PLANT SCIENCE

Curriculum Content Framework

Please note: All assessment questions will be taken from the knowledge portion of these frameworks.

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Curriculum Content Framework
PLANT SCIENCE

Grade Levels: 10, 11, 12
Course Code: 491340
Prerequisite: Agriculture Science and Technology or Agriculture Science

Course Description: This course covers the relationship between plants and people, plant morphology and physiology, plant production, the environment, soil and other related areas. Opportunities are provided for students to participate in FFA and supervised experience activities.

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Unit 1: Overview of Plant Science
5 Hours

Terminology: agronomy, Career Development Event, cultivar, forestry, genus, horticulture, plant science, species, variety

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
1.1	Define terms	1.1.1		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
1.2	Discuss the importance of plants in our daily lives	1.2.1	Prepare and deliver a short oral statement on an important plant species	Foundation	Speaking	Participates in conversation, discussion, and group presentations [1.5.8]
		1.2.2	Compile a log of products from plants that are used in daily living, including those for food, clothing, and shelter	Thinking	Creative Thinking	Combines ideas or information in new ways [4.1.2]
		1.2.3	Compile a list of the major crops in Arkansas			Makes connections between seemingly unrelated ideas [4.1.6]
1.3	Discuss the binomial system of naming plants	1.3.1	Determine the common and scientific names of five plants that grow in the local area or school greenhouse	Foundation	Science	Describes/Explains scientific principles related to plant science [1.4.14]
				Personal Management	Responsibility	Exerts a high level of effort and perseverance towards goal attainment [3.4.4]
1.4	Identify careers in plant science	1.4.1	Research a career in plant science to determine educational requirements, working conditions, and salary	Foundation	Reading	Applies information to job performance [1.3.4]
		1.4.2	Give an oral report in class on the career that has been researched			Uses standard occupational resource materials [1.3.22]
				Personal Management	Career Awareness, Development, and Mobility	Develops skills to locate, evaluate, and interpret career information [3.1.4]
1.5	Discuss the three broad areas of plant science: agronomy, horticulture, and forestry	1.5.1	Identify two species of plants in each of these broad areas that are grown locally	Foundation	Speaking	Speaks in a clear, concise manner [1.5.12]
				Thinking	Creative Thinking	Makes connections between seemingly unrelated ideas [4.1.6]

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
1.6	Discuss FFA and supervised experience opportunities available for students interested in plant science	1.6.1	Demonstrate knowledge by participating in Career Development Events	Foundation	Listening	Listens for content [1.2.3]
		1.6.2	Relate the role of supervised experience to advancements in the FFA	Interpersonal	Teamwork	Comprehends ideas and concepts related to FFA opportunities in plant science [2.6.1]
		1.6.3	Keep records of FFA and supervised experience activities			

Unit 2: Safety in Plant Science
5 Hours

Terminology: allergy, poison ivy, safety

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
2.1	Define terms	2.1.1		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
2.2	Discuss the meaning and importance of safety and safe work with plant science	2.2.1	Relate examples of safety hazards in plant science, including equipment used in plant production and the inputs applied to plants such as pesticides and fertilizers	Foundation	Reading	Distinguishes between fact and opinion [1.3.11]
		2.2.2	Have students name examples of accidents that have occurred locally in plant agriculture, horticulture, or forestry		Speaking	Asks questions to obtain information [1.5.4]
		2.2.3	Identify health issues that are transmissible from plants to humans and the precautions to follow to minimize such transmission			Communicates a thought, idea, or fact in spoken form [1.5.5]
				Personal Management Skills	Integrity/Honesty/ Work Ethic	Complies with safety and health rules in a given work environment [3.2.2]
2.3	Identify hazards in plant science	2.3.1	Survey hazardous situations in local agriculture or horticulture facilities and prescribe the appropriate safety measures to be taken and propose ways of eliminating or reducing the risk of these hazards	Foundation	Reading	Analyzes and applies what has been read to specific task [1.3.2]
		2.3.2	Develop a list of practices to reduce risk when working with plants	Personal Management Skills	Integrity/Honesty/ Work Ethic	Complies with safety and health rules in a given work environment [3.2.2]

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
2.4	Describe the importance of personal safety in plant science	2.4.1	Identify and properly use appropriate PPE with plant science	Thinking	Problem Solving	Comprehends ideas and concepts related to safety with animals [4.4.1]
		2.4.2	Calculate the cost of PPE for an individual involved with plant science	Foundation	Arithmetic/ Mathematics	Calculates dollar amounts [1.1.7]
		2.4.3	Work together with others to promote safety in plant science	Interpersonal	Negotiation	Works to resolve conflict between two or more individuals [2.5.3]
		2.4.4	Take a test on plant science safety before beginning work with plants			

Unit 3: Plant Genetics and Breeding
8 Hours

Terminology: cell, chromosome, crossbreeding, gene, genetics, genotype, heredity, phenotype, reproduction

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
3.1	Define terms	3.1.1		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
3.2	Discuss Mendel's contributions to the study of genetics	3.2.1	Research Mendel's genetic experiments	Foundation	Listening	Listens for long-term contexts [1.2.7]
		3.2.2	Design an experiment to replicate one of Mendel's experiments		Science	Applies knowledge to complete a practical task [1.4.3]
				Thinking	Creative Thinking	Prepares presentation based on subject research, interviews, surveys [4.1.10]
					Knowing How to Learn	Applies new knowledge and skills to genetics and animal breeding [4.3.1]
3.3	Identify the parts of and explain the functions of cells, chromosomes, and genes	3.3.1	Create a model showing chromosomes and genes in relation to a cell	Foundation	Writing	Presents answers/conclusions in a clear and understandable form [1.6.13]
		3.3.2	View cell structures with a microscope or using prepared line art drawings	Personal Management	Career Awareness, Development, and Mobility	Meets defined goals and objectives [3.1.9]
					Integrity/Honesty/ Work Ethic	Chooses ethical course of action [3.2.1]
3.4	Differentiate between genotype and phenotype	3.4.1	Classify hereditary characteristics as genotype or phenotype traits	Foundation	Speaking	Organizes ideas and communicates oral messages to listeners [1.5.7]
		3.4.2	Name examples of plant products (such as shapes or colors of tomatoes) with phenotypic similar or dissimilar traits	Thinking	Knowing how to Learn	Develops personal learning strategies—note taking, clustering related items, flash cards, etc. [4.3.2]
3.5	Compare pure breeding and crossbreeding with plants, including hybridization	3.5.1	Determine genotype and phenotype of crossbred plants using a Punnett Square	Foundation	Reading	Distinguishes between fact and opinion [1.3.11]
		3.5.2	Investigate the requirements of a seed registration	Personal Management	Career Awareness, Development, and Mobility	Explores career opportunities [3.1.6]
					Integrity/Honesty/ Work Ethic	Follows established rules, regulations, and policies [3.2.5]

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
3.6	Identify factors to consider in selecting plants for breeding	3.6.1	Research plant breeding and results of such efforts including corn, rice, and other crops	Foundation	Reading	Identifies relevant details, facts, and specifications [1.3.16]
		3.6.2	Identify prominent plant breeders of the past and present	Thinking	Decision Making	Comprehends ideas and concepts related to genetics and plant breeding [4.2.2] Generates options/alternatives [4.2.6]
3.7	Describe plant breeding processes use with agricultural and horticultural crops	3.7.1	Plan a breeding program to assure the production of plants with the desired qualities	Foundation	Science	Constructs model to depict basic concept of genetics and plant breeding [1.4.11]
				Personal Management	Responsibility	Comprehends ideas and concepts related to genetics and plant breeding [3.4.2]
3.8	Discuss genetic engineering and its effect on plant agriculture	3.8.1	Prepare a report on genetic engineering and its effect on one aspect of plant agriculture	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		3.8.2	Have a local plant producer who has used biotechnology methods to discuss these as related to plant production	Interpersonal	Cultural Diversity	Comprehends ideas and concepts related to genetics and plant breeding [2.2.1]
				Personal Management	Career Awareness, Development, and Mobility	Explores career opportunities [3.1.6]

Unit 4: Plant Anatomy and Physiology
14 Hours

Terminology: annual, apical dominance, biennial, chloroplasts, cotyledon, dicot, guard cells, herbaceous, internode, lateral bud, leaf, leaf blade, monocot, node, perennial, petiole, photosynthesis, phloem, physiology, respiration, root, stem, stoma, terminal bud, transpiration, woody, xylem

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
4.1	Define terms	4.1.1		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
4.2	List and explain the functions of the major vegetative plant parts	4.2.1	Draw a simple plant and label the three vegetative parts	Foundation	Science	Acquires and processes scientific data [1.4.1]
		4.2.2	Prepare short reports on the functions of vegetative plant parts		Writing	Applies/Uses technical words and concepts [1.6.4]
		4.2.3	Distinguish between herbaceous and wood stems	Thinking	Knowing How to Learn	Uses available resources to acquire new skills or improve skills [4.3.4]
4.3	Identify and compare the two leaf types	4.3.1	Collect samples of compound and simple leaves from plants that grow in the local area	Foundation	Science	Applies knowledge to complete a practical task [1.4.3]
		4.3.2	Prepare a display of leaves in which plant species and leaf type are labeled	Thinking	Creative Thinking	Develops visual aids to create audience interest [4.1.4]
4.4	Explain the function of the stoma, including guard cells	4.4.1	Use a hand lens to observe stoma on a leaf	Foundation	Science	Applies scientific principles related to plant science [1.4.5]
		4.4.2	Determine the role of guard cells		Reading	Comprehends written information for main ideas [1.3.7]
				Thinking	Seeing Things in the Mind's Eye	Visualizes a system's operation from schematics [4.6.3]
4.5	Review the function of the chloroplasts	4.5.1	View stomata, guard cells, and chloroplasts under a microscope	Foundation	Science	Chooses appropriately from a variety of scientific methods and techniques to complete a task [1.4.9]
				Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		Application		Skill Group	Skill	Description
4.6	Examine respiration, transpiration, and photosynthesis	4.6.1	Diagram the chemical equation for photosynthesis	Foundation	Reading	Uses written resources (books, dictionaries, directories) to obtain factual information [1.3.23]
				Personal Management	Responsibility	Maintains a high level of concentration in completion of a task [3.4.7]
4.7	Explain the function of phloem and xylem	4.7.1	Observe phloem and xylem cells under a microscope	Foundation	Science	Describes/Explains scientific principles related to plant systems [1.4.14]
				Interpersonal	Teamwork	Recognizes effects of positive/negative attitudes on co-workers [2.6.4]
4.8	Explain the difference between a monocot and dicot	4.8.1	Observe monocot and dicot stems under a microscope	Foundation	Writing	Analyzes data, summarizes results, and make conclusions [1.6.2]
				Thinking	Reasoning	Determines which conclusions are correct when given a set of facts and a set of conclusions [4.5.3]
4.9	Distinguish between the two kinds of root systems	4.9.1	Observe sample root systems from five species of plants that grow locally and classify as fibrous root or tap root	Foundation	Reading	Determines what information is needed [1.3.10]
					Science	Applies knowledge to complete a task [1.4.3]
				Thinking	Knowing How to Learn	Uses available resources to acquire new skills or improve skills [4.3.4]
4.10	Discuss the parts and functions of roots	4.10.1	Observe root specimens using a hand lens to assess root hairs and other structures	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2]
		4.10.2	Compare the root system of a legume with that of a non-legume		Science	Applies scientific principles related to plant root systems [1.4.5]
				Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
4.11	Distinguish between annual, biennial, and perennial plants	4.11.1	List and classify plants that grow in the local area as annuals, biennials, and perennials	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2]
		4.11.2	Classify annual, biennial, and perennial plants that grow locally as to agronomic, forestry, or horticultural plants		Science	Applies knowledge to complete a practical task [1.4.3]
				Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]
4.12	Discuss the types, parts, and functions of flowers	4.12.1	Observe the types of flowers and compare anatomical features	Knowledge	Reading	Comprehends written information for main ideas [1.3.7]
		4.12.2	Draw and label the major parts of a flower, including sepals, petals, ovary, and pistil		Science	Constructs model to depict basic concept of flower parts and functions [1.4.11]

Unit 5: Soil Science and Fertility
14 Hours

Terminology: capillary water, clay, elements, free water, fertilizer, fertilizer analysis, gravitational water, hygroscopic water, irrigation, lime, macronutrient, media, micronutrient, organic matter, pH, pore space, sand, silt, soil, soil fertility, soil profile, soil sterilization, soil structure, soil texture, subsoil, topsoil

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
5.1	Define terms	5.1.1		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
5.2	Differentiate between soil structure and soil texture	5.2.1	Determine the texture of soil samples using the “Soil Textural Triangle”	Thinking	Seeing Things in the Mind’s Eye	Organizes and processes images—symbols, pictures, graphs, objects, etc. [4.6.1]
5.3	Identify the three soil particles	5.3.1	Use the ribbon test to identify particle composition of a soil sample	Knowledge	Reading	Identifies relevant details, facts, and specifications [1.3.16]
5.4	Discuss the meaning, use, and importance of soil sterilization	5.4.1	Sterilize soil for use	Foundation	Reading	Comprehends written information and applies it to a task [1.3.8]
		5.4.2	Follow appropriate safety practices in using equipment and handling soil	Personal Management	Integrity/Honesty/ Work Ethic	Follows established rules, regulations, and policies [3.2.5]
5.5	Identify the nutrients necessary for plant growth and distinguish between the macronutrients and micronutrients	5.5.1	List the nutrients and one plant deficiency symptom	Foundation	Science	Describes/Explains scientific principles related to plant nutrition [1.4.14]
		5.5.2	Investigate nutrients most likely deficient in soil in the local community	Thinking	Reasoning	Sees relationship between two or more ideas, objects, or situations [4.5.5]
5.6	List the three types of water found in the soil	5.6.1	Distinguish between capillary water, gravitational water, and hygroscopic water	Foundation	Reading	Comprehends written information for main task [1.3.7]
		5.6.2	Describe how the presence of water in soil is related to the need for the artificial application of water by irrigation		Science	Chooses appropriately from a variety of scientific methods and techniques to complete a task [1.4.8]

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
5.7	Describe the use of irrigation in agronomic and horticultural crop production	5.7.1	Identify methods of irrigation and considerations in its use	Foundation	Reading	Identifies relevant details, facts, and specifications [1.3.15]
		5.7.2	Test soil moisture to determine need for irrigation		Science	Uses equipment and techniques in determining soil moisture [1.4.23]
		5.7.3	Identify sources of water for irrigation		Arithmetic/ Mathematics	Calculates measurements taken from measuring devices [1.1.9]
		5.7.4	Determine how irrigation water is used in the application of plant growth and pest management chemicals			Calculates/Estimates volume of water needed for a given irrigation application [1.1.18]
		5.7.5	Calculate volume of water needed to apply water amounts to given areas of land or numbers of individual plants			
5.8	Explain fertilizer analysis	5.8.1	Study labels from various types of fertilizers to determine content	Foundation	Reading	Uses appropriate materials and techniques as specified [1.3.20]
				Thinking	Knowing How to Learn	Processes new information as related to workplace [4.3.5]
5.9	Explain the meaning and importance of soil pH	5.9.1	Conduct a pH analysis on a sample of soil	Foundation	Arithmetic/ Mathematics	Applies computation skills related to soil fertility and pH [1.1.5]
		5.9.2	Calculate the amount of lime needed to alter the pH of soil	Thinking	Problem Solving	Draws conclusion from observations, evaluates conditions, and gives possible solutions [4.4.5]

Unit 6: Plant Growth Systems
12 Hours

Terminology: cell, growth regulator, internode, node, photoperiodism, rooting hormone

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
6.1	Define terms	6.1.1		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
6.2	Discuss plant growth systems and their importance in plant production	6.2.1	Illustrate examples of plant growth systems in the school greenhouse or other facility	Foundation	Reading	Comprehends written information for ideas [1.3.7]
		6.2.2	List examples of plants and/or plant products that are produced using technologies related to plant systems		Science	Performs experiment as specified [1.4.19]
		6.2.3	Plan an experiment related to a plant growth system			
6.3	Explain the use of rooting hormones on cuttings	6.3.1	Treat several cuttings with different hormones	Foundation	Science	Performs experiment as specified [1.4.20]
				Personal Management	Integrity/Honesty/ Work Ethic	Complies with safety and health rules in a given work environment [3.2.2]
6.4	Differentiate between nodes and internodes	6.4.1	Using stem samples, identify nodes and internodes	Foundation	Reading	Identifies relevant details, facts, and specifications [1.3.16]
					Science	Applies knowledge to complete a task [1.4.3]
				Thinking	Decision Making	Demonstrates decision-making skills [4.2.4]
6.5	Describe why and how plant growth regulators are used	6.5.1	Identify plant growth regulators that may be used with agricultural and horticultural crops in the local area and describe the function of the regulator	Foundation	Science	Acquires and processes scientific data [1.4.1]
		6.5.2	Determine safe practices in the application of plant growth regulators		Speaking	Organizes ideas and communicates oral messages to listeners [1.5.7]

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
6.6	Distinguish between short, long, and day neutral plants	6.6.1	Identify plants that grow in the local area by day length requirements	Foundation	Writing	Analyzes data, summarizes results, and makes conclusions [1.6.2]
		6.6.2	Illustrate how day length is controlled in greenhouse plant production		Science	Applies knowledge to complete a practical task [1.4.3]
				Thinking	Reasoning	Uses logic to draw conclusions from available information [4.5.6]

Unit 7: Sexual Propagation
12 Hours

Terminology: fertilization, germination, hybird, ovary, ovule, pollen, pollination, propagation, seed, sexual propagation, scarification, stratification, stigma

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
7.1	Define terms	7.1.1		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
7.2	Discuss the meaning and importance of sexual propagation of agricultural and horticultural plants	7.2.1	List advantages and disadvantages of growing plants from seed	Foundation	Reading	Applies information and concepts derived from printed materials [1.3.3]
		7.2.2	Use a seed catalog to compare using seed versus other methods of propagation such as plugs, scions, root stock, and plants		Science	Applies knowledge to complete a practical task [1.4.3]
		7.2.3	Explain practices used in local horticultural and agricultural operations to sexually reproduce plants	Thinking	Decision Making	Evaluates information/data to make best decision [4.2.5]
		7.2.4	Demonstrate how seed are planted to assure germination and plant growth			
		7.2.5	Prepare an appropriate seedbed for a species planted in the greenhouse			
7.3	Identify the parts of seeds and explain their functions	7.3.1	Label the parts of a seed in a line drawing	Foundation	Science	Acquires and processes scientific data [1.4.1]
		7.3.2	Dissect a seed to determine major parts		Writing	Applies/Uses technical words and concepts [1.6.4]
		7.3.3	Distinguish between monocotyledon and dicotyledon seeds			

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
7.4	Describe optimum conditions for seed germination	7.4.1	Germinate seeds using the rag doll or other method	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
		7.4.2	Use results of the rag doll test to determine percentage of germination	Interpersonal	Teamwork	Contributes to group with ideas, suggestions, and effort [2.6.2]
		7.4.3	Store and otherwise handle seed to maintain viability			
		7.4.4	Determine proper seeding depth and rate for efficient germination and economical plant production			

Unit 8: Asexual Propagation
20 Hours

Terminology: asexual propagation, clone, cutting, division, grafting, layering, scion, separation, tissue culture

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		**Application**		**Skill Group**	**Skill**	**Description**
8.1	Define terms	8.1.1		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
8.2	Discuss the meaning and importance of asexual propagation	8.2.1	List examples of plants in the local community that are propagated asexually	Foundation	Reading	Comprehends written information for ideas [1.3.7]
		8.2.2	List advantages and disadvantages of asexual propagation		Science	Applies knowledge to complete a practical task [1.4.3]
8.3	Explain how cuttings are made and used in propagation	8.3.1	Demonstrate the procedure for taking cuttings	Foundation	Listening	Listens to follow directions [1.2.6]
		8.3.2	Demonstrate the procedure for placing cuttings in rooting media		Science	Applies knowledge to complete a practical task [1.4.3]
		8.3.3	Identify plant species most readily propagated by cuttings	Personal Skills	Integrity/Honesty/ Work Ethic	Follows established rules, regulations, and policies [3.2.5]
				Thinking	Problem Solving	Draws conclusions from observations, evaluates conditions, and gives possible solutions [4.4.5]
8.4	Describe the tissue culture process	8.4.1	Perform a tissue culture using acceptable protocol	Foundation	Reading	Uses written resources (books, dictionaries, directories) to obtain factual information [1.3.23]
		8.4.2	Identify plant species most suited to tissue culture		Science	Observes health code/sanitation requirements [1.4.19]
						Applies knowledge to complete a practical task [1.4.3]

CAREER AND TECHNICAL SKILLS What the Student Should be Able to Do				ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge		Application		Skill Group	Skill	Description
8.5	Explain budding and grafting and how they are used in plant propagation	8.5.1	Demonstrate the steps involved in budding	Foundation	Reading	Comprehends written specifications and applies them to a task [1.3.9]
		8.5.2	Demonstrate the steps involved in grafting		Science	Applies scientific principles relates to budding and grafting [1.4.5]
		8.5.3	Identify species best suited to budding	Personal Management	Responsibility	Maintains a high level of concentration in completion of a task [3.4.7]
		8.5.4	Identify species best suited to grafting	Thinking	Reasoning	Applies rules and principles to a new situation [4.5.1]
		8.5.5	Identify sources of quality buds and scions			
		8.5.6	Demonstrate methods of harvesting buds and scions			
8.6	Explain the difference between separation and division and how they are used in plant propagation	8.6.1	Demonstrate the steps involved in separation	Foundation	Science	Solves practical problems using scientific methods and techniques [1.4.23]
		8.6.2	Demonstrate the steps involved in division	Personal Management	Responsibility	Exerts a high level of effort and perseverance towards goal attainment [3.4.4]

Glossary
Unit 1: Introduction to Plant Science

1. agronomy—the science, theory, and practice of field crop production; may include soil science
2. Career Development Event (CDE)—an FFA activity to promote and recognize students as they develop skills related to employment in the agricultural industry
3. cultivar—a cultivated plant that has specific and distinguishable characteristics; written in single quotes
4. forestry—the production of trees and manufacture of wood products
5. genus—a closely related and definable group of plants comprising of one or more species
6. horticulture—production and use of plants for personal appeal or food
7. plant science—is the study of the structure, functions, growth, and protection of plants; usually includes three areas: field crops, horticultural crops, and forestry.
8. species—the basic unit in the classification system whose members have similar structure, common ancestors, and maintain their characteristics; subgroup of genus
9. variety—a subdivision of a species; it has various inheritable characteristics of form and structure that are continued through both sexual and asexual propagation

Unit 2: Safety in Plant Science

1. allergy—reaction of humans by sneezing, scratching, itching, rashes, or other means to certain plants and plants products

2. poison ivy—a climbing plant to which some individuals are very allergic

3. safety—preventing loss or injury

Unit 3: Plant Genetics and Breeding

1. cell—the basic unit of life
2. chromosome—a strand of genetic material that contains genetic code
3. crossbreeding—the breeding of two different pure breeds
4. gene—a unit of inheritance composed of DNA
5. genetics—the study of heredity
6. genotype—genetic makeup of an animal
7. heredity—the passing of traits from parents to offspring
8. phenotype—the outward expression of a gene
9. reproduction—the process by which new organisms are derived, being sexually or asexually with plants

Unit 4: Plant Anatomy and Physiology

1. annual—a plant that completes its life cycle in one growing season
2. apical dominance—a condition created by hormones in the apical meristem that prevents lateral buds from developing
3. biennial—a plant that completes its life cycle in two growing seasons
4. chloroplasts—part of plant cell containing green pigment to trap light energy for photosynthesis
5. cotyledon—seed leaves on an embryo
6. dicot—a class of flowering plants where two cotyledon's are found
7. guard cells—a pair of cells that regulate the opening and closing of the stomata
8. herbaceous—a plant whose stem has little or no woody tissue; a soft-stem plant
9. internode—the area between two nodes
10. lateral bud—buds located along the sides of stems where the leaves are attached
11. leaf—plant part consisting of a stipule, petiole, and blade
12. leaf blade—large broad part of the leaf
13. monocot—a class of flowering plants where two cotyledon's are found
14. node—portion of the stem that is swollen or slightly enlarged that gives rise to buds
15. perennial—a plant that completes its life cycle in more than two years
16. petiole—the leaf stalk, connecting structure between leaf blade and plant stem
17. photosynthesis—the process by which green plants convert solar energy into stored chemical energy
18. phloem—the plant tissue that transports food made in the leaves down to the roots for storage
19. physiology—an area of biology that deals with processes that occur in living organisms
20. respiration—the process in which plants take in oxygen and give off carbon dioxide
21. root—the underground part of the plant which stores food and absorbs moisture and minerals from the ground
22. stem—the main trunk of a plant
23. stoma—an opening or pore in the leaf that allows for the exchange of oxygen, carbon dioxide, and water vapor (stomata –pl)
24. terminal bud—the large bud at the tip of a twig
25. transpiration—the movement of water vapor through a stoma out of a plant

26. xylem—the plant tissue that transports food, moisture, and nutrients up from the roots

Unit 5: Soil Science and Fertility

1. capillary water—water held between soil particles against the force of gravity
2. clay—the smallest of inorganic particles in the soil
3. elements—the most basic form of matter which maintains the characteristics of the substance
4. free water—water that drains out of the soil after it has been wetted
5. fertilizer—any material added to the soil to provide nutrients
6. fertilizer analysis—percentage of nutrients in fertilizer
7. gravitational water—water pulled downward in the soil by gravity
8. hygroscopic water—water that forms a thin film around soil particles and is not available to plants
9. irrigation—the artificial application of water to plants
10. lime—a substance that is added to soil, used to raise pH
11. macronutrient—the nutrients needed by plants in the largest amounts; such as nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur
12. micronutrient—the nutrients needed by plants in small amounts; such as boron, copper, chlorine, iron, manganese, molybdenum, nickel, and zinc
13. organic matter—decayed or partially decayed remains of plants and animals found in the soil
14. pH—the measure of acidity or alkalinity of the soil
15. pore space—space between soil particles
16. sand—the largest of the soil particles
17. silt—the middle sized of the soil particles
18. soil fertility—the ability of soil to provide nutrients for plant growth
19. soil profile—a cross section of the soil, usually 3 to 4 feet deep
20. soil sterilization—the process of preventing growth of plants in a soil
21. soil structure—the way soil particles are arranged
22. soil texture—the amount of sand, silt, and clay in soil
23. subsoil—the layer of soil below the topsoil
24. topsoil—the layer of soil found on the surface

Unit 6: Plant Growth Systems

1. cell—the basic unit of life containing living material bound by a membrane
2. growth regulator—substances that promote, inhibit, or modify plant growth
3. internode—the area between two nodes
4. node—portion of the stem that is swollen or slightly enlarged that gives rise to buds
5. photoperiodism—the response of plants to light
6. rooting hormone—a hormone used to enhance production of roots on a cutting

Unit 7: Sexual Propagation

1. fertilization—process in which the sperm cell joins the egg cell
2. germination—growth of a new plant from a seed
3. hybrid—offspring from genetically different parents; produced through human manipulation
4. ovary—the part of the flower that contains one or more ovules
5. ovule—the part of the ovary where eggs are produced and seeds develop
6. pollen—the part of the flower which produces male sex cells
7. pollination—the transfer of pollen from the male to female part of the flower
8. propagation—plant reproduction; increasing the number of plants using sexual and asexual means
9. seed—the fertilized, mature ovule of a plant; consist of three major parts: seed coat, embryo, and stored food
10. sexual propagation—reproducing plants from seed, which result from the union of male and female sex cells
11. scarification—the breaking down of a seed coat to encourage germination
12. stratification—the process of a seed going through a time of cold temperature before it germinates
13. stigma—the sticky part of a flower pistil where pollen is collected

Unit 8: Asexual Propagation

1. asexual propagation—reproducing plants vegetatively; reproduction without sexual union
2. clone—a genetic duplicate of a parent
3. cutting—stems, leaves, or roots of plants used for asexual reproduction
4. division—the cutting of new plants into sections for growing new plants
5. grafting—the process of getting the parts of one plant to grow on the parts of another plant; scion from one plant is placed on the stock of another plant
6. layering—the method of asexual reproduction in which stems form a root while the stem is attached to the parent plant
7. scion—the stem or bud portion of a graft
8. separation—a propagation method in which natural plant structures are removed from the parent plant and grown separately
9. tissue culture—reproducing a plant by using small pieces of tissue in an artificial medium under sterile conditions