

Community Forestry and Tree Management

8048 36 weeks

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Course Description

Suggested Grade Level: 11 or 12

Students will be instructed in the value, benefit, costs, and risks of trees and forests in urban, suburban, and rural communities. Course content will include identifying, selecting, and managing trees within a human-driven ecosystem.

As noted in [Superintendent's Memo #058-17 \(2-28-2017\)](#), this Career and Technical Education (CTE) course must maintain a maximum pupil-to-teacher ratio of 20 students to one teacher, due to safety regulations. The 2016-2018 biennial budget waiver of the teacher-to-pupil ratio staffing requirement does not apply.

Task Essentials Table

8048	Tasks/Competencies
<input checked="" type="checkbox"/>	Identify the role of supervised agricultural experiences (SAEs) in agricultural education.
<input checked="" type="checkbox"/>	Participate in an SAE.
<input checked="" type="checkbox"/>	Identify the benefits and responsibilities of FFA membership.
<input checked="" type="checkbox"/>	Describe leadership characteristics and opportunities as they relate to agriculture and FFA.
<input type="checkbox"/>	Apply for an FFA degree and/or an agricultural proficiency award.
<input checked="" type="checkbox"/>	Define terms related to urban and community forestry.
<input checked="" type="checkbox"/>	Explain the aesthetic value of trees.
<input checked="" type="checkbox"/>	Explain the environmental benefits of trees.
<input checked="" type="checkbox"/>	Explain the social value of trees.
<input checked="" type="checkbox"/>	Explain the economic value of trees.

<input checked="" type="radio"/>	Explain the health value of trees.	
<input checked="" type="radio"/>	Describe the ways in which trees are classified and named.	
<input checked="" type="radio"/>	Explain the anatomy of trees.	
<input checked="" type="radio"/>	Explain the physiology of trees.	
<input checked="" type="radio"/>	Identify native and nonnative woody species.	
<input type="radio"/>	Explain how to identify the age of the tree.	
<input checked="" type="radio"/>	Explain the factors that influence tree growth.	
<input checked="" type="radio"/>	Explain the characteristics required of trees living in urban areas.	
<input checked="" type="radio"/>	Describe the desirable and undesirable characteristics of various tree species.	
<input checked="" type="radio"/>	Explain ecological factors impacting the establishment of trees in a developed area.	
<input checked="" type="radio"/>	Compare the site characteristics of open and developed spaces.	
<input checked="" type="radio"/>	Evaluate a landscape plan that uses woody plants.	
<input checked="" type="radio"/>	Evaluate a development plan that uses woody plants.	
<input checked="" type="radio"/>	Interpret tree ordinances.	
<input checked="" type="radio"/>	Explain the benefits of proper tree maintenance.	
<input checked="" type="radio"/>	Identify conditions that signal a need for tree care.	
<input checked="" type="radio"/>	Describe various types of tree care.	
<input checked="" type="radio"/>	Describe types of damage that can be caused by trees.	
<input checked="" type="radio"/>	Identify signs and symptoms of tree disease.	
<input checked="" type="radio"/>	Identify the causes of disease in Virginia's common trees.	
<input checked="" type="radio"/>	Explain how tree diseases are transmitted.	
<input checked="" type="radio"/>	Explain the importance of sanitation in preventing tree diseases.	
<input checked="" type="radio"/>	Evaluate the damage done to urban forests by pests.	
<input checked="" type="radio"/>	Identify signs and symptoms of an insect infestation.	
<input checked="" type="radio"/>	Identify categories of pests.	
<input checked="" type="radio"/>	Describe conditions that encourage insect infestation.	

+	Explain integrated pest management (IPM).	
+	Explain management concerns related to non-insect pests (e.g., deer, rabbits, pigs, plants).	

Legend: Essential Non-essential Omitted

Note: Competencies 39-43 have been added to ensure compliance with federal legislation: National FFA Organization's Federal Charter Amendments Act (Public Law 116-7, <https://www.congress.gov/116/plaws/publ7/PLAW-116publ7.pdf>). All inquiries may be sent to cte@doe.virginia.gov. Students are provided opportunities for leadership, personal growth, and career success. Instruction is delivered through three major components: classroom and laboratory instruction, supervised agricultural experience (SAE) program, and student leadership (FFA).

Curriculum Framework

Task Number 39

Identify the role of supervised agricultural experiences (SAEs) in agricultural education.

Definition

Identification should include

- defining an SAE program as *an opportunity for students to consider multiple careers and occupations in the agriculture, food, and natural resources (AFNR) industries, learn expected workplace behavior, develop specific skills within an industry, and apply academic and occupational skills in the workplace or a simulated workplace environment*
- researching the Foundational SAE
 - career exploration and planning
 - personal financial planning and management
 - workplace safety
 - employability skills for college and career readiness
 - agricultural literacy
- researching the Immersion SAE
 - entrepreneurship/ownership
 - placement/internships
 - research (experimental, analytical, invention)
 - school business enterprises
 - service learning
- developing a plan to participate in an SAE, based on personal and career goals
- researching available awards and degrees, based on SAE participation.

Teacher resource: [SAE Resources](#), National Council for Agricultural Education

Process/Skill Questions

- What are examples of SAEs related to this course and in the AFNR industries?
- Where can a copy of the Virginia SAE Record Book be found?
- What is an Immersion SAE?
- How does a placement/internship SAE differ from an ownership/entrepreneurship SAE?
- How does an SAE provide relevant work experience and contribute to the development of critical thinking skills?
- How is the SAE an extended individualized instructional component of a student's Career Plan of Study?
- How can an SAE be used to provide evidence of student growth and participation in authentic, work-related tasks?
- What are the four types of SAEs?
- What are the advantages of participating in work-based learning experiences and projects?
- How does one choose an appropriate SAE in which to participate?

Task Number 40

Participate in an SAE.

Definition

Participation should include

- developing, completing, or continuing a plan to participate in an SAE as a work-based learning experience, based on personal and career goals
- documenting experience, connections, positions held, and competencies attained, using the *Virginia SAE Record Book*
- researching available awards and degrees, based on SAE participation.

Teacher resources:

[FFA SAE](#)

[The Agricultural Experience Tracker](#)

Process/Skill Questions

- What are the advantages of participating in work-based learning experiences and projects?
- How do SAEs help prepare students for the workforce?
- What are some examples of SAEs in AFNR?

Exploring Leadership Skills and FFA Membership

Task Number 41

Identify the benefits and responsibilities of FFA membership.

Definition

Identification should include

- benefits
 - listing opportunities to participate in community improvement projects and career development events (CDEs) and leadership development events (LDEs)
 - exploring leadership development opportunities
- responsibilities
 - researching the responsibilities of FFA officers, committees, and members
 - locating resources that guide participation in FFA activities
 - explaining the FFA Creed, Motto, Salute, and mission statement
 - explaining the meaning of the FFA emblem, colors, and symbols
 - explaining significant events and the history of the organization.

Process/Skill Questions

- How does one become an FFA member?
- What is the FFA's mission and how does it accomplish its mission?
- What are the benefits and responsibilities of FFA membership?
- What five FFA activities are available through the local chapter?
- What are some significant events in FFA history? How have these events shaped membership over time?
- What is the FFA program of activities (POA), and how is it used?

Task Number 42

Describe leadership characteristics and opportunities as they relate to agriculture and FFA.

Definition

Description should include

- examples of successful leaders
- types of leadership
 - autocratic
 - participative
 - laissez-faire
 - servant

- followership
- positive leadership qualities and traits of successful leaders
- opportunities for participating in leadership activities in FFA
- demonstrating methods for conducting an effective meeting.

Process/Skill Questions

- Who are some successful leaders in the agriculture industry?
- What qualities make a successful leader?
- What are leadership traits?
- What is the difference between positive and negative leadership?

Task Number 43

Apply for an FFA degree and/or an agricultural proficiency award.

Definition

Application should include

- identifying types of FFA degrees
 - Greenhand
 - Chapter
 - State
 - American
- identifying proficiency award areas
 - entrepreneurship
 - placement
 - combined
 - agriscience research
- exploring CDEs and LDEs related to this course
- identifying all SAE criteria to be eligible for the award
- identifying the type of award
- applying for an FFA award.

Teacher resource: [FFA Agricultural Proficiency Awards](#)

Process/Skill Questions

- Where are the awards and their application criteria located?
- What are the benefits of winning an FFA award?
- What are the benefits and requirements of an FFA degree?
- What FFA awards are available?
- How does the FFA degree program reward FFA members in all phases of leadership, skills, and occupational development?
- What is the highest degree that can be conferred upon an FFA member at the national level?
- What are the requirements for a Greenhand FFA degree?

Exploring Urban/Community Forestry and Its Benefits

Task Number 44

Define terms related to urban and community forestry.

Definition

Defining terms should include

- tree
- arboriculture
- forestry
- dendrology
- silviculture
- ecosystem
- forestry
- urban forest
- urban forestry
- natural areas
- community (rural, suburban, urban).

Process/Skill Questions

- How are trees and shrubs different from each other?
- How would you compare dendrology and arboriculture?
- How are arboriculture and silviculture different from each other?
- How does silviculture differ from forestry?
- Why are ecosystems important to urban forestry?
- In what ways does an urban forest influence a community?

Task Number 45

Explain the aesthetic value of trees.

Definition

Explanation should include

- ornamental value
- value of wildlife

- design principles as they relate to urban forests.

See Instructional Resources for additional resource(s).

Process/Skill Questions

- Why is it important to consider the ornamental value as well as the functional purpose of trees in the urban forest landscape?
- How can wildlife enhance the aesthetic value of an urban forest community?
- Why do trees bring aesthetic value to an urban forest community?
- In what ways can the aesthetic use of trees be enhanced by applying principles of design?
- How does public perception influence aesthetics in an urban forest community?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.02.03. Analyze how modern perceptions of natural resource management, protection, enhancement, and improvement change and develop over time.

PS.04.01. Evaluating, identifying, and preparing plants to enhance an environment.

Task Number 46

Explain the environmental benefits of trees.

Definition

Explanation should include

- storm-water management
- air-quality improvement
- noise reduction
- erosion control
- windbreaks
- temperature moderation
- wildlife habitat
- carbon sequestration.

See Instructional Resources for additional resource(s).

Process/Skill Questions

- What species of trees are most tolerant of urban air pollution?
- In what ways can trees be used to affect microclimates?
- How do trees affect carbon sequestration?
- How can the use of trees change the effects of wind?

- How do trees reduce urban storm-water runoff?
- Why should tree characteristics be considered when planning storm-water management and erosion control?
- In what ways can trees improve quality of life in urban forest communities?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.01.05. Apply ecological concepts and principles to terrestrial natural resource systems.

Task Number 47

Explain the social value of trees.

Definition

Explanation should include

- crime reduction
- community building
- traffic calming
- opportunities for recreation, education, and urban agriculture.

Process/Skill Questions

- How can trees reduce crime?
- What are some ways that trees can foster vibrant community life?
- What impact can trees have on traffic patterns?
- What role can trees play in helping people form relationships?
- What educational opportunities can trees provide for a community?
- In what ways can trees promote urban agriculture?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.02.03. Analyze how modern perceptions of natural resource management, protection, enhancement, and improvement change and develop over time.

Task Number 48

Explain the economic value of trees.

Definition

Explanation should include increases in

- property value
- environmental services
- employee satisfaction and retention
- commerce
- commercial development
- job opportunities

and decreases in

- utility costs
- healthcare spending.

Process/Skill Questions

- How can having a well-planned urban forest community increase commerce?
- What are ways that trees can affect living costs for people?
- What job opportunities may be created by the presence of an urban forest?
- How can trees affect healthcare costs?
- Why do well-planned urban forest communities help attract and retain employees?
- In what ways are property values affected by the design of urban forest communities?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.02.04. Examine and explain how economics affects the use of natural resources.

Task Number 49

Explain the health value of trees.

Definition

Explanation should include

- stress reduction
- asthma reduction
- improvements in mental health
- improvements in immune system function
- quicker recovery times
- encouragement of healthier lifestyles.

Process/Skill Questions

- How do urban forest communities promote biophilia?

- What human health issues can be improved through the use of trees in the landscape?
- How do urban forest communities promote healthier lifestyles?
- How can trees improve mental health?
- In what ways can urban forest communities be vital to the human rehabilitation process?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.02.03. Analyze how modern perceptions of natural resource management, protection, enhancement, and improvement change and develop over time.

Classifying Trees

Task Number 50

Describe the ways in which trees are classified and named.

Definition

Description should include

- leafing
- reproduction
- growth habits
- scientific names
- use of a dichotomous key.

Process/Skill Questions

- What are the differences between gymnosperms and angiosperms?
- What are the differences between evergreen and deciduous trees?
- How is a dichotomous key used to identify a plant?
- How are scientific names developed?
- Why are scientific names used?
- What does a scientific name tell you about a tree?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.01.01. Apply methods of classification to examine natural resource availability and ecosystem function in a particular region.

PS.02.01. Classify plants according to taxonomic systems.

Task Number 51

Explain the anatomy of trees.

Definition

Explanation should include

- leaves
- branches
- trunk
- buds
- roots
- bark
- xylem and phloem
- heartwood and sapwood
- cambium
- fruits
- flowers.

Process/Skill Questions

- What is the purpose of the xylem and phloem?
- What are the functions of the trunk?
- What is the purpose of the pith?
- What are the functions of the root system?
- What are the functions of the leaves?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

PS.02.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.

Task Number 52

Explain the physiology of trees.

Definition

Explanation should include

- definitions of *photosynthesis*, *cellular respiration*, *transpiration*, *translocation*, and *growth*
- chemical formulas for photosynthesis and cellular respiration
- relationships among photosynthesis, cellular respiration, transpiration, translocation, and growth
- defense processes of trees (e.g., compartmentalization of decay, wound closure, pest-detering chemicals).

Process/Skill Questions

- What are the functions of primary and secondary meristematic cells?
- How do trees grow in diameter and height?
- What is the process of photosynthesis?
- What occurs during respiration?
- What is the difference between meiosis and mitosis?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

PS.01.01. Determine the influence of environmental factors on plant growth.

PS.02.03. Apply knowledge of plant physiology and energy conversion to plant systems.

Task Number 53

Identify native and nonnative woody species.

Definition

Identification should include differentiation among

- physiological characteristics of species (e.g., leaf, bark, bud)
- ecoregion
- forest cover type
- potential natural vegetation
- native
- nonnative
- naturalized
- invasive.

Note: In identifying Virginia tree species, students should reference [Common Native Trees of Virginia](#) and [Common Native Shrubs and Woody Vines of Virginia](#), publications of the Virginia Department of Forestry. See Instructional Resources for additional resource(s).

See Instructional Resources for additional resource(s).

Process/Skill Questions

- What trees produce hard mast?
- How do environmental factors influence species location?
- What characteristics are used to identify trees?
- How is leaf size affected by the tree's environment?
- How are simple leaves distinguished from compound leaves?
- What are trade-offs between native and nonnative plants?
- How do invasive plants affect native ecosystems?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.01.02. Classify different types of natural resources in order to enable protection, conservation, enhancement, and management in a particular geographical region.

PS.02.01. Classify plants according to taxonomic systems.

Task Number 54

Explain how to identify the age of the tree.

Definition

Explanation should include

- growth of xylem and phloem and their aging into rings
- environmental effects on ring growth
- methods for counting rings.

Process/Skill Questions

- How are the rings in the trunk created?
- How can you tell when a drought occurred?
- Why is the ability to determine the age of a tree significant?
- How is an increment borer used?
- What does the color of the annual rings indicate about the environment?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

PS.02.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.

Determining Factors for Selection of Trees

Task Number 55

Explain the factors that influence tree growth.

Definition

Explanation should include the following factors:

- Aspect (i.e., direction of slope face)
- Climate zone/hardiness zone
- Competition
- Human activity (e.g., disturbance, pollution)
- Light
- Nutrient availability
- Pest prevalence
- Soils
- Topography
- Water availability

Process/Skill Questions

- How does aspect affect water availability?
- What species will thrive in the Appalachian Plateau? Valley and Ridge? Blue Ridge Mountains? Piedmont? Coastal Plain?
- How can buying tree stock from a reputable dealer, using the ANSI Z60 standards, help with future tree performance?
- How can surrounding structures create a microclimate?
- Why might the soil in an industrial area need to be amended before planting?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.01.05. Apply ecological concepts and principles to terrestrial natural resource systems.

NRS.02.02. Assess the impact of human activities on the availability of natural resources.

NRS.04.03. Prevent or manage introduction of ecologically harmful species in a particular region.

PS.01.01. Determine the influence of environmental factors on plant growth.

PS.01.02. Prepare and manage growing media for use in plant systems.

PS.01.03. Develop and implement a fertilization plan for specific plants or crops.

Task Number 56

Explain the characteristics required of trees living in urban areas.

Definition

Explanation should include

- tolerance of urban stressors such as heat, wind funneling, drought, reduced soil volume, poor soils, soil compaction, and air pollution
- growth habit
- mature size of tree
- resistance to storm damage and injury
- potential hazards and nuisances
- maintenance requirements
- aesthetic value.

Process/Skill Questions

- What is the difference between a forest tree and an urban tree?
- What are some maintenance issues of trees?
- What are three site characteristics that influence species selection?
- What trees are ideal for various urban environments (e.g., parking lots, parks, streets)?
- What are some site characteristics that might prohibit the planting of large trees?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.02.02. Assess the impact of human activities on the availability of natural resources.

NRS.02.03. Analyze how modern perceptions of natural resource management, protection, enhancement, and improvement change and develop over time.

PS.01.01. Determine the influence of environmental factors on plant growth.

PS.04.01. Evaluating, identifying, and preparing plants to enhance an environment.

Task Number 57

Describe the desirable and undesirable characteristics of various tree species.

Definition

Description should include

- defoliation
- fruit
- clearance requirements
- growth rates
- moisture requirements
- flowering
- scent
- rooting area
- hardiness
- allelopathy
- pest susceptibility
- invasiveness
- pollen.

Process/Skill Questions

- How are maintenance concerns different for a park and for a street?
- What trees require high levels of maintenance?
- What trees have showy flowers, fruit, or fall color?
- What are some undesirable characteristics of trees that might exclude them from urban areas?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.01.06. Apply ecological concepts and principles to living organisms in natural resource systems.

Task Number 58

Explain ecological factors impacting the establishment of trees in a developed area.

Definition

Explanation should include

- growing space (crown, roots)
- soil characteristics
- water availability
- sunlight
- microclimate
- proximity to traffic

- space restrictions
- resource availability
- tree risk
- debris
- access
- utility conflicts
- pollution.

Process/Skill Questions

- How do planting characteristics vary between a developed area and an open area?
- What are the most common limitations of trees in urban environments?
- What soil conditions and depth are required for growing trees?
- What are problems associated with establishing trees near solid structures?
- What is the relationship between tree uses and site selection?
- What species should be avoided adjacent to a fishpond? Why?
- What technologies and/or techniques are available to provide extra room for tree roots?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.01.05. Apply ecological concepts and principles to terrestrial natural resource systems.

PS.01.01. Determine the influence of environmental factors on plant growth.

Exploring the Use of Woody Plants in the Landscape

Task Number 59

Compare the site characteristics of open and developed spaces.

Definition

Comparison should include

- park settings
- street settings
- residential settings
- commercial settings.

Process/Skill Questions

- Which species can tolerate park settings? Residential settings? Commercial settings?
- What characteristics of trees should be considered when selecting them for parks? Residential settings? Commercial settings?
- How does soil differ in landscapes around buildings and in parks?
- What characteristics of trees should be considered when selecting trees for streetscapes?
- What trees do not work well in streetscapes? Residential settings? Commercial settings? Why?
- How would you compare water availability in parks to water availability for city street plantings?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

ESS.02.03. Examine and summarize the impact of public perceptions and social movements on the regulation of environmental service systems.

NRS.01.05. Apply ecological concepts and principles to terrestrial natural resource systems.

NRS.02.02. Assess the impact of human activities on the availability of natural resources.

NRS.02.03. Analyze how modern perceptions of natural resource management, protection, enhancement, and improvement change and develop over time.

Task Number 60

Evaluate a landscape plan that uses woody plants.

Definition

Evaluation should include consideration of

- bed patterns
- construction materials
- safety and construction-method requirements
- walks and paths
- trees to maximize winter sun energy, minimize summer heat, design windbreaks, and frame a view
- visual screens.

See Instructional Resources for additional resource(s).

Process/Skill Questions

- Why should newly planted trees be staked?
- What kind of barriers can trees provide?
- What should you consider when selecting trees for a landscape plan?
- How might landscape affect microclimate?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

PS.04.01. Evaluating, identifying, and preparing plants to enhance an environment.

Task Number 61

Evaluate a development plan that uses woody plants.

Definition

Evaluation should include consideration of

- trees to maximize winter sun energy, minimize summer heat, design windbreaks, and frame a view
- tree preservation
- species diversity
- environmental services
- soil volumes
- canopy coverage
- visual screens
- code requirements.

Process/Skill Questions

- What is the 30-20-10 rule?
- What are the most challenging code requirements, and how were they met?
- What kinds of environmental services can trees provide to a development?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

ESS.03.05. Apply ecology principles to environmental service systems.

NRS.01.01. Apply methods of classification to examine natural resource availability and ecosystem function in a particular region.

PS.04.01. Evaluating, identifying, and preparing plants to enhance an environment.

Task Number 62

Interpret tree ordinances.

Definition

Interpretation should include differentiating between ordinances, policies, and plans; citing the state legislation that allows the local government to enact the ordinance; and describing how ordinances aid in attaining goals by

- designating responsibilities
- developing comprehensive management plans
- resolving conflicts between trees and structures
- establishing planting and maintenance plans
- clarifying public nuisances
- establishing conservation procedures.

Process/Skill Questions

- What are the purposes of a tree ordinance?
- What are the benefits of having tree ordinances in urban areas?
- What are some reasons to establish a tree ordinance in your community?
- What federal regulations affect development plans?
- What differences exist between ordinances for trees in forests and trees in built environments?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

ESS.02.01. Interpret and evaluate the impact of laws, agencies, policies and practices affecting environmental service systems.

NRS.02.01. Examine and interpret the purpose, enforcement, impact, and effectiveness of laws and agencies related to natural resource management, protection, enhancement, and improvement (e.g., water regulations, game laws, historic preservation laws, environmental policy, etc.).

Maintaining and Caring for Trees

Task Number 63

Explain the benefits of proper tree maintenance.

Definition

Explanation should include the benefits to both trees and humans, such as the following:

- Greater tree survivorship and longevity
- Reduced hazards and conflicts
- Reduced long-term costs

- Reduced vulnerability to storm damage
- Reduced disruptions in storm events
- Reduced vulnerability to pests
- Improved ecological function
- Improved amenity
- Improved value

Explanation should also include an awareness of ANSI A300 and ANSI Z133 standards.

Process/Skill Questions

- Why do trees in urban areas require maintenance?
- What are the basic objectives of tree maintenance?
- How does proper tree maintenance promote overall tree health?
- How do you determine when a tree requires maintenance?
- What are the proper pruning techniques for woody plants?
- How can an IPM plan improve the overall health of a forest?
- When would it be appropriate to use growth-regulation practices?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.01. Demonstrate natural resource protection, maintenance, enhancement, and improvement techniques.

Task Number 64

Identify conditions that signal a need for tree care.

Definition

Identification should include

- hazard and conflict recognition
- condition and vitality assessment
 - lightning strike
 - ice damage
 - wind damage
 - signs and symptoms of insect damage or disease
 - deadwood in the branches
 - girdling roots
 - age of tree
 - poor structure
 - included bark
 - co-dominant leaders
 - mechanical damage

- cavities
- cankers
- sun scald.

Process/Skill Questions

- What are branch and trunk defects that indicate the need for maintenance?
- What are health and vitality characteristics that indicate the need for maintenance?
- What are symptoms of soil deficiencies?
- What are the characteristics of a tree that has been struck by lightning?
- What are characteristics of disease and insect damage?
- How would you respond as a tree-care professional to co-dominant leaders?
- What are some methods to reduce the risk of mechanical damage to young trees?
- How can you improve the structure of a young tree to encourage the type of growth desired in a mature tree?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.01. Demonstrate natural resource protection, maintenance, enhancement, and improvement techniques.

Task Number 65

Describe various types of tree care.

Definition

Description should include

- lightning protection systems
- cabling and bracing
- pruning
- root pruning
- soil management
- fertilization
- watering
- integrated vegetation management

and an awareness of ANSI A300 standards.

Process/Skill Questions

- What symptom would indicate the need for root pruning?
- What is a lightning protection system?
- When would cabling and bracing have to be used?

- Why is it important to not seal tree wounds?
- What is the importance of ANSI A300 standards?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.01. Demonstrate natural resource protection, maintenance, enhancement, and improvement techniques.

Task Number 66

Describe types of damage that can be caused by trees.

Definition

Description should include

- damage to structures and property by fallen trees
- damage to utilities by fallen trees
- fire caused by trees across power lines
- blocked roads
- damage caused by residual risk.

Process/Skill Questions

- What liabilities exist with having trees in the urban area?
- How can storm damage be minimized?
- How can damage to utilities be minimized?
- Why is obtaining the Tree Risk Assessment Qualification (TRAQ) beneficial to an arborist? To the arborist's employer?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.02.02. Assess the impact of human activities on the availability of natural resources.

Exploring Tree Diseases

Task Number 67

Identify signs and symptoms of tree disease.

Definition

Identification should include

- abnormal swelling
- cankers
- dieback
- stunted leaves
- flagging
- discoloration
- fungal fruiting bodies
- rot.

Process/Skill Questions

- What is a sign of tree disease?
- What is a symptom of tree disease?
- How can symptoms be used to identify diseases?
- What are the causes of Dutch elm disease?
- How does the American forest industry address widespread disease, such as Dutch elm disease and others?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.02. Diagnose plant and wildlife diseases and follow protocols to prevent their spread.

Task Number 68

Identify the causes of disease in Virginia's common trees.

Definition

Identification should include

- viral
- fungal
- bacterial.

Process/Skill Questions

- What pathogen is responsible for Dutch elm disease?
- What pathogen causes dogwood anthracnose?
- What pathogen causes chestnut blight?
- What is being done in Virginia to combat disease concerns?
- What factors should be considered when determining tree disease management in urban settings?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.02. Diagnose plant and wildlife diseases and follow protocols to prevent their spread.

Task Number 69

Explain how tree diseases are transmitted.

Definition

Explanation should include

- wind
- water
- animal vectors
- poor sanitation
- propagation
- root grafting.

Process/Skill Questions

- What are some ways that pathogens can be transmitted?
- How can you prevent the transmission of pathogens?
- What are some ways to reduce the risk of animal vectors?
- Which vectors are difficult to control under most urban forestry conditions? Why?
- What sanitation concerns surround a forested area that could affect disease transmission?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.02. Diagnose plant and wildlife diseases and follow protocols to prevent their spread.

Task Number 70

Explain the importance of sanitation in preventing tree diseases.

Definition

Explanation should include

- definition of *sanitation*
- effects of unsanitary tools and equipment
- effects of contaminated debris.

Process/Skill Questions

- What risks are presented by tools that have not been sanitized?
- How do you sanitize tools and equipment?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.02. Diagnose plant and wildlife diseases and follow protocols to prevent their spread.

Investigating Pests

Task Number 71

Evaluate the damage done to urban forests by pests.

Definition

Evaluation should include

- aesthetic
- economic
- environmental
- temporal.

Process/Skill Questions

- What can an insect pest do to a tree?
- How do insect pests affect the beauty of an urban forest?
- How do pests affect the ecological function of an urban forest?
- How do insect pests affect the economic value of an urban forest?
- What are some examples of secondary effects or damage caused by pests?
- How can pests change the dynamics of an urban forest?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.02. Diagnose plant and wildlife diseases and follow protocols to prevent their spread.

NRS.04.03. Prevent or manage introduction of ecologically harmful species in a particular region.

PS.03.03. Develop and implement a plan for integrated pest management for plant production.

Task Number 72

Identify signs and symptoms of an insect infestation.

Definition

Identification should include signs and symptoms of various types of insect damage, such as

- boring
- leaf mining
- sucking
- chewing
- tenting
- frass.

Process/Skill Questions

- What does leaf miner damage look like?
- How can you identify insect chewing damage?
- What are the signs of sucking insect infestation?
- How are boreholes from insects different from those created by other pests?
- How can you distinguish between signs of sucking insects and damage caused by nutrient deficiencies?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.03. Prevent or manage introduction of ecologically harmful species in a particular region.

PS.03.03. Develop and implement a plan for integrated pest management for plant production.

Task Number 73

Identify categories of pests.

Definition

Identification should include

- insects
- mites
- mammals
- worms
- birds
- plants.

Process/Skill Questions

- What damage is caused by the emerald ash borer?
- What damage is caused by the southern pine beetle?
- What are examples of the damage caused by mammalian pests?
- What damage is caused by the gypsy moth?
- How can plants be considered pests in the urban forest?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.01.02. Classify different types of natural resources in order to enable protection, conservation, enhancement, and management in a particular geographical region.

PS.03.03. Develop and implement a plan for integrated pest management for plant production.

Task Number 74

Describe conditions that encourage insect infestation.

Definition

Description should include

- lack of biodiversity and non-native plants
- lack of crown
- injury
- soil disturbance
- age
- water quality
- chemical and environmental factors
- genetic factors
- plant stress.

Process/Skill Questions

- How does a lack of biodiversity (monoculture) encourage insect infestation?
- How does injury to a tree encourage insect infestation?
- How do water and soil quality encourage insect infestation?
- How does the use of native species prevent insect infestation?
- How does the protection of the soil prevent insect infestation?
- How does the age of a tree affect its level of infestation?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.03. Prevent or manage introduction of ecologically harmful species in a particular region.

PS.03.03. Develop and implement a plan for integrated pest management for plant production.

Task Number 75

Explain integrated pest management (IPM).

Definition

Explanation should include

- field scouting
- counts
- thresholds
- spray records
- field mapping
- biological controls
- mechanical controls
- chemical controls
- cultural controls
- related advances in biotechnology
- environmental and economic benefits.

Process/Skill Questions

- What is the purpose of IPM?
- What are the advantages of IPM?
- Why are threshold levels important?
- What are ways that IPM can be used to control pests?
- What are examples of biological control agents used for insect infestations?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

PS.03.03. Develop and implement a plan for integrated pest management for plant production.

Task Number 76

Explain management concerns related to non-insect pests (e.g., deer, rabbits, pigs, plants).

Definition

Explanation should include

- types of damage
- control methods
- regulatory agency oversight
- legal restrictions (e.g., federal, state, local).

Process/Skill Questions

- What are the various programs employed by the Virginia Department of Game and Inland Fisheries to control damage-causing pests, such as deer?
- What are some social impacts of managing non-insect pests?
- What are some economic impacts of deer population management?
- What are the methods used to control nuisance rabbit populations?
- How can IPM be used on non-insect pests?
- What are the benefits of sterilization of feral hog populations?

The National Council for Agricultural Education: Agriculture, Food and Natural Resources Content Standards

NRS.04.01. Demonstrate natural resource protection, maintenance, enhancement, and improvement techniques.

NRS.04.03. Prevent or manage introduction of ecologically harmful species in a particular region.

SOL Correlation by Task

39	Identify the role of supervised agricultural experiences (SAEs) in agricultural education.	English: 11.3, 11.5, 12.3, 12.5
40	Participate in an SAE.	English: 11.5, 11.8, 12.5, 12.8
41	Identify the benefits and responsibilities of FFA membership.	English: 11.5, 11.6, 11.7, 11.8, 12.5, 12.6, 12.7, 12.8
42	Describe leadership characteristics and opportunities as they relate to agriculture and FFA.	English: 11.5, 12.5

		History and Social Science: VUS.8, VUS.9, VUS.10, VUS.11, WHII.8, WHII.10, WHII.11
43	Apply for an FFA degree and/or an agricultural proficiency award.	English: 11.5, 12.5
44	Define terms related to urban and community forestry.	English: 11.3, 11.5, 12.3, 12.5 History and Social Science: WG.16
45	Explain the aesthetic value of trees.	English: 11.5, 12.5 History and Social Science: WG.2
46	Explain the environmental benefits of trees.	English: 11.5, 12.5 History and Social Science: WG.2
47	Explain the social value of trees.	English: 11.5, 12.5 History and Social Science: WG.2, WG.16
48	Explain the economic value of trees.	English: 11.5, 12.5 History and Social Science: VUS.14, WG.2, WG.4
49	Explain the health value of trees.	English: 11.5, 12.5 History and Social Science: WG.2
50	Describe the ways in which trees are classified and named.	English: 11.5, 12.5
51	Explain the anatomy of trees.	English: 11.5, 12.5
52	Explain the physiology of trees.	English: 11.3, 11.5, 12.3, 12.5
53	Identify native and nonnative woody species.	English: 11.5, 11.8, 12.5, 12.8
54	Explain how to identify the age of the tree.	English: 11.5, 12.5
55	Explain the factors that influence tree growth.	English: 12.5
56	Explain the characteristics required of trees living in urban areas.	English: 12.5 History and Social Science: WG.2, WG.16
57	Describe the desirable and undesirable characteristics of various tree species.	English: 11.5, 12.5
58	Explain ecological factors impacting the establishment of trees in a developed area.	English: 11.5, 12.5
59	Compare the site characteristics of open and developed spaces.	English: 11.5, 12.5 History and Social Science: WG.2, WG.16
60	Evaluate a landscape plan that uses woody plants.	English: 11.5, 12.5
61	Evaluate a development plan that uses woody plants.	English: 11.5, 12.5
62	Interpret tree ordinances.	English: 11.5, 11.6, 11.7, 12.5, 12.6, 12.7 History and Social Science: GOVT.8, GOVT.15
63	Explain the benefits of proper tree maintenance.	English: 11.5, 12.5
64	Identify conditions that signal a need for tree care.	English: 11.5, 12.5
65	Describe various types of tree care.	English: 11.5, 12.5

66	Describe types of damage that can be caused by trees.	English: 11.5, 12.5 History and Social Science: WG.2
67	Identify signs and symptoms of tree disease.	English: 11.5, 12.5
68	Identify the causes of disease in Virginia's common trees.	English: 11.5, 12.5
69	Explain how tree diseases are transmitted.	English: 11.5, 12.5
70	Explain the importance of sanitation in preventing tree diseases.	English: 11.5, 12.5
71	Evaluate the damage done to urban forests by pests.	English: 11.5, 12.5 History and Social Science: WG.1, WG.2, WG.16
72	Identify signs and symptoms of an insect infestation.	English: 11.5, 12.5
73	Identify categories of pests.	English: 11.5, 12.5
74	Describe conditions that encourage insect infestation.	English: 11.5, 12.5 History and Social Science: WG.2
75	Explain integrated pest management (IPM).	English: 11.5, 12.5 History and Social Science: WG.2
76	Explain management concerns related to non-insect pests (e.g., deer, rabbits, pigs, plants).	English: 11.5, 12.5 History and Social Science: GOVT.8, WG.2

FFA Information

The National FFA is an organization dedicated to preparing members for leadership and careers in the science, business, and technology of agriculture. Local, state, and national activities and award programs provide opportunities to apply knowledge and skills acquired through agriculture education.

For additional information about the student organization, see the [National FFA website](#) and the [Virginia FFA Association website](#).

The following leadership development events are available for this course:

- [Agricultural Issues](#)
- [Employment Skills](#)
- [Extemporaneous Public Speaking](#)
- [Parliamentary Procedure](#)
- [Prepared Public Speaking](#)

The following career development events are available for this course:

- [Agricultural Technology and Mechanical Systems](#)
- [Agronomy](#)
- [Environmental & Natural Resources](#)
- [Floriculture](#)

- [Forestry](#)
- [Nursery/Landscape](#)

Entrepreneurship Infusion Units

Entrepreneurship Infusion Units may be used to help students achieve additional, focused competencies and enhance the validated tasks/competencies related to identifying and starting a new business venture. Because the unit is a complement to certain designated courses and is not mandatory, all tasks/competencies are marked “optional.”

Instructional Resources

Instructional Resources by Task

Task #40: Explain the aesthetic value of trees.

Resource: University of Washington School of Environmental and Forest Sciences. “Human Dimensions of Urban Forestry and Urban Greening.” <http://www.naturewithin.info/>.

Task #41: Explain the environmental benefits of trees.

Resource: Casey Trees and Davey Tree Expert Co. “National Tree Benefit Calculator.” <http://www.treebenefits.com/calculator/>.

Task #55: Evaluate a landscape plan that uses woody plants.

Resource: United States Department of Agriculture Forest Service. “i-Tree Design.” <https://www.itreetools.org/index.php>.

Task #58: Explain proper tree maintenance.

Resource: Virginia Cooperative Extension, Virginia Tech, and Virginia State University. “24 Ways to Kill a Tree.” <https://pubs.ext.vt.edu/430/430-210/430-210.html>.

Appendix: Credentials, Course Sequences, and Career Cluster Information

Industry Credentials: Only apply to 36-week courses

- College and Work Readiness Assessment (CWRA+)
- Customer Service Specialist (CSS) Examination
- Forest Products and Processing Assessment
- Landscape Management Certification Examination
- National Career Readiness Certificate Assessment
- Natural Resources Systems Assessment
- Urban Forestry Certification Test
- Workplace Readiness Skills for the Commonwealth Examination

Concentration sequences: *A combination of this course and those below, equivalent to two 36-week courses, is a concentration sequence. Students wishing to complete a specialization may take additional courses based on their career pathways. A program completer is a student who has met the requirements for a CTE concentration sequence and all other requirements for high school graduation or an approved alternative education program.*

- Agricultural Business Fundamentals I (8022/36 weeks)
- Agricultural Business Management III (8026/36 weeks)
- Agricultural Business Operations II (8024/36 weeks)
- Applied Agricultural Concepts (8072/18 weeks)
- Applied Agricultural Concepts (8073/36 weeks)
- Ecology and Environmental Management (8045/18 weeks)
- Ecology and Environmental Management (8046/36 weeks)
- Fisheries and Wildlife Management (8041/36 weeks)
- Forestry Management (8042/36 weeks)
- Forestry Management, Advanced (8044/36 weeks)
- Introduction to Natural Resources and Ecology Systems (8040/36 weeks)
- Outdoor Recreation, Parks, and Tourism Systems Management (8043/36 weeks)

Career Cluster: Agriculture, Food and Natural Resources	
Pathway	Occupations
Environmental Service Systems	Agricultural Products Sales Representative Environmental Compliance Inspector Environmental Sampling and Analysis Technician Hazardous Materials Handler Recycling Coordinator Secondary School Teacher Toxicologist Turf Farmer Water Conservationist
Natural Resources Systems	Ecologist Forest Manager, Forester Forest Technician Geological Technician Logging Equipment Operator Microbiologist Outdoor Recreation Guide

Career Cluster: Agriculture, Food and Natural Resources	
Pathway	Occupations
	Park Manager Park Technician Range Technician Wildlife Manager
Plant Systems	Agricultural Products Sales Representative Botanist Certified Crop Advisor Crop Grower Custom Harvester Forest Geneticist Golf Course Superintendent Machine Setter, Operator Ornamental Horticulturist Plant Breeder/ Geneticist Secondary School Teacher Soil and Plant Scientist Tree Surgeon Turf Farmer