

Turfgrass Management, Advanced

8054 36 weeks

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Course Description

Suggested Grade Level: 11 or 12

Prerequisites: 8051

Students continue to study the duties and tasks of professionals who establish and maintain turf in public areas such as golf courses; parks; athletic fields; school, industrial, and institutional campuses; and residential lawns.

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

8054	Tasks/Competencies
+	Identify the role of supervised agricultural experiences (SAEs) in agricultural education.
+	Participate in an SAE.
+	Identify the benefits and responsibilities of FFA membership.
+	Describe leadership characteristics and opportunities as they relate to agriculture and FFA.
○	Apply for an FFA degree and/or an agricultural proficiency award.
+	Investigate careers associated with the management and maintenance of turf in various industry sectors.

<input checked="" type="radio"/>	Investigate careers associated with the manufacture and sale of turf equipment and supplies.
<input checked="" type="radio"/>	Investigate careers associated with turf-related services.
<input checked="" type="radio"/>	Investigate careers associated with agricultural science, education, and public services.
<input type="radio"/>	Participate in the development of a training plan for work-based learning experiences (e.g., SAE) in the turfgrass industry.
<input checked="" type="radio"/>	Identify the components of an irrigation system.
<input checked="" type="radio"/>	Conduct experiments and exercises related to irrigation.
<input checked="" type="radio"/>	Debate issues surrounding water use and quality.
<input checked="" type="radio"/>	Explain considerations regarding the management of soil drainage.
<input checked="" type="radio"/>	Evaluate alternative drainage systems.
<input checked="" type="radio"/>	Keep records associated with management of a turf business.
<input checked="" type="radio"/>	Explain issues related to human resources management in the turf industry.
<input checked="" type="radio"/>	Develop an overview of pesticides.
<input checked="" type="radio"/>	Demonstrate safety guidelines related to pest management.
<input checked="" type="radio"/>	Apply principles of integrated pest management.
<input checked="" type="radio"/>	Manage weed pests.
<input checked="" type="radio"/>	Manage insect pests.
<input checked="" type="radio"/>	Manage turf diseases.
<input checked="" type="radio"/>	Identify cultural practices used in turf management.
<input checked="" type="radio"/>	Apply cultural turf management practices.
<input checked="" type="radio"/>	Identify equipment used to maintain synthetic turf surfaces.
<input checked="" type="radio"/>	Explain synthetic turf management practices.
<input checked="" type="radio"/>	Evaluate nutrient management practices in turfgrass systems.
<input checked="" type="radio"/>	Debate environmental issues related to the turf industry.
<input checked="" type="radio"/>	Debate alternative management practices for turf areas.
<input checked="" type="radio"/>	Demonstrate sprayer and spreader calibration.

<input type="radio"/>	Design a turf facility.
<input type="radio"/>	Perform maintenance and repair to general turf areas.
<input type="radio"/>	Perform equipment maintenance.
<input type="radio"/>	Perform athletic field setup.
<input checked="" type="radio"/>	Promote a turfgrass management business through social media.
<input checked="" type="radio"/>	Use digital resources common to the turfgrass industry.

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 Opportunities through FFA

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?

Investigating Careers in the Turfgrass Industry

Task Number 44

Investigate careers associated with the management and maintenance of turf in various industry sectors.

Definition

Investigation should include

- golf courses
- parks and recreational facilities
- municipal properties
- professional and semi-professional athletic facilities
- school grounds and college campuses
- commercial and residential lawns.

Jobs may include

- superintendent
- assistant superintendent
- crew supervisor
- spray technician
- irrigation technician
- groundskeeper/greenskeeper
- service technician
- nutrient planner.

Investigation should yield information about entry-level or advanced positions in the selected career area, including

- duties and tasks that make up the job
- educational and training requirements for career entry
- physical demands of the job
- working conditions

- economic considerations
- local, regional, and statewide job opportunities
- licensing/certification requirements.

Many websites offer career exploration resources, including the Virginia Department of Education's Career Planning Guide.

Process/Skill Questions

- What foundational experiences would prepare you for this career?
- What factors might influence you to choose this career?
- What communication skills will you need to succeed in a career with a diverse (e.g., bilingual, multicultural) workforce?
- What is the potential for professional growth in this career?
- What personal traits will help you succeed in this career?
- What technical and academic courses will help you prepare for this career?
- Other than money, what rewards (e.g., social interaction, personal growth, job satisfaction) do you want to gain from your career? Which of these rewards is most important to you? Why?
- What are the benefits of work-based learning experiences to career entry in the turfgrass industry?

Task Number 45

Investigate careers associated with the manufacture and sale of turf equipment and supplies.

Definition

Investigation may include

- science lab technician
- factory line supervisor
- factory line worker
- manufacturer's sales representative
- retail sales specialist
- equipment service technician
- sod farmer.

Investigation should yield information about entry-level or advanced positions in the selected career area, including

- duties and tasks that make up the job
- educational and training requirements for career entry
- physical demands of the job
- working conditions
- economic considerations
- local, regional, and statewide job opportunities

- licensing/certification requirements.

Many websites offer career exploration resources, including the Virginia Department of Education's Career Planning Guide.

Process/Skill Questions

- What foundational experiences would prepare you for this career?
- What factors might influence you to choose this career?
- What communication skills will you need to succeed in a career with a diverse (e.g., bilingual, multicultural) workforce?
- What is the potential for professional growth in this career?
- What personal traits will help you succeed in this career?
What technical and academic courses will help you prepare for this career?
- Other than money, what rewards (e.g., social interaction, personal growth, job satisfaction) do you want to gain from your career? Which of these rewards is most important to you? Why?
- What are the benefits of work-based learning experiences to career entry in the turfgrass industry?

Task Number 46

Investigate careers associated with turf-related services.

Definition

Investigation may include

- service contractor
- turf construction/renovation contractor (e.g., golf course, athletic fields, turf complexes)
- synthetic turf contractor
- equipment setup and service technician/mechanic
- turf service technician.

Investigation should yield information about entry-level or advanced positions in the selected career area, including

- duties and tasks that make up the job
- educational and training requirements for career entry
- physical demands of the job
- working conditions
- economic considerations
- local, regional, and statewide job opportunities
- licensing/certification requirements.

Many websites offer career exploration resources, including the Virginia Department of Education's [Career Planning Guide](#).

Process/Skill Questions

- What foundational experiences would prepare you for this career?
- What factors might influence you to choose this career?
- What communication skills will you need to succeed in a career with a diverse (e.g., bilingual, multicultural) workforce?
- What is the potential for professional growth in this career?
- What personal traits will help you succeed in this career?
- What technical and academic courses will help you prepare for this career?
- Other than money, what rewards (e.g., social interaction, personal growth, job satisfaction) do you want to gain from your career? Which of these rewards is most important to you? Why?
- What are the benefits of work-based learning experiences to career entry in the turfgrass industry?

Task Number 47

Investigate careers associated with agricultural science, education, and public services.

Definition

Investigation may include

- researcher
- chemist
- botanist
- geneticist
- plant science technician
- environmental science technician
- agricultural extension agent
- journalist/writer
- public relations agent
- agricultural education teacher.

Investigation should yield information about entry-level or advanced positions in the selected career area, including

- duties and tasks that make up the job
- educational and training requirements for career entry
- physical demands of the job
- working conditions
- economic considerations
- local, regional, and statewide job opportunities
- licensing/certification requirements.

Many websites offer career exploration resources, including the Virginia Department of Education's Career Planning Guide.

Process/Skill Questions

- What foundational experiences would prepare you for this career?
- What factors might influence you to choose this career?
- What communication skills will you need to succeed in a career with a diverse (e.g., bilingual, multicultural) workforce?
- What is the potential for professional growth in this career?
- What personal traits will help you succeed in this career?
- What technical and academic courses will help you prepare for this career?
- Other than money, what rewards (e.g., social interaction, personal growth, job satisfaction) do you want to gain from your career? Which of these rewards is most important to you? Why?
- What are the benefits of work-based learning experiences to career entry in the turfgrass industry?

Task Number 48

Participate in the development of a training plan for work-based learning experiences (e.g., SAE) in the turfgrass industry.

Definition

The instructional component of the training plan should be developed jointly by the student, his or her parent, the teacher, and the training sponsor. The plan should outline duties and tasks expected of the student both on the job and in the classroom.

Process/Skill Questions

- What are the benefits of work-based learning experiences to a chosen career in the turfgrass industry?
 - What criteria should be used to evaluate the effectiveness of a training plan?
 - What criteria should be used to evaluate a student's performance on the job?
 - What communication skills does one need to succeed in an internship environment?
 - How do work-based learning experiences compare with other pathways to career entry in the turfgrass industry, such as apprenticeship or technical school?
 - What skills do you expect to develop during an internship experience?
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Managing Turf Areas with Irrigation

Task Number 49

Identify the components of an irrigation system.

Definition

Identification should include

- pump systems
- controllers
- design
- startup and winterization
- back flow
- valves
- irrigation heads
- pipe selection
- controller to valve
- filters
- wireless systems
- remote sensors
- low-volume system components.

Process/Skill Questions

- What factors influence the selection of specific irrigation system components?
- Which components are easiest to replace?
- Why are backflow preventers so important?
- What is fertigation?

Task Number 50

Conduct experiments and exercises related to irrigation.

Definition

- Experiments should include evaporation tests, flow rates, and piping adaptations.
- Exercises should include sprinkler identification, sprinkler repair, water schedules (timing vs. soil), sprinkler system layout, irrigation system audit, and fundamental electricity principles.

Process/Skill Questions

- What is the effect of specific components on system performance?
- What local codes apply to irrigation systems?

Task Number 51

Debate issues surrounding water use and quality.

Definition

Debate should include issues such as

- testing of water used for irrigation
- testing for chemicals in the water source
- legal limitations on water use
- use of non-potable water sources.

Process/Skill Questions

- What factors influence the choice of water source?
- What are the advantages and disadvantages of various water sources?
- What laws and regulations may limit the use of water?

Task Number 52

Explain considerations regarding the management of soil drainage.

Definition

Explanation should include

- subsurface drainage (e.g., French drains, Cambridge-style systems)
- surface drainage
- slope percent calculations
- percolation tests
- soil types
- drainage/erosion/silt control
- use of filters
- equipment identification and use
- drainage setup (including hay, fence, rock, etc.)
- federal, state, and local regulations.

Process/Skill Questions

- What effect does the Chesapeake Bay Act have on soil drainage management?
- What is the correlation between slope and soil type concerning drainage?
- What are the advantages and disadvantages of various drainage systems as erosion control methods?

Task Number 53

Evaluate alternative drainage systems.

Definition

Evaluation should include examples of systems, such as

- bio filters
- plants that digest impurities and nutrient runoff
- holding ponds/catch ponds
- pumping systems.

Process/Skill Questions

- What criteria should be used when selecting a drainage system?
- What factors would influence the selection of an alternative system?

Managing a Turf Business

Task Number 54

Keep records associated with management of a turf business.

Definition

Keeping records may include

- time management records (e.g., employee log, daily activities)
- inventory
- safety data sheets (SDS) for hazardous materials
- local, state, and federal employment regulations
- pesticide application records
- fertilizer application records
- equipment maintenance
- equipment depreciation/replacement schedules
- budget
- fuel and power use
- water use
- weather logs.

Process/Skill Questions

- How can records be interpreted to improve management decisions?
- How does the use of different languages affect recordkeeping?
- What recordkeeping methods are best suited to a specific business? Why?

Task Number 55

Explain issues related to human resources management in the turf industry.

Definition

Explanation should include issues associated with a culturally diverse workforce, as well as the following elements of human resource management:

- Hiring
- Training/cross-training
- Benefits
- Insurance
- Compensation
- Licensure
- Communication
- Work schedules
- Safety
- Local, state, and federal employment regulations (e.g., OSHA)
- Evaluation
- Promotion
- Termination of employment

Process/Skill Questions

- What are characteristics of a valued employee of a turf maintenance business?
- What measures should an employer take to ensure employee safety?
- What criteria do employers use to evaluate employees?
- What is the employer's responsibility for training and retraining employees?
- What role do communication skills play in an employee's development and success?
- What are the benefits and risks of a multilingual, multicultural workforce?

Managing Natural and Synthetic Turfgrass Areas

Task Number 56

Develop an overview of pesticides.

Definition

Overview should include

- user responsibilities
- safety concerns and precautions
- legal issues
- interpretation of labels
- formulations of types of pesticides
- environmental effect of pesticides

- application equipment
- personal protective equipment (PPE).

Process/Skill Questions

- What are potential consequences of a failure to follow safety precautions, legal regulations, or label instructions regarding pesticide use?
- What is the importance of printing label information in different languages?
- What are environmental considerations related to pesticides, specifically run-off and leaching?

Task Number 57

Demonstrate safety guidelines related to pest management.

Definition

Demonstration should include following guidelines pertaining to

- simulations of handling pesticides
- use of PPE
- storage of pesticides and equipment
- simulations of the disposal of pesticides
- signs and symptoms of pesticide poisoning
- first aid
- SDS and "right to know"
- poison control
- label interpretation
- signage requirements
- notification requirements
- local, state, and federal regulations.

Demonstration includes simulations of techniques of application and use of equipment.

Process/Skill Questions

- What are the consequences of improper handling, application, or disposal of pesticides?
- What are the employee's responsibilities concerning pesticide safety? What are the employer's responsibilities?
- What are the guidelines to follow for administration of first aid?

Task Number 58

Apply principles of integrated pest management.

Definition

Application should include

- identifying pests, their hosts, and beneficial organisms (i.e., biological control)
- establishing scouting and monitoring guidelines for each pest species
- establishing an action threshold for the pest(s), timing of the introduction of management practices
- alternative management practices
- evaluating and implementing cultural practices and control tactics.

Process/Skill Questions

- What are the relationships among the different facets of integrated pest management?
- How do alternative management practices influence conventional management practices?
- How does monitoring reduce the need for chemical control?
- Why is it important to select tactics that are effective, economical, and have least impact on non-target species and the environment?
- Why is it important to select methods of control that will affect beneficial organisms as little as possible while suppressing the pest(s)?
- What are the differences among action threshold, economic threshold, and threshold?

Task Number 59

Manage weed pests.

Definition

Management should include

- identification of weeds
- life cycle as it affects application of controls and cultural practices
- preventive weed control
- cultural control
- chemical control
- mechanical control
- biological control
- management threshold.

Process/Skill Questions

- What are the consequences of improper weed identification?
- How does the life cycle of a weed affect management of the turf area?
- What factors determine management of noxious weeds?

Task Number 60

Manage insect pests.

Definition

Management should include

- identification of insects
- life cycle as it affects application of controls and cultural practices
- diagnosis of injury caused by pests
- management methods
- management threshold.

Process/Skill Questions

- What are the consequences of improper insect identification?
- How does the life cycle of an insect affect management of the turf area?
- What factors determine management of insect pests?

Task Number 61

Manage turf diseases.

Definition

Management should include

- identification of turf diseases
- contributing factors or causes (e.g., thatch, environment, weather)
- types of turf diseases
- prevention of diseases
- life cycle/stages of development of turf diseases
- management threshold.

Process/Skill Questions

- What are the consequences of improper turf disease identification?
 - How do the stages of development of a disease affect management of the turf area?
 - What factors influence management of turf diseases?
-

Task Number 62

Identify cultural practices used in turf management.

Definition

Identification should include

- aeration practices (e.g., core, deep-tine, linear aeration, hydrojecting)
- topdressing
- verticutting/dethatching
- slicing
- slit seeding
- rolling/cultipacking.

Process/Skill Questions

- How do cultural turf practices benefit the turf and soil?
- What is the difference between solid-tine and hollow-tine aeration?
- What are the benefits of topdressing? What are examples of topdressing materials?
- What factors determine the specific types of cultural turf practices needed?
- What are the latest technologies being used in turf management? What types of organic material reduce soil compaction?

Task Number 63

Apply cultural turf management practices.

Definition

Application may include

- turfgrass selection
- aeration practices (e.g., core, deep-tine, linear aeration, hydrojecting)
- fertilization
- irrigation
- cultivation
- overseeding
- topdressing
- fraze mowing
- verticutting/dethatching
- cultivation (e.g., slicing, core aerification, deep-tine aerification, deep-drill aerification, water injection cultivation, vertical mowing, deep vertical mowing, spiking)
- slit seeding, sprigging, sodding
- rolling/cultipacking.

Process/Skill Questions

- What is the most effective application of topdressing?
- When should cultural turf management practices be applied? How often?
- How does aeration help to reduce soil compaction?
- How does repeated aeration improve soil structure, oxygen, and water infiltration?
- How can improper seedbed preparation or preparation under adverse weather or soil moisture conditions result in complete seeding failure?

Task Number 64

Identify equipment used to maintain synthetic turf surfaces.

Definition

Identification should include

- ultraviolet (UV) lighting systems
- groomers
- sweepers
- irrigation equipment/systems
- sprayers
- painters.

Process/Skill Questions

- How is the equipment used to maintain synthetic turf different from the equipment used to maintain natural turf?
- Why are UV lighting systems used with synthetic turf?

Task Number 65

Explain synthetic turf management practices.

Definition

Explanation should include

- effects of traffic
- effects of heat
- surface hardness
- safety issues
- playability
- opportunities for use by multiple sports
- water use and drainage
- cleaning with special solvents and cleansers for difficult to remove items
- treating with anti-microbial products to remove bacterial growth
- costs of construction, maintenance, and disposal.

Process/Skill Questions

- What are the advantages and disadvantages of a synthetic turf field?
- How are the effects of compaction measured in modern synthetic turf systems? Why is it this a major issue in these systems?
- Why is it important to establish policies that prohibit the use of chewing gum, sunflower seeds, and chewing tobacco while on the field's surface?
- What are the health risks associated with synthetic turf fields? Natural turfgrass fields?

Addressing Environmental Issues

Task Number 66

Evaluate nutrient management practices in turfgrass systems.

Definition

Evaluation may include

- appropriate use of organic nutrient sources
- guidelines for nitrogen- and phosphorous-based fertilizers (i.e., Virginia Nutrient Management Standards and Criteria)
- appropriate response to soil test results
- effects of nutrient runoff
- certified nutrient plan guidelines
- local stormwater legislation.

Process/Skill Questions

- How are nutrient management strategies applied in modern turf systems?
- How important is the accuracy of soil test results? Explain.
- Why must we adhere to a quality nutrient management plan?
- What is the value of a quality soil sample?

Task Number 67

Debate environmental issues related to the turf industry.

Definition

Debate should include issues such as

- public perception
- wetland interactions
- land values
- chemical run-off from pesticides and fertilizers
- proximity of projects to major waterways
- effects on public water supply
- destruction of natural areas by construction.

Process/Skill Questions

- What are advantages and disadvantages of turfgrass areas?
- What are the positive and negative effects of turfgrass areas on the environment?
- How are turf management practices related to watershed management?
- What is the relationship between environmental concerns and property rights?

Task Number 68

Debate alternative management practices for turf areas.

Definition

Debate may include issues such as

- guidelines for low-impact pesticides
- environment-friendly fertilizers
- possibility of organics for pest control
- minimal water use/water conservation
- composting of clippings
- variations in mowing practices
- planting of trees.

Process/Skill Questions

- What are the environmental benefits of alternative management practices?
- What factors influence the use of alternative management practices?
- How do costs compare between traditional and alternative management practices?
- How can one reduce the negative impact on pollinators in turfgrass landscapes when using pesticides?
- What are some best-management practices for protecting non-target species?

Task Number 69

Demonstrate sprayer and spreader calibration.

Definition

Demonstration may include calibration of

- boom-type sprayer
- backpack/handheld sprayer
- drop spreader
- rotary spreader
- commercial lawn application equipment.

Process/Skill Questions

- How are boom-type sprayers calibrated?
- What would happen if a spreader/sprayer is used and is out of calibration?

- What calculations are required when calibrating a backpack sprayer?
 - How does one calculate pounds of product applied per thousand square feet?
 - How does one calibrate a broadcast spreader?
-
-

Managing a Turf Facility

Task Number 70

Design a turf facility.

Definition

Design includes

- planning
 - concept
 - funds
 - land and water
 - environmental factors
 - regulatory agencies/land-use and planning councils
 - existing resources
 - topography/natural resources
 - expectation level of design
 - budget for operations and maintenance
 - site selection
- site selection
 - economic criteria
 - physiographic criteria
 - soil suitability
 - site drainage
 - vegetation
 - power and water availability
 - zoning
- architecture
 - philosophy of design
 - principles of design

- purpose of facility
- standards and regulations pertaining to the facility.

Process/Skill Questions

- What major factors influence the planning of a turf facility?
- What laws and regulations (e.g., Americans with Disabilities Act, zoning regulations) need to be considered? How can adherence to these requirements be ensured?
- What criteria should be used to evaluate turf facility design? How can the design be improved?
- What considerations affect site selection?
- What resources are needed to implement the design?

Task Number 71

Perform maintenance and repair to general turf areas.

Definition

Performance may include

- out-of-play areas
- common spaces.

Process/Skill Questions

- What specific maintenance and repairs are normally performed on the high-traffic areas of athletic fields?
 - What considerations should be made when maintaining goal areas, out-of-play areas, and common spaces?
 - How can maintenance and repair to areas surrounding athletic fields be performed when they are in use?
-

Task Number 72

Perform equipment maintenance.

Definition

Performance may include

- preventive maintenance
- repairs and adjustments
- reel or rotary sharpening
- troubleshooting problems.

Process/Skill Questions

- Why is preventive maintenance important in the turf industry?
 - How does a preventive maintenance plan help with the overall condition of a piece of equipment?
-

Task Number 73

Perform athletic field setup.

Definition

Performance may include

- layout and painting of lines
- layout and painting of logos and numbers
- setup of all field equipment and paraphernalia
- stripe patterns in grass
- preparation of skinned areas on baseball and softball fields.

Process/Skill Questions

- Why is preparation of skinned areas on baseball and softball fields necessary?
 - Why is it important to plan and measure the field for layout and painting of lines?
 - What are some examples of preparation methods for skinned areas on baseball and softball fields?
 - What is the most efficient way to paint logos, lines, and numbers on athletic fields?
 - How are patterns created on turf grass?
-

Task Number 74

Promote a turfgrass management business through social media.

Definition

Promotion should include responsible use of social media to share information with customers and stakeholders.

Process/Skill Questions

- What types of information might be shared to promote a business?
- How often should social media be used to promote a business?
- What are examples of posts that might attract new customers?

Task Number 75

Use digital resources common to the turfgrass industry.

Definition

Use may include mobile apps for management of turfgrass facilities, including

- measurement
- diagnostics
- applications
- global positioning system (GPS) software
- geographic information system (GIS) software
- business apps
- drones.

Process/Skill Questions

- What apps are commonly used in the management of turfgrass facilities?
- How are drones used in turfgrass management?
- What are the potential applications in turfgrass management and diagnostics for remote sensing devices and aerial, hand-held, and equipment-mounted sensors coupled with GPS and GIS?
- What is precision turfgrass management?

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	Investigate careers associated with the management and maintenance of turf in various industry sectors.	English: 11.5, 11.8, 12.5, 12.8
45	Investigate careers associated with the manufacture and sale of turf equipment and supplies.	English: 11.5, 11.8, 12.5, 12.8
46	Investigate careers associated with turf-related services.	English: 11.5, 11.8, 12.5, 12.8
47	Investigate careers associated with agricultural science, education, and public services.	English: 11.5, 11.8, 12.5, 12.8
48	Participate in the development of a training plan for work-based learning experiences (e.g., SAE) in the turfgrass industry.	
49	Identify the components of an irrigation system.	English: 11.5, 12.5
50	Conduct experiments and exercises related to irrigation.	
51	Debate issues surrounding water use and quality.	English: 11.1, 12.1

		History and Social Science: GOVT.1, GOVT.9, GOVT.15, WG.1, WG.2, WG.3, WG.4 Science: ES.6
52	Explain considerations regarding the management of soil drainage.	English: 11.5, 12.5 Mathematics: A.1, A.4, A.6
53	Evaluate alternative drainage systems.	English: 11.5, 12.5
54	Keep records associated with management of a turf business.	English: 11.6, 11.7, 12.6, 12.7 History and Social Science: VUS.8, WHII.8
55	Explain issues related to human resources management in the turf industry.	English: 11.5, 12.5 History and Social Science: WG.4
56	Develop an overview of pesticides.	English: 11.1, 11.5, 12.1, 12.5 History and Social Science: GOVT.1, GOVT.9, GOVT.10, GOVT.15, WG.1, WG.18
57	Demonstrate safety guidelines related to pest management.	
58	Apply principles of integrated pest management.	English: 11.5, 12.5
59	Manage weed pests.	
60	Manage insect pests.	Science: BIO.4
61	Manage turf diseases.	
62	Identify cultural practices used in turf management.	English: 11.5, 12.5
63	Apply cultural turf management practices.	English: 11.5, 12.5
64	Identify equipment used to maintain synthetic turf surfaces.	English: 11.5, 12.5
65	Explain synthetic turf management practices.	English: 11.5, 12.5
66	Evaluate nutrient management practices in turfgrass systems.	English: 11.5, 11.8, 12.5, 12.8
67	Debate environmental issues related to the turf industry.	English: 11.1, 12.1 History and Social Science: GOVT.9, GOVT.10, GOVT.15, WG.1, WG.18 Science: BIO.8
68	Debate alternative management practices for turf areas.	English: 11.1, 12.1 History and Social Science: VUS.14, WG.17, WHII.14
69	Demonstrate sprayer and spreader calibration.	
70	Design a turf facility.	English: 11.1, 12.1 Mathematics: G.3
71	Perform maintenance and repair to general turf areas.	
72	Perform equipment maintenance.	

73	Perform athletic field setup.	
74	Promote a turfgrass management business through social media.	English: 11.2, 12.2
75	Use digital resources common to the turfgrass industry.	English: 11.2, 12.2 History and Social Science: VUS.14, WG.17, WHII.14

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](#).

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.”

Appendix: Credentials, Course Sequences, and Career Cluster Information

Industry Credentials: Only apply to 36-week courses

- Certified Turfgrass Professional Examination
- Chesapeake Bay Landscape Professional, Associate (CBLP-A) Examination
- College and Work Readiness Assessment (CWRA+)
- Customer Service Specialist (CSS) Examination
- Landscape Management Certification Examination
- National Career Readiness Certificate Assessment
- Turfgrass Management Certification Program Examination
- 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)
- Horticulture Sciences (8034/36 weeks)
- Introduction to Plant Systems (8007/36 weeks)
- Introduction to Power, Structural, and Technical Systems (8016/36 weeks)
- Landscaping I (8036/36 weeks)
- Landscaping II (8039/36 weeks)
- Turfgrass Management (8051/36 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 Secondary School Teacher Turf Farmer
Plant Systems	Golf Course Superintendent

Career Cluster: Science, Technology, Engineering and Mathematics	
Pathway	Occupations
Science and Mathematics	Botanist Plant Breeder and Geneticist