
- Describe a soil profile

Instructional Strategies:

- Students will use iPads on a daily basis, including using an instructional platform such as:
  - Edmodo
  - Google Classroom
- Classroom discussion/activities:
  - What soil is made of
  - Many uses of soil
  - Soil Structure
  - Soil Horizons
- Mini projects/activities:
  - Soil Texturing lab
  - Lab how soil is formed
  - There is more than brown-soil color and what it means
  - Examining soil from the naked eye to under a microscope
  - Soil sample analysis
- Video: What Makes up Soil?

Board Approved 8-3-15

- Possible guest speaker: Soil scientist
- Students will create a soil analysis guide or flow chart

Assessments/Evaluations:

- Formative:
  - Lab reports
  - Teacher observations
  - Soil color share out
  - Feedback on in-class activities
- Summative:
  - Soil analysis guide – assessed using a scoring guide
  - Written assessment

Sample Assessment Questions:

- What gives a soil a dark color and is found primarily in the surface layer of the soil?
  a. alluvium
  b. loess
  c. organic matter
  d. sand
- When the ribbon method of determining soil texture is used, what soil texture produces a long, pliable ribbon?
  a. coarse textured
  b. fine textured
  c. medium textured
  d. moderately coarse textured
- List three examples of biological life that might be found in soil.
- Soil is composed of the following components: (4 points)
  a. _____ percent mineral matter
  b. 5 percent _____
  c. _____ percent water
  d. 25 percent _____

Instructional Resources/Tools:

- IML Soil Science: Making Artificial Soil – soil texturing chart
- Soil sample kit from MSU
- MyCAERT curriculum reference
- NAAE Communities of Practice
- University of MO Extension Publications
- Various online research/resources

Board Approved 8-3-15

Cross Curricular Connections:

- ELA:
  - Research
  - Speaking/presentation
  - Reading:
    - and following complex multistep procedures (labs)
    - in content area
- Science: Earth composition

Depth of Knowledge (Section 5)

DOK: 3

Curriculum: Foundations of Plant and Soil Science

Curricular Unit: Land Usage Based on Soil

Instructional Unit: H. Create a usage plan for a plot of land based on its soil composition

Standard Alignments (Section 2)

SCCLE: SC1.1.H; SC5.3.A,B (Biology)
National AFNR Standards: ESS.03.02.03b
Knowledge: (SC) 6
CCSS: 9-10.SL.1; 9-10.SL.2; 9-10.SL.4
NETS: 1c
Performance: 1.3

Unit (Section 3)

Learning Targets:

- Identify the physical qualities of the soil that determine its use for environment service systems
- Prepare and read results from a soil sample
- Identify ways to conserve and manage soil
- Describe the environmental impact of soil and water management

Instructional Strategies:

- Students will use iPads on a daily basis, including using an instructional platform such as:
  - Edmodo
  - Google Classroom
- Classroom discussion/activities:
  - Calculating needed soil amendments
  - Soil uses
  - Soil and water interactions and relationships
- Mini projects/activities:
  - Taking a soil sample
  - Reading and analyzing soil
  - Lab in relationship of soil and water in an area
- Videos for re-teaching and reinforcement
- Possible guest speaker: Entry event person who has area that they want to repurpose for a specific use
- Students will create suggestions in written and conversation form as to how a person should use an area – assessed using a scoring guide

Assessments/Evaluations:

- Formative:
  - Lab reports
  - Self evaluation
  - Peer evaluation
  - Teacher observations
  - Soil analysis
  - Feedback on in class activities
- Summative:
  - Recommendation for land use, written and verbal – assessed using a scoring guide
  - Written assessment

Sample Assessment Questions:

- Compare and contrast the results from your soil sample to this new sample. Where would you rather plant? Why? Back up your answer with four specific details.
- How would putting ions into the soil affect the soil's pH? Please give examples of adding both positive and negative ions.

Instructional Resources/Tools:

- IML Soil Science
- MyCAERT curriculum reference
- NAAE Communities of Practice
- University of MO Extension Publications
- Various online research/resources

Cross Curricular Connections:

- ELA:
  - Research
  - Speaking/presentation
  - Reading:
    - and following complex multistep procedures (labs)
    - in content area
- Science: Earth composition and how it is used by humans

Depth of Knowledge (Section 5)

DOK: 4