



AGRONOMY SCIENCE

#01025

Description

This course provides the study of plant physiology and morphology and its relationship to growth, development and reproduction of crop and forage plants in the global environment. Topics include: seed identification, testing and grain grading, identification of agronomic crops and major weeds in crop production. Harvesting and handling will be emphasized. Supervised agricultural experience programs and leadership are integrated in the course. Career opportunities and educational preparation are examined. Learning activities are varied with classroom, laboratory and field experiences

Note: These courses can be taught for Agricultural Education credit only.

Grade 9-12

½ or 1 credit

Max Credit = 1

Standard 1	AGRICULTURE, FOOD, & NATURAL RESOURCES (AFNR) CLUSTER SKILLS	
Topic 1.5	<i>Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food, & Natural Resources career pathways.</i>	
Student Competencies		
	1.5.1	EVALUATE AND IMPLEMENT THE STEPS AND REQUIREMENTS TO PURSUE A CAREER OPPORTUNITY IN EACH OF THE AFNR CAREER PATHWAYS (E.G., GOALS, DEGREES, CERTIFICATIONS, RESUMES, COVER LETTER, PORTFOLIOS, INTERVIEWS, ETC.).
	1.5.1.1	Identify and summarize the steps to pursue a career in an AFNR pathway (e.g., self-assessment, set goals, etc.).
	1.5.1.2	Examine the educational, training, and experiential requirements to pursue a career in an AFNR pathway (e.g., degrees, certifications, training, internships, etc.).
	1.5.1.3	Research and summarize specific tools (e.g., resumes, portfolios, cover letters, etc.) and processes (e.g., interviews, applications, etc.) needed to pursue a career in an AFNR pathway.
	1.5.1.4	Create a personal plan outlining goals and steps to obtain a career in an AFNR pathway.
	1.5.1.5	Analyze personal skillset and create a plan for obtaining the required education, training, and experiences to obtain a career in an AFNR pathway.
	1.5.1.6	Assess personal goals, experiences, education, and skillsets and organize them to produce the appropriate tools and develop the skills to effectively communicate about one’s qualifications for an AFNR career.
	1.5.1.7	Evaluate progress toward AFNR career goals and identify opportunities for improvement and necessary adjustments to one’s plan of action.
	1.5.1.8	Implement one’s personal plan of action for obtaining the required education, training, and experiences and evaluate progress to identify opportunities for improvement and necessary adjustments.
	1.5.1.9	Evaluate, update, and improve a set of personal tools to reflect current skills, experiences, education, goals, etc. and complete the processes needed to pursue and obtain a career in an AFNR pathway.
	1.5.2	EXAMINE AND CHOOSE CAREER OPPORTUNITIES THAT ARE MATCHED TO PERSONAL SKILLS, TALENTS, AND CAREER GOALS IN AN AFNR PATHWAY OF INTEREST.
	1.5.2.1	Examine and categorize careers in each of the AFNR pathways.
	1.5.2.2	Research and describe careers in each of the AFNR pathways and choose potential careers connecting to personal interests and skills.
	1.5.2.3	Assess personal skills and align them with potential career opportunities in AFNR pathways.
	1.5.2.4	Assemble and analyze examples of careers and related statistics on a local, state, national, and global level.

	1.5.2.5	Interpret and evaluate the results of a personal career assessment and connect them to potential careers in AFNR pathways.
	1.5.2.6	Conduct interviews with career professionals within AFNR pathways and summarize the results.

Standard 8	PLANT SYSTEMS	
Topic 8.1	<i>Develop and implement a crop management plan for a given production goal that accounts for environmental factors.</i>	
	Student Competencies	
	8.1.2	PREPARE AND MANAGE GROWING MEDIA FOR USE IN PLANT SYSTEMS.
	8.1.2.2	Identify the categories of soil water.
	8.1.2.3	Describe the physical and chemical characteristics of growing media and explain the influence they have on plant growth.
	8.1.2.4	Discuss how soil drainage and water-holding capacity can be improved.
	8.1.2.5	Formulate and prepare growing media for specific plants or crops.
	8.1.2.6	Determine the hydraulic conductivity for soil and how the results influence irrigation practices.
	8.1.3	DEVELOP AND IMPLEMENT A FERTILIZATION PLAN FOR SPECIFIC PLANTS OR CROPS.
	8.1.3.1	Identify the essential nutrients for plant growth and development and their major functions (e.g., nitrogen, phosphorous, potassium, etc.).
	8.1.3.2	Discuss the influence of pH and cation exchange capacity on the availability of nutrients.
	8.1.3.3	Collect soil and plant tissue samples using generally accepted procedures and explain how incorrect sample collection will affect the results of a laboratory analysis.
	8.1.3.4	Identify fertilizer sources of essential plant nutrients; explain fertilizer formulations, including organic and inorganic; and describe different methods of fertilizer application.
	8.1.3.5	Research and summarize production methods focused on soil management (e.g., crop rotation, companion planting, cover crops, etc.).
	8.1.3.6	Summarize the impact of environmental factors on nutrient availability (e.g., moisture, temperature, pH, etc.).
	8.1.3.7	Analyze the effects of nutrient deficiencies and symptoms and recognize environmental causes of nutrient deficiencies.
	8.1.3.8	Contrast pH and cation exchange capacity between mineral soil and soilless growing media.
	8.1.3.9	Interpret laboratory analyses of soil and tissue samples.

	8.1.3.10	Calculate the amount of fertilizer to be applied based on nutrient recommendation and fertilizer analysis.
	8.1.3.11	Assess and describe the shorthand long-term effects production methods have on soil.
	8.1.3.12	Assess and describe the impact environmental factors have on a crop.
	8.1.3.13	Monitor plants for signs of nutrient deficiencies and prepare a scouting report to correct elements negatively affecting plant growth in a field or greenhouse.
	8.1.3.14	Adjust the pH of growing media for specific plants or crops.
	8.1.3.15	Prescribe fertilizer applications based on the results of a laboratory analysis of soil and plant tissue samples.
	8.1.3.16	Calibrate application equipment to meet plant nutrient needs.
	8.1.3.17	Devise a plan for soil management for a selected production method.
	8.1.3.18	Devise a plan to meet plant nutrient needs based on environmental factors present.
Topic 8.2	<i>Apply principles of classification, plant anatomy, and plant physiology to plant production and management.</i>	
	Student Competencies	
	8.2.2	APPLY KNOWLEDGE OF PLANT ANATOMY AND THE FUNCTIONS OF PLANT STRUCTURES TO ACTIVITIES ASSOCIATED WITH PLANT SYSTEMS.
	8.2.2.11	Apply knowledge of flower structure to differentiate between the types of flowers and flower inflorescence (e.g., complete, incomplete, perfect, imperfect).
	8.2.2.12	Analyze and categorize the major types of seeds and fruit.
	8.2.2.13	Apply the knowledge of cell differentiation and the functions of the major types of cells to plant systems.
	8.2.2.14	Correlate the active and passive transport of minerals into and through the root system to plant nutrition.
	8.2.2.15	Evaluate the function of the xylem, phloem, and cambium tissues and the impact on plant systems.
	8.2.2.16	Devise a plan for plant management practices that takes into account leaf structure and functions.
	8.2.2.17	Evaluate flower structures and analyze the impact of plant structure on plant breeding, production, and use.
	8.2.2.18	Evaluate the impact of different seed and fruit structures to plant culture and use.
Topic 8.3	<i>Propagate, culture, and harvest plants and plant products based on current industry standards.</i>	
	Student Competencies	
	8.3.1	DEMONSTRATE PLANT PROPAGATION TECHNIQUES IN PLANT SYSTEM ACTIVITIES.
	8.3.1.6	Examine and apply the process of plant pollination and/or fertilization.
	8.3.1.7	Handle seed to overcome seed dormancy mechanisms and to maintain seed viability and vigor.
	8.3.1.10	Compare and contrast the potential risks and advantages associated with genetically modified plants.
	8.3.1.11	Select and defend the use of pollination methods and practices used to maximize crop pollination.
	8.3.1.12	Conduct tests associated with seed germination rates, viability, and vigor.
	8.3.1.15	Evaluate the impact of using genetically modified crops on other production practices.

	8.3.2	DEVELOP AND IMPLEMENT A MANAGEMENT PLAN FOR PLANT PRODUCTION.	
	8.3.2.3	Determine seeding rate need for specified plant population or desired quantity of finished plants.	
	8.3.2.4	Observe and record environmental conditions during the germination, growth, and development of a crop.	
	8.3.2.5	Summarize the stages of plant growth and the reasons for controlling plant growth.	
	8.3.2.16	Analyze how mechanical planting equipment performs soil preparation and seed placement.	
	8.3.2.17	Adjust and calibrate mechanized seeding and/or planting equipment for desired seed application rate.	
	8.3.3	DEVELOP AND IMPLEMENT A PLAN FOR INTEGRATED PEST MANAGEMENT FOR PLANT PRODUCTION.	
	8.3.3.1	Identify and categorize plant pests, diseases, and disorders.	
	8.3.3.2	Diagram the life cycle of major plant pests and diseases.	
	8.3.3.3	Identify and summarize pest control strategies associated with integrated pest management and the importance of determining economic threshold.	
	8.3.3.4	Distinguish between risks and benefits associated with the materials and methods used in plant pest management.	
	8.3.3.5	Identify and analyze major local weeds, insect pests, and infectious and noninfectious plant diseases.	
	8.3.3.6	Predict pest and disease problems based on environmental conditions and life cycles.	
	8.3.3.7	Demonstrate pesticide formulations including organic and synthetic active ingredients and selection of pesticide to control specific pest.	
	8.3.3.8	Examine and apply procedures for the safe handling, use, and storage of pesticides including personal protective equipment and reentry interval.	
	8.3.3.9	Devise solutions for plant pests, diseases, and disorders.	
	8.3.3.10	Design and implement a crop scouting program.	
	8.3.3.11	Employ pest management strategies to manage pest populations, assess the effectiveness of the plan and adjust the plan as needed.	
	8.3.3.12	Evaluate environmental and consumer concerns regarding pest management strategies.	
	8.3.4	APPLY PRINCIPLES AND PRACTICES OF SUSTAINABLE AGRICULTURE TO PLANT PRODUCTION.	
	8.3.4.1	Compare and contrast the alignment of different production systems (conventional and organic) with USDA sustainable practices criteria.	
	8.3.4.2	Summarize national/international and local/regional food production systems.	
	8.3.4.3	Identify and summarize impacts of environmental conditions on plants.	
	8.3.4.4	Analyze the alignment of modern technologies used in production systems (e.g., precision agriculture, GE crops, etc.) with USDA sustainable practices criteria.	
	8.3.4.5	Compare and contrast the impact on greenhouse gas, carbon footprint of the national/international production system with local/regional production system markets.	

	8.3.4.6	Compare and contrast differing research conclusions related to environmental factors and their effect on plants.
	8.3.4.7	Research, prepare, and defend plans for a plant systems enterprise that aligns with USDA sustainable practices criteria.
	8.3.4.8	Select and defend the use of nationally/internationally grown or locally/ regionally grown for a production operation system.
	8.3.4.9	Evaluate evidence supporting claims on how environmental conditions effect plants.
8.3.5	HARVEST, HANDLE, AND STORE CROPS ACCORDING TO CURRENT INDUSTRY STANDARDS.	
	8.3.5.1	Identify and summarize harvesting methods and equipment.
	8.3.5.2	Research and summarize reasons for calculating crop loss and or damage.
	8.3.5.3	Research and summarize how safety is ensured at each stage of the following processes: harvesting, processing, and storing.
	8.3.5.4	Identify and categorize plant preparation methods for storing and shipping plants and plant products.
	8.3.5.5	Summarize the reasons for preparing plants and plant products for distribution.
	8.3.5.6	Assess the stage of growth to determine crop maturity or marketability and demonstrate proper harvesting techniques.
	8.3.5.7	Evaluate crop yield and loss data and make recommendations to reduce crop loss.
	8.3.5.8	Research and analyze practices used to maintain a safe product through harvest, processing, storage, and shipment (e.g., Food Safety Modernization Act, Good Agricultural Practices, etc.).
	8.3.5.9	Analyze the proper conditions required to maintain the quality of plants and plant products held in storage and during shipping.
	8.3.5.10	Demonstrate techniques for grading, handling, and packaging plants and plant products for distribution.
	8.3.5.11	Analyze the processed used by mechanical harvesting equipment.
	8.3.5.12	Implement and evaluate the effectiveness of plans to reduce crop loss.
	8.3.5.13	Research laws and apply regulations to ensure the production of plants and plant products that are safe for distribution and use.
	8.3.5.14	Monitor and evaluate environmental conditions in storage facilities for plants and plant products.
	8.3.5.15	Evaluate techniques for grading, handling, and packaging plants and plant products.

Standard 9	POWER, STRUCTURAL, AND TECHNICAL SYSTEMS	
Topic 9.5	<i>Use control, monitoring, geospatial, and other technologies in AFNR power, structural, and technical systems.</i>	
	Student Competencies	
9.5.3	APPLY GEOSPATIAL TECHNOLOGIES TO SOLVE PROBLEMS AND INCREASE THE EFFICIENCY OF AFNR SYSTEMS.	
	9.5.3.1	Research and summarize the impact of utilizing geospatial technologies (i.e., GPS, GIS, remote sensing, telematics, etc.) in AFNR systems.
	9.5.3.2	Examine the components of precision technologies used in AFNR systems.
	9.5.3.3	Analyze and interpret trends in data collected utilizing geospatial technologies.
	9.5.3.4	Analyze and calculate the economic impact of utilizing precision technologies (e.g., GPS/GIS) in AFNR systems.
	9.5.3.5	Collect data and create maps utilizing geospatial technologies.
	9.5.3.6	Install, maintain, and service instrumentation and equipment used for precision technologies (i.e., GPS receivers, yield monitors, remote sensors, etc.) used in AFNR systems.

Career Ready Practices (CRP)

FFA & SUPERVISED AGRICULTURAL EXPERIENCE

CRP 1	Act as a responsible and contributing citizen and employee.
CRP 2	Apply appropriate academic and technical skills.
CRP 3	Attend to personal health and financial well-being.
CRP 4	Communicate clearly, effectively, and with reason.
CRP 5	Consider the environmental, social, and economic impacts of decisions.
CRP 6	Demonstrate creativity and innovation.
CRP 7	Employ valid and reliable research strategies.
CRP 8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP 9	Model integrity, ethical leadership, and effective management.
CRP 10	Plan education and career path aligned to personal goals.
CRP 11	Use technology to enhance productivity.
CRP 12	Work productively in teams while using cultural/global competence.