

Nursery Operation

Exam Information	Description														
Exam number 134	The Nursery Operation industry certification exam assesses learners' knowledge and skills in nursery operation practices. The exam evaluates their ability to select appropriate plant materials, design, install, and maintain interior and exterior plantings and hardscapes. Learners also demonstrate their skills in maintaining the facilities and equipment associated with the industry.														
Items 49															
Points 51	Exam Blueprint														
Prerequisites None	<table><tr><th>Standard</th><th>Percentage of exam</th></tr><tr><td>1. Leadership Development</td><td>4%</td></tr><tr><td>2. Work-Based Learning</td><td>4%</td></tr><tr><td>3. Nursery Components</td><td>33%</td></tr><tr><td>4. Integrated Pest Management</td><td>20%</td></tr><tr><td>5. Irrigation Systems</td><td>29%</td></tr><tr><td>6. Nursery Business Concepts</td><td>10%</td></tr></table>	Standard	Percentage of exam	1. Leadership Development	4%	2. Work-Based Learning	4%	3. Nursery Components	33%	4. Integrated Pest Management	20%	5. Irrigation Systems	29%	6. Nursery Business Concepts	10%
Standard	Percentage of exam														
1. Leadership Development	4%														
2. Work-Based Learning	4%														
3. Nursery Components	33%														
4. Integrated Pest Management	20%														
5. Irrigation Systems	29%														
6. Nursery Business Concepts	10%														
Recommended course length One semester															
National Career Cluster Agriculture, Food & Natural Resources															
Performance standards Included (Optional)															
Certificate available Yes															

Standard 1

Student will participate in personal and leadership development activities through the FFA.

Objective 1 Student will use communication skills to effectively communicate with others.

1. Understand when it is appropriate to listen and to speak.
2. Understand and follow verbal and written instructions for classroom and laboratory activities.
3. Will practice communication skills through public speaking using one or more of the following activities: memorized speech, prepared speech, extemporaneous speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Objective 2 Student will effectively use teamwork to respectfully work with others.

1. Identify and understand different roles in working with a team.
2. Lead a group discussion or serve in a leadership capacity.

Objective 3 Student will use critical thinking and problem-solving skills.

1. Analyze the cause of the problem.
2. Develop a solution to address the problem.
3. Implement the plan.
4. Evaluate the effectiveness of the plan.

Objective 4 Student will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

1. Set and meet goals on attendance and punctuality.
2. Prioritize, plan, and manage work to complete assignments and projects on time.

Objective 5 Students will be accountable for results.

1. Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
2. Use reflection to describe what was learned, what went well, what could have been improved, and what are the implications to the learning process.
3. Track and communicate progress toward completion of assignments and projects.

Objective 6 Be familiar with the legal requirements and expectations of the course.

1. Be familiar with the course disclosure statement and all requirements for successful completion of the course.
2. Demonstrate workplace ethics, e.g., fair, honest, disciplined.

Standard 1 Performance Evaluation included below (Optional)

Standard 2

Student will participate in work-based learning activities through the Supervised Agricultural Experience (SAE) Program.

Objective 1 Student will demonstrate employability skills.

1. Use a career search network to find career choices.
2. Identify appropriate CTE Pathway for selected career choice.
3. Prepare for entry into the workforce by completing one of the following: list of required skills needed for a career choice, a resume including a list of demonstrated skills, a cover letter or letter of application, a job application, or participate in an actual or simulated job interview.

Objective 2 Student will participate in a work-based learning experience outside the classroom.

1. Students will plan and implement a Supervised Agricultural Experience Program:
2. Foundational SAE: Career exploration and planning, employability skills for college and career readiness, personal financial management and planning, workplace safety, and agricultural literacy.
3. Immersion SAE: Ownership/entrepreneurship, placement/internship, research, school-based enterprise, and/or service-learning experiences.

Objective 3 Student will develop a job portfolio specific to their selected SAE/WBL experience.

1. Student will keep a personal record/journal/log of their SAE/WBL experience; including pictures, financial records or log of their hours, skills learned, goals, reflection, etc.

Standard 2 Performance Evaluation included below (Optional)

Standard 3

Students will demonstrate an understanding of nursery components.

Objective 1 Explain nursery practices.

1. Compare the different types of nurseries, i.e., wholesale, retail, etc.
2. Explain how a plant hardiness zone map and plant heat-zone map are used.
3. Describe the three types of packaging of nursery crops and contrast the advantages and disadvantages of each (e.g., ball and burlap, container, and bare root).
4. Explain how nursery stock is measured (e.g., trunk diameter, height, container size, etc.).
5. Determine factors for selecting a nursery site.

Objective 2 Identify and categorize nursery plants.

1. Explain systems used to classify plants.
2. Classify nursery plants according to the hierarchical classification system, life cycles, plant use, and status as monocotyledons or dicotyledons.
3. Identify flowering and shade trees.
4. Identify fruit and nut trees and shrubs.
5. Identify ornamental trees and shrubs.
6. Identify ornamental grasses, ground covers, and vines

Objective 3 Propagate nursery crops.

1. Compare and contrast sexual and asexual reproduction in nursery crops.
2. Diagram the process of plant pollination and fertilization of flowering plants.

3. Describe the process and conditions required for seed germination.
4. Demonstrate techniques for growing nursery crops from seed.
5. Describe optimal conditions for asexual propagation.
6. Demonstrate techniques used to propagate plants by grafting, cutting, division, separation, and layering.
7. Transplant nursery crops.

Objective 4 Describe proper tree and shrub maintenance practices and procedures.

1. Identify symptoms of water stress in trees and shrubs.
2. Explain recommended watering practices for trees and shrubs.
3. Identify symptoms of nutrient deficiency in trees and shrubs.
4. Explain guidelines for fertilizing trees and shrubs.
5. Describe how mulching and composting are used to retain moisture and supplement nutrients in nursery operations.
6. Identify tools used for pruning trees and shrubs.
7. Demonstrate various techniques for pruning trees and shrubs.
8. Describe the use of growth regulators in tree and shrub production.

Objective 5 Examine the physical and chemical properties of growing media in a nursery application.

1. Describe the components of growing media.
2. Describe the functions of growing media.
3. Determine desirable properties of growing media.
4. Evaluate the advantages and disadvantages of soilless media.
5. Demonstrate proper techniques for sampling growing media.
6. Test and determine pH level of various growing media.
7. Interpret pH test results of a growing medium sample.
8. Describe pH and how it is modified.

Standard 3 Performance Evaluation included below (Optional)

Standard 4

Students will describe integrated pest management in a nursery operation.

Objective 1 Describe the principles of integrated pest management (IPM).

1. Explain IPM.
2. Identify benefits of IPM.
3. Describe pest control strategies associated with IPM.

Objective 2 Identify plant pests and diseases and their causes.

1. Identify types of plant pests and disorders.
2. Identify plant, insect, animal, and fungal pests.
3. Identify infectious and noninfectious plant diseases.

Objective 3 Explain procedures for the safe handling, use, and storage of pesticides.

1. Explain risks and benefits associated with the materials and methods used in plant pest management.
2. Interpret pesticide labels.
3. Explain procedures for mixing and storing pesticides.
4. Describe types of pesticide controls and formulations.
5. Explain the safety practices that should be followed when applying pesticides.
6. Describe the proper disposal of surplus pesticides and empty containers.
7. Evaluate environmental and consumer concerns regarding pest management strategies.

Standard 4 Performance Evaluation included below (Optional)

Standard 5

Students will demonstrate an understanding of nursery equipment and irrigation systems.

Objective 1 Plan, install, and maintain a nursery irrigation system.

1. Determine plant needs for irrigation.
2. Calculate water flow in gallons per minute (GPM).
3. Identify and select components of irrigation systems, including pipes and joints.
4. Plan and illustrate a distribution system.
5. Calculate the cost of the parts, supplies, and labor for system installation.
6. Cut, fit, and install PVC/poly pipes and fittings.
7. Install valves and emitters.
8. Perform an irrigation system test.
9. Replace or repair irrigation system components.

Objective 2 Demonstrate the use of equipment and tools in nursery operations.

1. Identify common equipment and tools and their use in nursery operations.
2. Explain the meaning and importance of the operator's manual.
3. Identify the location and use of controls on equipment.
4. Follow safe practices in the use of nursery operation equipment.

Objective 3 Properly maintain equipment used in nursery operations.

1. Complete basic tire inspections and perform maintenance for safe tire performance.
2. Check the oil level and add oil if necessary.
3. Check the fuel level and add fuel if necessary.
4. Service the air cleaner.

Standard 5 Performance Evaluation included below (Optional)

Standard 6

Students will explain nursery business concepts.

Objective 1 Prepare and price nursery plants for sale.

1. Assess typical markup and pricing strategies.
2. Attach price tags and care instructions.
3. Describe effective packaging and delivery.
4. Display nursery materials for sale.

Objective 2 Describe nursery business management.

1. Demonstrate customer relations skills.
2. Demonstrate the importance of effective inventory management.
3. Recognize costs related to nursery production.
4. Analyze the importance of marketing, promotion, and sales.
5. Describe career opportunities in the nursery industry.
6. Explain laws, codes, and regulations that affect the nursery industry.
7. Demonstrate the importance of safety for nursery operation employees.

Standard 6 Performance Evaluation included below (Optional)

Nursery Operation

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of 8 or higher on the rating scale. Students may be encouraged to repeat the objectives until they average 8 or higher.

Student's Name: _____

Class: _____

Performance standards rating scale

0	Limited skills	2	→	4	Moderate skills	6	→	8	High skills	10
---	----------------	---	---	---	-----------------	---	---	---	-------------	----

Standard 1 – Leadership Development

Score:

- Student will practice communication skills through public speaking using one or more of the following activities: memorized speech, prepared speech, extemporaneous speech, parliamentary practice, group presentation, or serving in a leadership capacity.

Standard 2 – Work-Based Learning

Score:

- Student will keep a personal record/journal/log of their SAE/WBL experience; including pictures, financial records or log of their hours, skills learned, goals, reflection, etc.

Standard 3 – Landscape Design Components

Score:

- Identify by name flowering and shade trees.
- Identify by name fruit and nut trees and shrubs. Identify by name ornamental trees and shrubs.
- Identify by name ornamental grasses, ground covers, and vines.

Standard 4 – Landscape Plant Practice**Score:**

- Identify by name types of plant pests and disorders.

Standard 5 – Irrigation Systems**Score:**

- Plan, install, and maintain a nursery irrigation system.

Performance standard average score:**Evaluator Name:** _____**Evaluator Title:** _____**Evaluator Signature:** _____**Date:** _____