

Agricultural Science II

Instructional Framework

An instructional framework provides educators with a list of benchmark statements aligned to Common Core and national content area standards for a given course or program. The Missouri Agricultural Science II Instructional Framework lists a sequence of content, organized into distinct units of instruction. Sample activities and potential Common Core related enhancements are provided.

	Common Core Standards	National Standards (AFNR)	Activities	Enhancements
A. Premier Leadership: Acquire the skills necessary to positively influence others.		CS.01		
1. Demonstrate FFA, SAE, and classroom instruction as an intracurricular part of the Agricultural Education Program.			Create a poster that incorporates the three circles and illustrates how they are related.	Students will develop a career profile that includes how classroom instruction, FFA and SAE and how they are incorporated into each other. This plan will be peer edited and revised as needed.
2. Revise their personal plan of study for their Agricultural Education Program including classroom instruction, FFA and SAE.			Complete a worksheet that outlining the students future goals and plan of study.	
3. Demonstrate proper parliamentary procedure.	SL.9-10.1, SL.9-10.4		Participate in a demonstration meeting following Parliamentary Procedures and present a logical, realistic, and convincing discussion based on a topic determined by the instructor.	Research a current issue and write a one page position paper outlining their position and substantiating it with evidence gathered from multiple sources. Work with the English department to assess the paper using proper English writing.
4. Demonstrate effective public speaking and communication skills by leading a group discussion.	SL.9-10.1, SL.9-10.4, WHST.9-10.2, WHST.9-10.4, WHST.9-10.5, WHST.9-10.7			
5. Demonstrate the ability to complete a task without assistance.		CS.01.01.01 b	Group students together to design a community service project. The students will plan all aspects of the project including setting goals, budgeting, and evaluation. The groups will then present their ideas with the class determining the one that is the	The class will then conduct the community service plan according to the plans presented. If there are suggestions for change after being peer reviewed, those changes will be made. At the conclusion of the project, the students will evaluate the success or failure of the project and the impact of the project on the members of the community. The student will also reflect on their role in the project and do a self-inspection
6. Work independently and in group settings to accomplish a task.		CS.01.01.01 c		
7. Create measurable objectives for a given situation.		CS.01.01.02 b		
8. Assess outcomes to determine success for a task.		CS.01.01.02 c		

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9. Assess individual strengths and weaknesses in planning.		CS.01.01.03 b	most feasible.	of their strengths and weaknesses. Reflection paper will be evaluated based on the English language rules.
10. Implement an effective project plan.		CS.01.01.03 c		
11. Use appropriate and reliable resources to complete an action or project.		CS.01.01.04 b		
12. Identify the strengths/talents of team members needed to achieve a desired task.		CS.01.01.06 a		
13. Identify techniques used to work with and manage team members with varying strengths and weaknesses.		CS.01.02.01 a		
14. Explain human relation skills such as compassion, empathy, unselfishness, trustworthiness, reliability and being friendly.		CS.01.02.01 a		
15. Engage in a conversation with others to identify their interests and aspirations.		CS.01.02.02 a		
16. Identify the steps/strategies to successfully coach/mentor others.		CS.01.02.03 a		
17. Describe personal values.		CS.01.04.02 a		
18. Identify the consequences of personal actions.		CS.01.04.03 a		
19. Explain the benefits of mutual respect.		CS.01.04.04 a		
20. Describe the benefits of serving others.		CS.01.04.06 a		
21. Explain the reasons for having a leadership/personal growth plan.		CS.01.06.01 a		
22. Develop a plan that includes specific goals for leadership and personal growth.		CS.01.06.01 b		
23. Describe the value of being a life-long learner and the need for continuous development.		CS.01.06.05 a		

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B. Career Success: Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.		CS.03		
1. Use basic technical and business writing skills.	W.9-10.4 RST.9-10.3	CS.03.01.01 a	Have students create a cover letter and resume using proper form as covered in the unit.	At the completion of the cover letter and resume, student will complete a job application and a mock interview to demonstrate competency in area of study.
2. Select the appropriate form of technical and business writing or communication for a specific situation.	RI.9-10.2 RST.9-10.1	CS.03.01.01 b		
3. Describe the various types of uses of resumes.	RST.9-10.1	CS.03.01.02 a		
4. Prepare a resume.	W.9-10.4 RST.9-10.3	CS.03.01.02 b		
C. Examine the importance of health, safety and environmental management systems in organizations and their importance to performance and regulatory compliance.		CS.06		
1. Use proper safety practices/personal protective equipment.		CS.06.02.01 a		
2. Demonstrate the importance of safety, health and environmental practices in the workplace.		CS.06.03.01 a		

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D. Technical Skills: Use tools, equipment, machinery and technology appropriate to work within areas related to AFNR.		CS.08		
1. Identify standard tools, equipment and safety procedures related to a specific task.		CS.08.01.01 a		
2. Set up/adjust tools and equipment related to complete a specific task.		CS.08.01.01 b		
3. Use tools and equipment appropriately to complete a specific task.		CS.08.01.01 c		
4. Follow operating instructions related to specific tools and equipment needed to complete a task.		CS.08.01.02 a		
5. Use the appropriate procedures for the use and operation of specific tools and equipment.		CS.08.02.01 a		
6. Demonstrate safety precautions when using tools for a specific task around bystanders.		CS.08.02.01 b		
E. Utilize recordkeeping to accomplish AFNR business objectives while complying with laws and regulations.		ABS.03		
1. Complete receipt and expenditure forms, cash flows, beginning and ending inventory, financial and net worth statements.	N-Q.1 N-Q.2		Students will use the Missouri Agricultural Education record book to maintain SAE financial records.	Have the students complete a math worksheet practicing calculating net worth, cash flow, receipts and expenditures.
2. Fill out supplemental and leadership pages.	N-Q.1 N-Q.2			
3. Evaluate SAE Programs through FFA Awards and Degree Programs.	N-Q.1 N-Q.2			

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F. Assess accomplishment of goals and objectives by an AFNR business.				
1. Maintain accounting information utilizing the Missouri Ag. Record Book for Secondary Students to prepare an income statement, balance sheet and cash-flow analysis.	N-Q.1 N-Q.2	ABS.05.01.0 1b	Students will use the Missouri Agricultural Education record book to maintain SAE financial records.	
2. Interpret financial information for an SAE Project to determine profitability, net worth position, financial ratios, performance measures and ability to meet cash-flow requirements.	N-Q.1 N-Q.2	ABS.05.01.0 1c	Analyze Missouri Agricultural Education record book to determine profitability, net worth, financial ratios, performance measures, and meet cash-flow requirements.	
G. Apply scientific principles to environmental service systems.				
1. Explain the process of soil formation.	RST.9-10.2	ESS.03.02.0 1a	Complete worksheet identifying steps of soil formation.	Research the local type of soil looking at soil formation, biodiversity of soil, microorganisms, texture, structure, and other physical qualities that affect the soil. Students should organize the information in a written format and present it to the other students in the classrooms. Project will be evaluated utilizing rubric for a research paper.
2. Describe the biodiversity found in soil and the contribution of biodiversity to the physical and chemical characteristics of soil.	RST.9-10.4	ESS.03.02.0 2a	Complete worksheet to see value in microorganisms in soil.	
3. Relate the activities of microorganisms in soil to environmental service systems.	RST.9-10.4	ESS.03.02.0 2b		
4. Explain how the physical qualities of the soil influence the infiltration and percolation of water.	RST.9-10.2	ESS.03.02.0 3a	Analyze soil samples to determine texture and structure of soil.	
5. Identify the physical qualities of the soil that determine its use for environmental service systems.	RST.9-10.7 SL.9-10.2	ESS.03.02.0 3b	Analyze soil samples to determine the best use for the soil.	
H. Demonstrate techniques used to protect natural resources.		NRS.04		
1. Identify common insects and their characteristics.	RST.9-10.7 SL.9-10.2		Utilize picture to identify common insects in Missouri.	Create a presentation about 10 insects that includes characteristics, mouthparts, life cycles, and a picture and present to the class.

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1. Apply knowledge of plant classification, plant anatomy and plant physiology to the production and management of plants.		PS.01		
1. Explain systems used to classify plants.	RST.9-10.7	PS.01.01.01 a	Create a poster of the hierarchical classification of plants and illustrate a plants family.	Each student will create a plant collection that includes types of roots, types of leaf shapes, types of leaf margins, types of leaf attachments, and types of venation. For examples of these plant types and shapes, students can refer to lessons in the unit and outside sources to identify plant parts. Students will mount each specimen to a piece of paper in some manner. Each root or leaf should be labeled as to the category and the sample it represents.
2. Compare and contrast the hierarchical classification of agricultural plants.	SL.9-10.2 SL.9-10.4 RST.9-10.7	PS.01.01.01 b		
3. Classify agricultural plants according to the hierarchical classification system, life cycles, plant use and as monocotyledons or dicotyledons.	SL.9-10.2 SL.9-10.4	PS.01.01.01 c	Gather plant samples and separate the samples into categories based on their morphological characteristics.	
4. Describe the morphological characteristics used to identify agricultural plants.	RST.9-10.4	PS.01.01.02 a		
5. Identify agriculturally important plants by common names.	SL.9-10.2 SL.9-10.4	PS.01.01.02 b	Utilize pictures to identify important plants by common name.	
6. Identify plant cell organelles and their functions.	RST.9-10.4		Create a model of a plant cell illustrating organization and function.	
7. Identify the components, the types and the functions of plant roots.	SL.9-10.2 SL.9-10.4	PS.01.02.02 b	Create a poster outlining the types and functions of roots and outline the route water and nutrients take into the plant.	
8. Identify root tissues and explain the pathways of water and nutrients into and through the root tissues.	SL.9-10.2 SL.9-10.4	PS.01.02.03 a		
9. Identify the components and the functions of plant stems.	SL.9-10.2 SL.9-10.4	PS.01.02.03 a	Gather stems from monocots and dicots looking at the different arrangements of vascular bundles and the process of translocation.	
10. Describe the processes of translocation.	RST.9-10.4	PS.01.02.03 b		
11. Discuss leaf morphology and the functions of leaves.	SL.9-10.2 SL.9-10.4	PS.01.02.04 a	Gather a sample of leaves and classify them based on their morphological characteristics.	
12. Explain how leaves capture light energy and allow for the exchange of gases.	RST.9-10.2	PS.01.02.04 b		

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13. Identify the components of a flower, the functions of a flower and the functions of flower components.	SL.9-10.2 SL.9-10.4	PS.01.02.05 a	Gather a sample of flowers and classify them based on their morphological characteristics.	
14. Identify the different types of flowers and flower forms.	SL.9-10.2 SL.9-10.4	PS.01.02.05 b		
15. Explain the functions and components of seeds and fruit.	RST.9-10.22	PS.01.02.06 a	Gather a sample of seeds and fruit and classify them based on their morphological characteristics.	
16. Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis.	SL.9-10.2 RST.9-10.2	PS.01.03.01 b	Create a poster illustrating the process of photosynthesis and respiration.	Students will perform an experiment with multiple plants removing each component needed for plant growth and analyze the value of each. The student will keep a lab report of observations and present the findings in a presentation to the class.
17. Explain cellular respiration and its importance to plant life.	SL.9-10.2 RST.9-10.2	PS.01.03.02 a		
18. Explain factors that affect cellular respiration and identify the products and byproducts of cellular respiration.	SL.9-10.2 RST.9-10.2	PS.01.03.02 b		
19. Define primary growth and the role of the apical meristem.	RST.9-10.2	PS.01.03.03 a	Complete a worksheet about primary and secondary plant growth.	
20. Explain the process of secondary plant growth.	SL.9-10.2 RST.9-10.2	PS.01.03.03 b		
J. Prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients and soil on plant growth.		PS.02		
1. Describe the qualities of light that affect plant growth.	RST.9-10.2	PS.02.01.01 a	Complete a worksheet on the influence of light, air, temperature, and water on plant growth and metabolism.	Perform an experiment illustrating the effect of light, air, temperature, and water on plant growth and metabolism. Students will keep findings in a lab report and present information to others in the class in an organized manner.
2. Describe the effects of air, temperature and water have on plant metabolism and growth.	SL.9-10.2 SL.9-10.4 RST.9-10.2	PS.02.01.02 a		
K. Progate, culture, and harvest plants.		PS.03		
1. Explain pollination, cross-pollination and self-pollination of flowering plants.	SL.9-10.4	PS.03.01.01 a	Create a poster illustrating the process of pollination, self-	Students will work individually to conduct a seed germination experiment comparing the

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2. Diagram the process of plant fertilization.	RST.9-10.5 RST.9-10.7	PS.03.01.01 .b	pollination, and fertilization.	differences in growth patterns based on the variable to which the seeds are exposed. Each student will plant and care for approximately 10 seeds (e.g., corn or beans) to the instructor's specifications. Students will examine the plants each class period and record the differences (i.e., the height and appearance of the plant) in a chart that they design. Before the students plant their seeds, they must hypothesize what will happen to their seeds. At the end of the experiment, students will write a short summary of their findings. Assessment will be based on the overall content and presentation of the chart and summary. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.
3. Demonstrate sowing techniques and provide favorable conditions for seed germination.	SL.9-10.4 RST.9-10.9	PS.03.02.02 a	Have students sow seeds for use in the greenhouse.	
4. Explain the importance of starting with pest- and disease-free propagation material.	RST.9-10.9	PS.03.02.01 a		
5. Identify the difference between monocot and dicots.	RST.9-10.9		Create a Venn-Diagram illustrating the similarities and differences between monocots and dicots.	
6. Describe why planting techniques are different for monocots and dicots.	RST.9-10.9			
7. Identify types of plant pests and disorders.	RST.9-10.1	PS.03.03.01 a	Utilize pictures to have students identify plant pests and disorders.	Students will be assigned one plant pest and one plant disease. They will write a report on each that includes the effects the pest or disease has on the plant, warning signs the plant might exhibit to indicate the presence of the pest or disease, and a listing of any recommended treatments and their application methods. Students should include a picture with each report that illustrates the pest or disease. The reports also can be used to educate future students. Assessment will be based on the overall content and presentation of the reports. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.
8. Identify major local weeds, insect pests and infectious and noninfectious plant diseases.	RST.9-10.1	PS.03.03.01 b	Utilize seed samples to identify weed seed and pictures to identify infectious and noninfectious diseases. Have the student write a description of the life cycles and damage of plant pests and diseases.	
9. Describe life cycles and damage caused by plant pests and diseases.	RST.9-10.1 RST.9-10.4 RST.9-10.7			
L. Agriculture Mechanics for Ag II				
1. Identify criteria in selecting materials in agricultural construction/fabrication.		PST.04.03.0 1a		
2. Demonstrate skills for working with wood and/or metal.				

	Common Core Standards	National Standards (AFNR)	Activities	Enhancements
Power Tools				
1. Analyze the uses and safety procedures of common power tools used in woodworking.	RST.11-12.9 RST.11-12.4 L.11-12.6 SL.11-12.4 WHST.11-12.2		<p><u>Activity:</u> Students will identify, create and write a set of safety rules aligned with the technical process and safety of the power tools. Students will be evaluated on use of key terms and overall ability to explain entire procedure for using equipment.</p> <p><u>Assessment:</u> Students will construct simple project in woodworking/metalworking following the safety procedures lectured on during class. The students will have to follow the verbal, written, and visually demonstrated procedures. Examples: boot jack, bird house, receiving pin... refer to Missouri State Fair Ag Mechanics Contest.</p>	<p>English Enhancement: Add a component where student write a mass media story to a local newspaper about how not following safety procedures affected a local member of society. The newspaper article will be evaluated using a rubric from the English class teacher.</p>
2. Analyze the uses and safety procedures of common power tools used in metalworking.				
Arc Welding				
1. Identify basic safety and maintenance procedures for arc welding.	RST.11-12.9 L.11-12.6 SL.11-12.4 WHST.11-12.2			<p><u>Activity:</u> Students will create safety procedures to be followed while using the arc welder.</p> <p><u>Activity:</u> Students will use prior knowledge of how electrode symbols are used to determine correct rod for metal type and position.</p> <p><u>Activity:</u> Students will conduct simple science experiment by comparing different metals to their easy-ability to be welded. Examples: Compare Ferrous Metals to Nonferrous Metals.</p> <p><u>Assessment:</u> Using the technical processes taught during class students will demonstrate safety with Arc Welding while completing an Arc welding project. Reference Missouri State Fair Ag Mechanical Projects list for ideas.</p>
2. Describe the procedures used to control distortion during arc welding.				
3. Describe the factors in selecting and maintaining electrodes and safety lens.	RST.11-12.4			
4. Analyze the characteristics of different metals; include their ability to be welded.				
5. Demonstrate the procedures for making out-of-position welds using a shielded metal arc welder.				
Oxyacetylene Welding				

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1. Identify the basic safety and maintenance procedures for oxyacetylene welding.	RST.11-12.9 L.11-12.6 SL.11-12.4 WHST.11-12.2		Activity: Students will develop and follow a list of safety procedures and steps when conducting oxyacetylene welding.	English Modification: Students present safety rules using a variety of media sources and will be peer evaluated by other students within the class.
2. Weld with and without filler rods using an oxyacetylene outfit.	G-CO.1 G-CO.6 G-CO.7 G-CO.12 G-MG.1 G-MG.3 G-GMD.4 RST.11-12.9 SL.11-12.4		<u>Activity:</u> Student will compare welding with and without filler rod and the structural integrity of each using a standard break test. <u>Activity:</u> Students will use proper angles and distance to complete proper torch movements to complete weld. <u>Assessment:</u> will be based on the ability to safely and correctly perform the assigned procedures and on the accuracy of responses to the identification and written assessment portions of the activity.	Math Enhancement: WITH MACHINE UNPLUGGED. Have students use tools (protractor) to work in teams and measure each other's angles used when mock practicing welding.
3. Braze on mild steel using an oxyacetylene outfit.	G-CO.1 G-CO.6 G-CO.7 G-CO.12 G-MG.1 G-MG.3 G-GMD.4 RST.11-12.9 SL.11-12.4			
Tool Sharpening and Reconditioning				
1. Identify the safety procedures for tool sharpening and reconditioning.	RST.11-12.9 L.11-12.6 SL.11-12.4 WHST.11-12.2		<u>Activity:</u> Using reliable resources students will create a summary of safety procedures and equipment to be used during tool sharpening and reconditioning.	
2. Dress a grinding wheel.				<u>Assessment:</u> Students will be evaluated on ability to safely and correctly complete a tool sharpening or reconditioning task.

	Common Core Standards	National Standards (AFNR)	Activities	Enhancements
3. Sharpen a twist drill.	G-CO.1 G-CO.12		<u>Activity:</u> Students will use tools and angles (1) to check the correct cutting edge based on vertical and horizontal line connect with angles. Students will use the Tool Gauge to complete this activity (12)	
4. Sharpen a lawn mower blade.	G-CO.1		Activity: Students will determine 45 degree angles in order to properly sharpen the blade.	
5. Maintain a chain saw chain.	WHST.9-10.2		Activity: Student must read the operator's manual to determine correct tool, angle, shape, and proportions for the chain saw. Once they have identified the correct procedure students create visual aid to be used in matching chain saw to recommended procedure.	
Cold Metal Work				
1. Lay out cold metal.	G-CO.12		Activity: Students will properly identify tools to lay out cold metal and relate them to their use cross analyzing their alternative uses in other mathematical settings.	
2. Shape cold metal.	G-CO.1 G-GMG.1 G-GMG.3		Activity: Students must use knowledge of angles to shape metal to match design provided by instructor.	
3. Fasten cold metal.	RST.9-10.4		Activity: Students must use symbols and key terms to determine correct fastening device.	
Materials Selection, Plan Reading, and Interpretation.				

	Common Core Standards	National Standards (AFNR)	Activities	Enhancements
1. Describe how to choose and plan a project.	G-CO.1 G-CO.12 G-CO.6 RST.11-12.2 RST.11-12.3 RST.9-10.4 RST.11-12.9 SL.11-12.2 SL.9-10.4 L.9-10.6 WHST.11-12.2		Students will develop a construction plan for a project by making three scale drawings — one each for the top, front, and side of the project. Students must also devise a plan of procedure, a cutting bill of materials, and a purchasing bill of materials for a project. Assessment will be based on the completeness, accuracy, and appearance of the drawings and the overall thoroughness and accuracy of the plan of procedure and bills of materials.	
2. Interpret a working drawing.				
3. Prepare a working drawing.				
4. Identifying common building supplies using standard terms and sizes.				
Spray Painting and Finishing				
1. Identify the safety procedures for spray painting and finishing.	WHST.9-10.2		<u>Activity:</u> Students develop a safety procedure and visual.	
2. Demonstrate the procedures for spray painting and finishing.	RST.11-12.3 RST.11-12.4 RST.11-12.9 L.11-12.6		<u>Assessment:</u> Students will use equipment and materials discussed in class, such as sandpaper, brushes, and rollers, to prepare the surface of a project, prime the project, and paint it. Assessment will be based on the overall quality of the work and the ability to safely and correctly complete the project within the available time.	<u>Science Enhancement:</u> Students could use scientific process to conduct a product comparison between varying brands of spray painting. <u>Writing Connection:</u> Students explain using a lab report their results through the experiment.
3. Maintain spray painting and finishing equipment.	WHST11-12.2		<u>Activity:</u> Students will be evaluated on ability to properly clean equipment.	<u>Enhancement:</u> Write a list of procedures and technical processes to be completed when cleaning up.

Examples Aligned to Common Core Standards

The following instructional examples follow the expectations of the Agricultural Science II Instructional Framework and align to the Common Core standards.

Common Core English Language Arts and Literacy

Research a topic of interest that has a relation to agriculture and present a ten minute demonstration to classmates and answer up to five minutes of questions.

SL.9-10.1

SL.9-10.4

WHST.9-10.2

WHST.9-10.4

WHST.9-10.5

WHST.9-10.7

Participate in a demonstration meeting following Parliamentary Procedures and present a logical, realistic, and convincing discussion based on a topic determined by the instructor.

SL.9-10.1

SL.9-10.4

As a team, deliver a product sales presentation, conducted as a one-on-one interactive sale to a prospective consumer. This presentation should include a brochure developed by the team, a sample, or a demonstrated use of the actual product for the sales presentation.

W.9-10.4

Complete a job description form, resume, and job interview practicum for an entry-level retail sales position related to agricultural sales.

W.9-10.4

Codes for the Agriculture, Food, and Natural Resources standards are

ABS = Agribusiness Systems

AS = Animal Systems

CS = Life Knowledge and Cluster Skills

FPP = Food Products and Processing Skills

PST = Power, Structural, and Technical Systems

Codes for Common Core English Language Arts and Literacy are:

SL = Speaking and Listening

W = Writing

WHST = Writing for Literacy in History/Social
Studies, Science, and Technical Subjects

Codes for National Academic Content Standards are:

ELA = Standards for the English Language
Arts from the International Reading
Association and the National Council of
Teachers of English

M = Principles and Standards for School
Mathematics from the National Council
of Teachers of Mathematics

S = National Science Education Standards
from the National Academy of Sciences

SS = Expectations of Excellence: Curriculum
Standards for Social Studies from the
National Council for the Social Studies