Horticulture

01.0601

Career Cluster: Agriculture, Food & Natural Resources

Pathway: **Plant Systems Pathway**

Last Update: 2002

Title: Applied Horticulture/Horticulture Operations, General.

Definition:

A program that focuses on the general production and processing of domesticated plants, shrubs, flowers, foliage, trees, groundcovers, and related plant materials; the management of technical and business operations connected with horticultural services; and the basic scientific principles needed to understand plants and their management and care.

DIRECTIONS

Evaluate the student by checking the appropriate box to indicate the degree of Competency. The rating for each task should reflect **employability readiness** rather than the grades given in class.

**Rating Scale:**

1. **No exposure**
2. **Introduced**- the student has been exposed through non participatory instruction (e.g. lecture, demonstration, field trip, and video).
3. **Practiced**- the student can perform the task with direct supervision.
4. **Entry-Level Competency**- the student can perform the task with limited supervision and/or does not perform the task to standard (a typical entry-level performance expectation).
5. **Competency**- the student consistently performs task to standard with no supervision (on at least two occasions or at instructor’s option).

# SECTION I

## HORTICULTURE SCIENCE AND TECHNOLOGY FUNDAMENTALS

**0 1 2 3 4** A. Horticulture Careers

(Vermont Standards: 3.15, 3.16, 4.5)

**0 1 2 3 4** B. Plant Science Processes

(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11. 7.13)

**0 1 2 3 4** C. Plant Science Taxonomy

(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11. 7.13)

**0 1 2 3 4** D. Soil Science Concepts

(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11. 7.13)

**0 1 2 3 4** E. Plant Propagation: Sexual

(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11. 7.13)

**0 1 2 3 4** F. Plant Propagation: Asexual

(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11. 7.13)

**0 1 2 3 4** G. Pest Control

(Vermont Standards: 1.3, 1.10, 1.17, 1.19, 2.2, 7.1, 7.2, 7.8, 7.10, 7.11. 7.13)

## BUSINESS MANAGEMENT AND RECORD KEEPING

**0 1 2 3 4** A. Horticulture Enterprises

(Vermont Standards: 1.3, 1.8, 1.18, 1.22, 3.7, 7.6, 7.10, 7.18)

**0 1 2 3 4** B. Finance and Record Management

(Vermont Standards: 1.8, 2.5, 7.6, 7.10)

**0 1 2 3 4** C. Sources of Horticultural Information and Assistance

(Vermont Standards: 1.18, 1.19)

## SALES, MERCHANDISING, AND MARKETING

**0 1 2 3 4** A. Sales Tasks

(Vermont Standards: 1.11, 1.13, 1.15, 1.19, 1.22, 2.1, 3.3, 3.8, 3.11)

**0 1 2 3 4** B. Product and Service Advertising and Marketing

(Vermont Standards: 1.19, 2.3, 2.6, 5.15)

**0 1 2 3 4** C. Customer Services

(Vermont Standards: 1.13, 2.11, 3.3, 3.10, 3.12, 3.13)

## HORTICULTURE MECHANICS

**0 1 2 3 4** A. Horticulture Equipment Operation

(Vermont Standards: 1.3, 2.1, 2.2, 3.14, 7.7, 7.10, 7.11, 7.12)

**0 1 2 3 4** B. Safety Practices

(Vermont Standards: 1.3,1.15, 2.3, 3.5, 3.7)

## SECTION II

## GREENHOUSE OPERATION

**0 1 2 3 4** A. Plant Identification

(Vermont Standards: 1.19, 7.1)

**0 1 2 3 4** B. Greenhouse Plant Propagation

(Vermont Standards: 3.8, 7.6, 7.10, 7.13)

**0 1 2 3 4** C. Growing Mediums and Seed Beds

(Vermont Standards: 2.2, 3.14, 7.6, 7.8)

**0 1 2 3 4** D. Plant Environment Control

(Vermont Standards: 1.18, 2.1, 2.3, 3.14, 7.10, 7.11, 7.12, 7.19)

**0 1 2 3 4** E. Pest Control

(Vermont Standards: 1.18, 2.1, 2.3, 7.13, 7.19)

## NURSERY OPERATION

**0 1 2 3 4** A. Nursery Plant Identification

(Vermont Standards: 1.19, 7.1)

**0 1 2 3 4** B. Nursery Plant Propagation

(Vermont Standards: 3.8, 7.6, 7.10, 7.13)

**0 1 2 3 4** C. Growing Mediums and Seed Beds

(Vermont Standards: 2.2, 3.14, 7.6, 7.8)

**0 1 2 3 4** D. Plant Environment Control

(Vermont Standards: 1.18, 2.1, 2.3, 3.14, 7.10, 7.11, 7.12, 7.19)

**0 1 2 3 4** E. Pest Control

(Vermont Standards: 1.18, 2.1, 2.3, 7.13, 7.19)

## RETAIL FLORIST

**0 1 2 3 4** A. Floral Design

(Vermont Standards: 1.3, 1.16, 1.18, 2.2, 2.13, 3.8, 3.14, 5.15, 7.6, 7.10)

**0 1 2 3 4** B. Plant Environment Control

(Vermont Standards: 1.3, 3.13, 7.10, 7.13)

**0 1 2 3 4** C. Pest Control

(Vermont Standards: 1.18, 2.1, 2.3, 7.13, 7.19)

## LANDSCAPE/TURF SERVICES

**0 1 2 3 4** A. Landscape Plant Identification

(Vermont Standards: 1.18, 1.19, 2.2, 7.13)

**0 1 2 3 4** B. Landscape Area Preparation

(Vermont Standards: 1.18, 1.22, 2.1, 2.2, 3.8, 5.15, 7.6, 7.7, 7.10)

**0 1 2 3 4** C. Trees, Shrubs, Ground Cover, and Flowers Planting

(Vermont Standards: 1.19, 2.1, 7.6, 7.7, 7.10, 7.13)

**0 1 2 3 4** D. Turf and Lawn Establishment and Renovation

(Vermont Standards: 1.16, 1.19, 2.2, 3.8, 5.15, 7.7, 7.10, 7.11)

**0 1 2 3 4** E. Tree, Shrub, Ground Cover, and Flower Maintenance

(Vermont Standards: 1.18, 2.1, 2.2, 3.14, 7.13)

**0 1 2 3 4** F. Landscape Design

(Vermont Standards: 1.16, 1.19, 2.1, 2.2, 3.8, 5.15, 7.6, 7.7, 7.19)

**0 1 2 3 4** G. Pest Control

(Vermont Standards: 1.18, 1.19, 2.1, 2.2, 3.14, 7.6, 7.13)

## ARBORIST SERVICES

**0 1 2 3 4** A. Tree Care and Maintenance

(Vermont Standards: 1.3, 1.8, 2.2, 3.13, 3.14, 7.8, 7.10, 7.12, 7.13, 7.16)

**0 1 2 3 4** B. Pest Control

(Vermont Standards: 1.3, 1.91, 2.1, 3.7, 7.10, 7.13)

## FRUIT AND VEGETABLE PRODUCTION

**0 1 2 3 4** A. Soil Management

(Vermont Standards: 1.3, 1.18, 2.1, 3.9, 7.6, 7.11, 7.13)

**0 1 2 3 4** B. Soil Preparation for Planting

(Vermont Standards: 1.3, 3.7, 7.1, 7.6, 7.13)

**0 1 2 3 4** C. Crop Planting/Transplanting

(Vermont Standards: 1.3, 2.1, 3.14, 7.10, 7.13)

**0 1 2 3 4** D. Crop Fertilization

(Vermont Standards: 1.3, 2.2, 2.14, 7.1, 7.6, 7.13)

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## HORTICULTURE SCIENCE AND TECHNOLOGY

## SECTION 1

## FUNDAMENTALS OF HORTICULTURE (All Students)

**0 1 2 3 4** A. Horticulture Careers

 A.001 Identify the areas of specialization in the horticulture industry.

 A.002 Evaluate employment opportunities in the horticulture industry.

 A.003 Describe job requirements for specific horticulture careers.

**0 1 2 3 4** B. Plant Science Processes

B.001 Explain the process of photosynthesis.

B.002 Analyze the processes of respiration, water absorption, translocation, and transpiration.

B.003 List the requirements for healthy plant growth.

B.004 Differentiate among annual, biennial, and perennial plan life spans.

B.005 Identify major plant pasts and diseases.

**0 1 2 3 4** C. Plant Science Taxonomy

C.001 Demonstrate the use of plant nomenclature (scientific classification).

C.002 Identify leaf shapes and types of leaf arrangements.

C.003 Use plant identification characteristics.

C.004 Identify plant hardiness zones.

C.005 Identify floral parts.

C.006 Identify taproot and fibrous root systems.

C.007 Distinguish between woody and herbaceous plants.

**0 1 2 3 4** D. Soil Science Concepts

D.001 Identify the nature and the properties of soil.

D.002 Identify the roles of organic matter.

D.003 Collect soil samples for analysis.

D.004 Analyze soil samples for available nutrients and pH.

D.005 Identify roles of fertilizers and lime.

D.006 Identify the functions of major nutrients in plant growth.

D.007 Pasteurize soils. Expose only.

D.008 Identify and use artificial growth media.

D.009 Compost organic materials.

**0 1 2 3 4** E. Plant Propagation: Sexual

E.001 Identify seed parts.

E.002 Identify and apply seed germination practices.

E.003 Transplant seedlings.

**0 1 2 3 4** F. Plant Propagation: Asexual

F.001 Describe and apply methods of asexual plant propagation (layering, grafting, budding, division, and cuttings).

**0 1 2 3 4** G. Pest Control

G.001 Use, handle, store, and dispose of pesticides safely (follow manufacturer’s recommendations).

G.002 Interpret pesticide information on an agricultural chemical label.

G.003 Classify insecticides, fungicides, bactericides, and herbicides.

G.004 Identify signs of pesticide poisoning in plants.

G.005 Maintain pesticide use records.

G.006 Perform safety checks on pesticide application equipment.

G.007 Use integrated pest management (IPM) practices.

G.008 Identify common weeds, pests, and diseases.

G.009 Clean and store pesticide and chemical application equipment.

G.010 Recognize symptoms of pesticide poison and apply first aid.

G.011 Reduce dangers of insecticide residues on fruits, vegetables, ecosystems, and application equipment.

## BUSINESS MANAGEMENT AND RECORD KEEPING

**0 1 2 3 4** A. Horticulture Enterprises

A.001 Prepare a cost estimate of horticultural project.

A.002 Develop an enterprise plan.

**0 1 2 3 4** B. Finance and Record Management

B.001 Maintain horticultural business records.

B.002 Identify sources of credit.

B.003 Reconcile a bank statement.

B.004 Prepare and mail bills to collect accounts due.

B.005 Prepare bank deposits.

B.006 Calculate and analyze statement of financial condition.

B.007 Complete a profit and loss statement.

B.008 Determine insurance coverage needs.

**0 1 2 3 4** C. Sources of Horticultural Information and Assistance

C.001 Identify sources of horticultural information and assistance.

C.002 Maintain a file of current technical information.

C.003 Participate in associations and societies related to horticultural enterprises.

C.004 Use computer software for records, reports, and horticultural applications.

## SALES, MERCHANDISING, AND MARKETING

**0 1 2 3 4** A. Sales Tasks

A.001 Describe to customers the purposes and qualities of merchandise for sale.

A.002 Identify customer needs and wants.

A.003 Conduct and close a sale.

A.004 Make cost estimates for customers.

A.005 Complete sales forms.

A.006 Use effective interpersonal relationships with customers.

A.007 Label and price products.

A.008 Use sales catalogs.

**0 1 2 3 4** B. Product and Service Advertising and Marketing

B.001 Prepare advertising materials.

B.002 Prepare an attractive display of plants.

B.003 Plan marketing strategy.

B.004 Examine consumer characteristics.

**0 1 2 3 4** C. Customer Services

C.001 Provide customers with technical assistance.

C.002 Process customer complaints.

C.003 Process customer product returns.

C.004 Package customer purchases.

C.005 Provide recommendations for control of pests.

C.006 Describe care and use of plants to customers.

C.007 Maintain customer file system.

## HORTICULTURE MECHANICS

**0 1 2 3 4** A. Horticultural Equipment Operation

A.001 Operate tractor.

A.002 Operate shovel and back hoe.

A.003 Hitch towed equipment.

A.004 Operate powered sprayer equipment.

A.005 Operate fertilizer equipment.

A.006 Operate a chain saw. (Core for arboriculture and landscape)

**0 1 2 3 4** B. Safety Practices

B.001 Apply basic emergency first aid techniques.

B.002 Use fire extinguisher.

B.003 Administer cardiopulmonary resuscitation (CPR).

B.004 Participate in safety training programs.

A school may offer one or more areas of specialization: Greenhouse Operation, Retail Florist, Arborist Services, Nursery Operation, Landscape/Turf Services, and Fruit and Vegetable Production.

## SECTION II

## GREENHOUSE OPERATION

**0 1 2 3 4** A. Plant Identification

A.001 Identify 50 specific greenhouse plants.

A.002 Classify plants according to growth habit, shape, and common name.

A.003 Describe site preference of plants.

**0 1 2 3 4** B. Greenhouse Plant Propagation

B.001 Prepare seed for germination.

B.002 Sow seed.

B.003 Transplant seedlings and rooted cuttings.

B.004 Label planted specimens.

B.005 Plant bulbs.

B.006 Prepare a rooting bed

B.007 Plan planting schedule.

**0 1 2 3 4** C. Growing Mediums and Seed Beds

C.001 Adjust pH level of media.

C.002 Select planting media (components).

C.003 Mix fertilizer with planting media.

C.004 Apply sanitation practices when handling and storing plant media materials.

**0 1 2 3 4** D. Plant Environment Control

D.001 Water plants.

D.002 Prune and thin plants.

D.003 Fertilize with dry and liquid fertilizers.

D.004 Monitor plant growth.

D.005 Pinch and disbud flowering plants.

D.006 Force potted plants to bloom at seasonal times.

D.007 Dispose of diseased plants.

D.008 Aerate compacted soils.

D.009 Report disease and spray damage.

D.010 Regulate growth of plants through chemical means.

D.011 Read and interpret information on a fertilizer label.

D.012 Collect leaf tissue samples for analysis.

D.013 Treat nutrient deficiencies.

D.014 Identify chemical injury of plants.

**0 1 2 3 4** E. Pest Control

E.001 Identify pest problems.

E.002 Apply chemicals to eliminate weeds, insects, and diseases.

E.003 Calibrate pesticide and/or chemical application equipment.

E.004 Operate, adjust, and maintain, pesticide and chemical application equipment.

E.005 Select a pesticide for a problem situation.

E.006 Calculate chemical applications.

E.007 Dispose of chemicals and containers according to manufacturer and governmental specifications.

E.008 Maintain chemical inventory file, keeping in mind “Right to Know” regulations.

E.009 Interpret and use spray compatibility chart.

## NURSURY OPERATION

 (Includes ornamental and shade tree production, ornamental shrubbery, and perennial plants)

**0 1 2 3 4** A. Nursery Plant Identification

A.001 Identify 50 ornamental tree, shrubbery, and perennial plants.

A.002 Classify plants according to growth habit, shape, and common name.

A.003 Describe site preference of plants.

**0 1 2 3 4** B. Nursery Plant Propagation

B.001 Prepare seed for germination.

B.002 Sow seed.

B.003 Transplant seedlings and rooted cuttings.

B.004 Label planted specimens.

B.005 Plant bulbs.

B.006 Prepare a rooting bed.

**0 1 2 3 4** C. Growing Mediums and Seed Beds

C.001 Adjust pH level of media.

C.002 Select planting media (components).

C.003 Mix fertilizer with planting media.

C.004 Apply sanitation practices when handling and storing plant media materials.

C.005 Mix media materials.

**0 1 2 3 4** D. Plant Environment Control

D.001 Water nursery stock.

D.002 Prune and thin plants.

D.003 Fertilize with dry and liquid fertilizers.

D.004 Monitor plant growth.

D.005 Plant nursery stock.

D.006 Provide for winterization of plants.

D.007 Care for “over winterizing” of container grown plants.

D.008 Demonstrate root pruning techniques.

D.009 Apply mulches.

D.010 Dispose of diseased plants.

D.011 Aerate compacted soils.

D.012 Report disease and spray damage.

D.013 Regulate growth of plants through chemical means.

D.014 Read and interpret information on a fertilizer label.

D.015 Collect soil and leaf tissue samples for analysis.

D.016 Identify nutrient deficiency symptoms in growing plants.

**0 1 2 3 4** E. Pest Control

E.001 Identify pest problems.

E.002 Apply chemicals to eliminate weeds, insects, and diseases.

E.003 Calibrate pesticide and/or chemical application equipment.

E.004 Operate, adjust, and maintain pesticide and chemical application equipment.

E.005 Select a pesticide for a problem situation.

E.006 Calculate chemical applications.

E.007 Dispose of chemicals and containers according to manufacturer and governmental specifications.

E.008 Maintain chemical inventory file, keeping in mind “Right to Know” regulations.

E.009 Interpret and use spray compatibility chart.

## RETAIL FLORIST

**0 1 2 3 4** A. Floral Design

A.001 Design artificial flower and foliage arrangements.

A.002 Design circle arrangements.

A.003 Design corsages.

A.004 Design dish gardens.

A.005 Design dried arrangements.

A.006 Design planters and terrariums.

A.007 Design oval arrangements.

A.008 Design right angle shaped arrangements.

A.009 Design symmetrically/asymmetrically balanced triangle arrangements.

A.010 Design vertically shaped arrangements.

A.011 Dress potted plants.

A.012 Make bows.

A.013 Spray tint dried and live floral products.

A.014 Wire flowers using piercing, hairpin, and hook-wire methods.

A.015 Make silk flowers and foliage arrangements.

A.016 Design bud vases.

A.017 Construct boutonnieres.

A.018 Identify seasonal arrangements and displays.

A.019 Design seasonal arrangements and displays.

A.020 Identify design styles.

**0 1 2 3 4** B. Plant Environmental Control

B.001 Water plants and nursery stock.

B.002 Remove diseased and infested plants.

B.003 Pinch and disbud flowering plants.

B.004 Attach care cards to plants.

B.005 Receive and care for cut flowers obtained from wholesaler.

B.006 Clean storage facility.

**0 1 2 3 4** C. Pest Control

C.001 Identify pest problems.

C.002 Apply chemicals to eliminate weeds, insects, and diseases.

C.003 Calibrate pesticide and/or chemical application equipment.

C.004 Operate, adjust, and maintain pesticide and chemical application equipment.

C.005 Select a pesticide for a problem situation.

C.006 Calculate chemical applications.

C.007 Dispose of chemicals and containers according to manufacturer and governmental specifications.

C.008 Maintain chemical inventory file, keeping in mind “Right to Know” regulations.

C.009 Interpret and use spray compatibility chart.

## LANDSCAPE/TURF SERVICES

**0 1 2 3 4** A. Landscape Plant Identification

A.001 List culture requirements of landscape plants.

A.002 Identify species of landscape plants.

A.003 Determine grades of landscape plants.

A.004 Identify lawn grasses and ground covers.

A.005 Select plants.

**0 1 2 3 4** B. Landscape Area Preparation

B.001 Interpret blueprints and plans.

B.002 Determine the time to plant various species.

B.003 Survey, grade, rake and level the site.

B.004 Prepare seed beds for bulbs, seeds, cuttings and shrubs.

B.005 Understand and apply surface drainage principles.

B.006 Clear brush and unwanted plants.

B.007 Collect soil samples.

B.008 Apply fertilizers.

B.009 Spread and level topsoil.

**0 1 2 3 4** C. Trees, Shrubs, Ground Cover, and Flowers Planting

C.001 Plant “balled-and-burlapped” and container grown stock.

C.002 Determine spacing and depth of plantings.

C.003 Plant bore root plants.

C.004 Select and apply mulching material.

C.005 Support woody plants by guying, staking, or cabling.

C.006 Plant seeds and bulbs.

C.007 Irrigate new plantings.

C.008 Plant flowers and shrubs.

C.009 Follow landscape plan in installing plants.

C.010 Control weeds and soil insects with I’M.

**0 1 2 3 4** D. Turf and Lawn Establishment and Renovation

D.001 Plant grasses by sodding, sprigging, and/or seeding.

D.002 Roll newly sodded areas.

D.003 Determine seeding and sprigging rates and methods.

D.004 Thatch and renovate turf.

**0 1 2 3 4** E. Tree, Shrub, Ground Cover, and Flower Maintenance

E.001 Water ornamental plants.

E.002 Trim and prune trees and shrubs.

E.003 Cultivate and mulch plants.

E.004 Provide winter protection.

E.005 Brace and repair trees.

E.006 Identify nutrient deficiencies.

**0 1 2 3 4** F. Landscape Design

F.001 Analyze site for the landscape.

F.002 Survey the area to be landscaped.

F.003 Locate existing utilities lines in landscape area.

F.004 Select the plant materials to be used.

**0 1 2 3 4** G. Pest Control

G.001 Identify pest problems.

G.002 Apply chemicals to eliminate weeds, insects, and diseases.

G.003 Calibrate pesticide and/or chemical application equipment.

G.004 Operate, adjust, and maintain pesticide and chemical application equipment.

G.005 Select a pesticide for a problem situation.

G.006 Calculate chemical applications.

G.007 Dispose of chemicals and containers according to manufacturer and governmental specifications.

G.008 Maintain chemical inventory file, keeping in mind “Right to Know” regulations.

G.009 Interpret and use spray compatibility chart.

G.010 Identify common lawn insects.

## ARBORIST SERVICES

**0 1 2 3 4** A. Tree Care and Maintenance

A.001 Prune and trim shade trees.

A.002 Provide winter protection.

A.003 Remove broken and storm damaged limbs.

A.004 Remove brush and weeds.

A.005 Fell trees.

A.006 Remove tree stumps.

A.007 Climb trees.

A.008 Cable and brace weak trees or limbs.

A.009 Fertilize established trees.

A.010 Identify trees.

**0 1 2 3 4** B. Pest Control

B.001 Identify pest problems.

B.002 Apply chemicals to eliminate weeds, insects, and diseases.

B.003 Calibrate pesticide and/or chemical application equipment.

B.004 Operate, adjust, and maintain pesticide and chemical application equipment.

B.005 Select a pesticide for a problem situation.

B.006 Calculate chemical applications.

B.007 Dispose of chemicals and containers according to manufacturer and governmental specifications.

B.008 Maintain chemical inventory file, keeping in mind “Right to Know” regulations.

B.009 Interpret and use spray compatibility chart.

## FRUIT AND VEGETABLE PRODUCTION

**0 1 2 3 4** A. Soil Management

A.001 Identify soil and site characteristics.

A.002 Relate soil and site characteristics to crops.

A.003 Develop a crop rotation plan.

A.004 Secure or make a soil map.

A.005 Obtain a soil sample for testing.

A.006 Interpret soil test results.

A.007 Evaluate soil drainage.

A.008 Identify erosion potential and control.

A.009 Plan conservation practices.

**0 1 2 3 4** B. Soil Preparation for Planting

B.001 Select a site for planting.

B.002 Prepare a seed bed with a plow, disk, tiller, and/or harrows.

B.003 Perform field adjustments to tillage equipment.

B.004 Construct open drainage ditch.

B.005 Row up (bed) land.

B.006 Cut crop residue with a rotary mower.

**0 1 2 3 4** C. Crop Planting/Transplanting

C.001 Identify fruit and vegetable crops.

C.002 Select high quality seed and transplant.

C.003 Determine method for planting.

C.004 Perform field adjustments to planters and/or transplanters.

C.005 Plant seed using mechanical planter.

**0 1 2 3 4** D. Crop Fertilizer

D.001 Calibrate fertilization equipment.

D.002 Read and interpret information on a fertilizer label.

D.003 Apply fertilizer and lime.

D.004 Identify major nutrient deficiency symptoms in plants.

D.005 Clean and store fertilization equipment.

D.006 Collect soil sample for fertility test.