

Horticulture Technician Foundation Program Outline



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HORTICULTURE TECHNICIAN FOUNDATION PROGRAM OUTLINE

**APPROVED BY INDUSTRY
MAY 2013**

**BASED ON
NOA 2010**

**Developed by
Industry Training Authority
Province of British Columbia**



TABLE OF CONTENTS

Section 1 INTRODUCTION.....	1
Foreword	2
Acknowledgements	3
How to Use this Document.....	5
Section 2 PROGRAM OVERVIEW.....	7
Program Credentialing Model	8
Occupational Analysis Chart.....	9
Training Topics and Suggested Time Allocation.....	10
Section 3 PROGRAM CONTENT	12
Level 1 Horticulture Technician Foundation.....	13
Level 2 Horticulture Technician Foundation.....	38
Section 4 TRAINING PROVIDER STANDARDS	63
Facility Requirements.....	64
Tools and Equipment	68
Reference Materials	73



Section 1

INTRODUCTION

Horticulture Technician Foundation



Foreword

This Program Outline describes the Landscape Horticulturist Apprenticeship Program. This program represents the new standard for horticulture apprenticeship training in British Columbia. All tasks identified in the National Occupational Analysis (NOA) have been included, as well as those competencies that apply specifically to Landscape Horticulture in British Columbia.

This document is intended as a guide for the course instructors in the classroom, laboratories and for practical training. Since this is a practical trade it is expected that instructor demonstration and student participation will be integrated into all learning activities.

Note: The Achievement Criteria for the practical assessments may be combined at the instructor's discretion and as time permits.

Safe working practices may not be specified in all competencies and learning tasks, however they are an implied part of this training program and should be stressed throughout the apprenticeship training.

This Program Outline also lists the Training Provider Standards which includes:

- Facility Requirements
- Tools and Equipment (for each level of technical training)
- Reference Materials
- Instructor Requirements

SAFETY ADVISORY

Be advised that references to the WorkSafeBC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: <http://www.worksafebc.com>). Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.



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- *Anne Kadwell*, CEO HortEducationBC
- *Bill Hardy*, HEBC Board Chair (Northwest Landscape Ltd.)
- *Don Fraser*, Past Chair (Northwest Landscape Ltd.)
- *Mary Ann Van Den Berge*, BCLNA Representative (Trice Farms Pond & Garden Centre)
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How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Program Credentialing Model	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
OAC	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
Training Topics and Suggested Time Allocation	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the relative weightings of various competencies of the occupation on which assessment is based
Program Content	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measurable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels



Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Training Provider Standards	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment



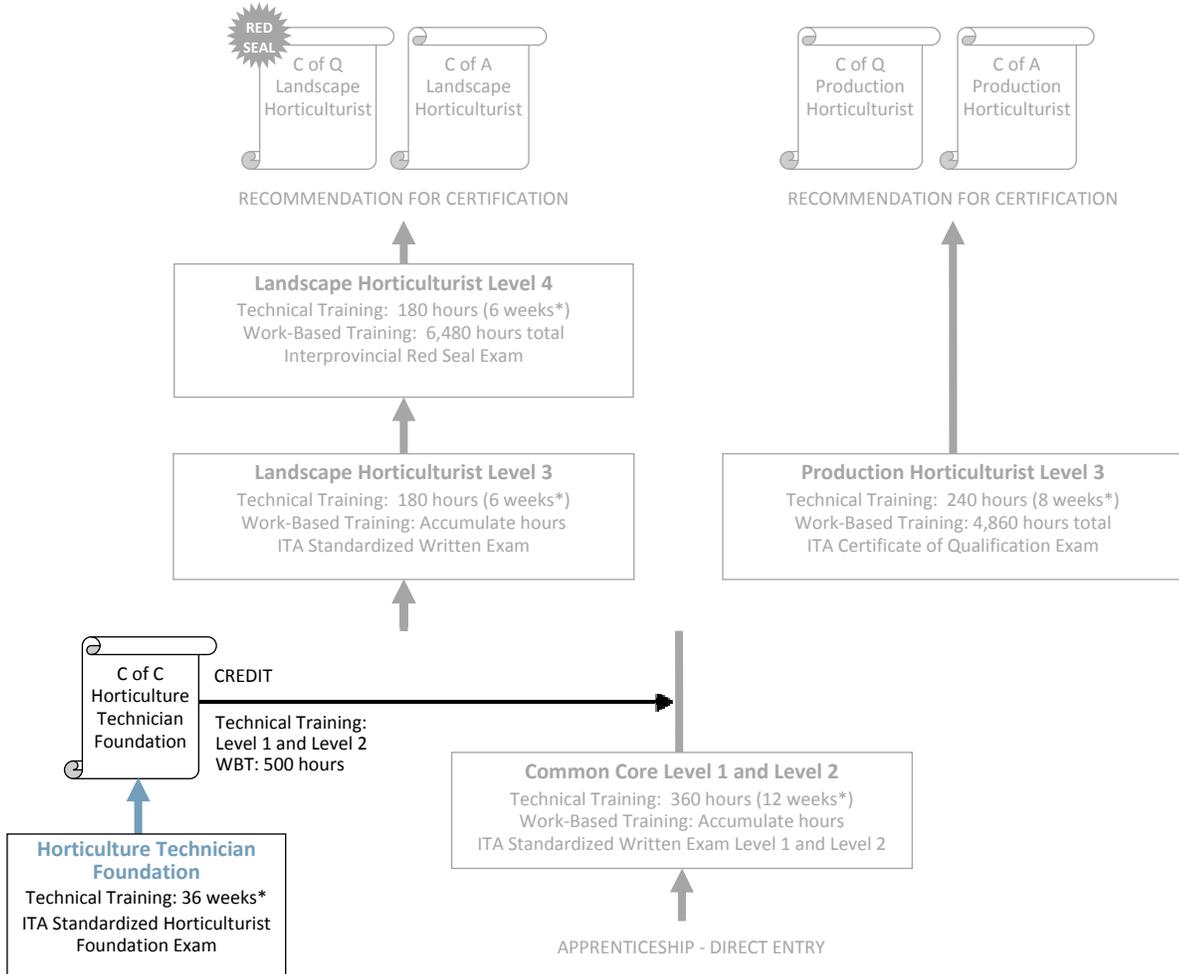
Section 2

PROGRAM OVERVIEW

Horticulture Technician Foundation



Program Credentialing Model



*Suggested duration based on 30-hour week

C of Q = Certificate of Qualification
 C of A = Certificate of Apprenticeship
 C of C = Certificate of Completion
 WBT = Work-Based Training



Occupational Analysis Chart

Horticulture Technician Foundation

USES OCCUPATIONAL SKILLS A	Use personal protective equipment (PPE) A1	Identify fire types and extinguishing methods A2	Use WHMIS A3	Recognize work hazards A4	Demonstrate basic horticultural skills A5	Identify relevant legislation, regulations and standards A6
	1 2	1	1	1	1 2	1
USES AND MAINTAINS TOOLS AND EQUIPMENT B	Use and maintain hand tools and power tools B1	Use and maintain measuring equipment B2	Operate vehicles and motorized equipment B3	Maintain vehicles and motorized equipment B4	Use and maintain equipment attachments B5	
	1 2	1	1 2	1 2	2	
ORGANIZES WORK C	Communicate with others C6	Organize plants, materials and equipment C9	Maintain safe work environment C10	Examine interpersonal and supervisory skills C11		
	1 2	2	1 2	1 2		
ANALYZES AND MAINTAINS PLANT HEALTH E	Identify plants and plant requirements E1	Manage growing conditions E2	Manage pests and diseases E3	Describe plant science as it applies to horticulture E4	Describe physical and biological characteristics of soil and soilless media E5	Describe chemical characteristics of soil and soilless media E6
	1 2	2	1 2	1 2	1	2



Training Topics and Suggested Time Allocation

Horticulture Technician Foundation – Level 1

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line A	USES OCCUPATIONAL SKILLS	15%	75%	25%	100%
A1	Use personal protective equipment (PPE)		✓	✓	
A2	Identify fire types and extinguishing methods		✓	✓	
A3	Use WHMIS		✓		
A4	Recognize work hazards		✓	✓	
A5	Demonstrate basic horticultural skills		✓	✓	
A6	Identify relevant legislation, regulations and standards		✓		
Line B	USES AND MAINTAINS TOOLS AND EQUIPMENT	25%	40%	60%	100%
B1	Use and maintain hand tools and power tools		✓	✓	
B2	Use and maintain measuring equipment		✓	✓	
B3	Operate vehicles and motorized equipment		✓	✓	
B4	Maintain vehicles and motorized equipment		✓	✓	
Line C	ORGANIZES WORK	10%	80%	20%	100%
C6	Communicate with others		✓	✓	
C10	Maintain safe work environment		✓	✓	
C11	Examine interpersonal and supervisory skills		✓	✓	
Line E	ANALYZES AND MAINTAINS PLANT HEALTH	50%	50%	50%	100%
E1	Identify plants and plant requirements		✓	✓	
E3	Manage pests and diseases		✓	✓	
E4	Describe plant science as it applies to horticulture		✓	✓	
E5	Describe physical and biological characteristics of soil and soilless media		✓	✓	
Total Percentage for Horticulture Technician Foundation Level 1		100%			



Training Topics and Suggested Time Allocation

Horticulture Technician Foundation – Level 2

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
Line A	USES OCCUPATIONAL SKILLS	10%	25%	75%	100%
A1	Use personal protective equipment (PPE)		✓	✓	
A5	Demonstrate basic horticultural skills		✓	✓	
Line B	USES AND MAINTAINS TOOLS AND EQUIPMENT	20%	40%	60%	100%
B1	Use and maintain hand tools and power tools		✓	✓	
B3	Operate vehicles and motorized equipment		✓	✓	
B4	Maintain vehicles and motorized equipment		✓	✓	
B5	Use and maintain equipment attachments		✓	✓	
Line C	ORGANIZES WORK	20%	50%	50%	100%
C6	Communicate with others		✓	✓	
C9	Organize plants, materials and equipment		✓	✓	
C10	Maintain safe work environment		✓	✓	
C11	Examine interpersonal and supervisory skills		✓	✓	
Line E	ANALYZES AND MAINTAINS PLANT HEALTH	50%	60%	40%	100%
E1	Identify plants and plant requirements		✓	✓	
E2	Manage growing conditions		✓	✓	
E3	Manage pests and diseases		✓	✓	
E4	Describe plant science as it applies to horticulture		✓	✓	
E6	Describe chemical characteristics of soil and soilless media		✓	✓	
Total Percentage for Horticulture Technician Foundation - Level 2		100%			



Section 3

PROGRAM CONTENT

Horticulture Technician Foundation



Level 1

Horticulture Technician Foundation



Line (GAC): **A** **USES OCCUPATIONAL SKILLS**
Competency: **A1** **Use personal protective equipment (PPE)**

Objectives

To be competent in this area, the individual must be able to:

- Describe and demonstrate personal safety in the workplace.
- Demonstrate proper use of PPE.

LEARNING TASKS

1. Select and use PPE as required for task, tools, equipment, machinery and environment

2. Ensure safe use of PPE

3. Store PPE to maintain its integrity

4. Check PPE prior to use

5. Check PPE inventory

6. Recognize damaged and expired PPE

7. Check and replace PPE components

CONTENT

- Ear protection
- Eye protection
- Hand protection
- Foot protection
- Safety vests
- Respiratory protection
- Fall protection

- Inspect
- Maintain

- Dry area
- Protected area

- Operation
- Condition

- Ensuring there is a ready supply

- Check expiration date
- Ensure integrity of PPE

- According to manufacturers' specification
- According to workplace requirements

Achievement Criteria

Performance The learner will select PPE for specified tasks.
Conditions The learner will be given the appropriate PPE commonly used in the trade.
Criteria The learner will score a passing grade of 70% or better on a rating sheet according to the following criteria:
 Selected correct PPE required for specified tasks as designated by the instructor



Line (GAC): A USES OCCUPATIONAL SKILLS
Competency: A2 Identify fire types and extinguishing methods

Objectives

To be competent in this area, the individual must be able to:

- Identify various types and classes of fires.
- Describe the procedure for using a fire extinguisher.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| <p>1. Describe conditions necessary to support a fire</p> | <ul style="list-style-type: none"> • Air • Fuel • Heat • Chemical chain reaction • Weather conditions |
| <p>2. Describe classes of fires according to the materials being burned</p> | <ul style="list-style-type: none"> • Class A • Class B • Class C • Class D • Symbols and colours |
| <p>3. Describe the procedure for using a fire extinguisher</p> | <ul style="list-style-type: none"> • Extinguisher selection • P.A.S.S. <ul style="list-style-type: none"> ○ Pull ○ Aim ○ Squeeze ○ Sweep |



Line (GAC): **A** **USES OCCUPATIONAL SKILLS**
Competency: **A3** **Use WHMIS**

Objectives

To be competent in this area, the individual must be able to:

- Summarize Workplace Hazardous Material Information System (WHMIS).
- Complete the online WHMIS certification.

LEARNING TASKS

1. Describe WHMIS requirements

CONTENT

- WHMIS certification
- WHMIS symbols
 - Compressed gas
 - Flammable and combustible material
 - Oxidizing Material
 - Poisonous and Infectious Material
 - Poisonous and Infectious Material that will cause immediate or serious toxic effects
 - Poisonous and Infectious Material that will cause other toxic effects
 - Corrosive material
 - Dangerously reactive material
- WHMIS labels

NOTE: WHMIS certification is mandatory to complete Level One.



Line (GAC): A USES OCCUPATIONAL SKILLS

Competency: A4 Recognize work hazards

Objectives

To be competent in this area, the individual must be able to:

- Identify workplace hazards.
- Identify how to mitigate the risk of workplace accidents and injuries.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| <p>1. Identify workplace hazards and potential risks</p> | <ul style="list-style-type: none"> • Electrical and utility • Working at heights • Gravitational (“slips, trips and falls”) • Thermal (heat and cold stress) • Motorized equipment/mechanical (pinch point, “struck against”, vehicle) • Public • Behavioural (fatigue, rushing, complacency, stress, substance abuse, ignorance, frustration) • Chemical • Compressed gas • Environmental (insects, plants, weather) • Hazardous trees |
| <p>2. Identify how to mitigate the risks of workplace accidents and injuries</p> | <ul style="list-style-type: none"> • Visual assessments • Safe work plan • Post-job inspection |



Line (GAC): **A** **USES OCCUPATIONAL SKILLS**
Competency: **A5** **Demonstrate basic horticultural skills**

Objectives

To be competent in this area, the individual must be able to:

- Practice basic skills used in general horticulture.
- Use safe work habits.
- Identify, select, use and maintain appropriate hand tools for the task.
- Practice safe operation of common power equipment.
- Identify levels of landscape maintenance and plant standards stated in the BC Landscape Standard.

LEARNING TASKS

1. Demonstrate basic horticultural skills

CONTENT

- Range of workplace hazards
 - Hazards versus risks
- Hand tools used in basic horticulture
 - Refer to Level One *B1- Use and maintain hand tools and power tools*
- BC Landscape Standard
 - Objectives of the BC Landscape Standard
 - Guide to use
 - Format of the BC Landscape Standard
 - Scope of sections
- Basic horticultural tasks
 - Maintenance
 - Determining maintenance levels
 - Appropriate maintenance procedures
 - Common landscape maintenance tasks and tools
- Operating horticulture power equipment safely and efficiently
 - Refer to Level One *B1- Use and maintain hand tools and power tools*
- Safe work practices when lifting and bending
- Basic calculations
 - Landscape calculations
 - Calculating quantities: fertilizer application rates
 - Conversions
- Cooperative work methods



Achievement Criteria

Performance The learner will maintain beds, borders, lawns, nurseries, and containers on campus.

Conditions The learner will be given the appropriate materials, equipment and tools.

Criteria The learner will score a passing grade of 70% or better on a rating sheet according to the following criteria:

- Performed tasks in a safe manner
- Used tools and equipment safely and correctly
- Performed tasks in a logical sequence



Line (GAC): **A USES OCCUPATIONAL SKILLS**
Competency: **A6 Identify relevant legislation, regulations and standards**

Objectives

To be competent in this area, the individual must be able to:

- Describe and apply relevant legislation and regulations to activities that impact onsite activities.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Identify applicable federal legislation and regulations 2. Identify applicable provincial legislation and regulations 3. Identify applicable local regulations 4. Examine applicable regulations 5. Examine relevant WorkSafeBC procedures | <ul style="list-style-type: none"> • Where to find standards • How specific federal requirements apply to horticulture activities • How specific provincial requirements apply to horticulture activities • How specific local requirements apply to horticulture activities • Applying regulations, standards, and procedures to the job • Applying WorkSafeBC accident and near miss reporting procedures • Applying accident investigation requirements |
|---|---|



Line (GAC): **B USES AND MAINTAINS TOOLS AND EQUIPMENT**
Competency: **B2 Use and maintain measuring equipment**

Objectives

To be competent in this area, the individual must be able to:

- Safely use and maintain measuring equipment.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Select and use appropriate measuring equipment for the task
 2. Maintain measuring equipment | <ul style="list-style-type: none"> • (see the list of <i>Measuring Equipment</i> for Level One, detailed in the <i>Training Provider Standards</i> of this Program Outline)
 • Cleaning and disinfecting measuring equipment to ensure proper operation and to prevent transfer of contaminants • Calibrating measuring equipment such as thermometers, pH meters, levels and EC meters • Checking and replacing batteries on measuring equipment • Checking tools for damage, excessive wear and proper operation • Storing measuring equipment for organization, safety and security |
|---|---|

Achievement Criteria

- Performance** The learner will calibrate measuring equipment.
- Conditions** The learner will be given thermometers, pH meters, levels and EC meters.
- Criteria** The learner will score a passing grade of 70% or better on a rating sheet according to the following criteria:
- Calibrated to manufacturers' specifications



Line (GAC): **B USES AND MAINTAINS TOOLS AND EQUIPMENT**
Competency: **B3 Operate vehicles and motorized equipment**

Objectives

To be competent in this area, the individual must be able to:

- Identify engine designs and functions of motorized equipment.
- Apply safe work practices as related to motorized horticulture equipment.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Identify engine components of motorized equipment engines
 2. Demonstrate personal safety in the workplace
 3. Demonstrate safe operating procedures for motorized horticulture equipment such as starting, stopping and adjusting | <ul style="list-style-type: none"> • Differences between a two-stroke, four-stroke, and hybrid four-stroke engines • Carburetor • Ignition system • Starter components • Piston • Compression
 • Safety procedures • Use of PPE
 • String trimmers • Lawnmowers • Backpack blowers |
|---|---|

Achievement Criteria

- Performance** The learner will start, stop and adjust power equipment.
- Conditions** The learner will be given string trimmers, lawnmowers and backpack blowers.
- Criteria** The learner will score a passing grade of 70% or better on a rating sheet according to the following criteria:
- Started, stopped and adjusted power equipment to manufacturers' specifications



Line (GAC): **B USES AND MAINTAINS TOOLS AND EQUIPMENT**
Competency: **B4 Maintain vehicles and motorized equipment**

Objectives

To be competent in this area, the individual must be able to:

- Maintain motorized equipment.
- Apply safe work practices as related to motorized horticulture equipment.

LEARNING TASKS

CONTENT

1. Use hand tools to maintain horticulture equipment	<ul style="list-style-type: none"> • Sockets and wrenches • Ignition tester • Tachometer • Torque wrench • Feeler gauges
2. Perform and document circle check of vehicles and motorized equipment	<ul style="list-style-type: none"> • Lights • Plates • Brakes
3. Inspect equipment	<ul style="list-style-type: none"> • Inspect visually for: <ul style="list-style-type: none"> ○ Damage and wear • Lock-out and tag-out as necessary • Inspect equipment to ensure efficient functioning
4. Check position of safety features as applicable	<ul style="list-style-type: none"> • Lock-out devices • Chutes • Trimmer and belt guards • Operator presence switches
5. Check and replace fluids according to manufacturers' specifications	<ul style="list-style-type: none"> • Oil • Coolant • Hydraulic fluids
6. Check and replace components	<ul style="list-style-type: none"> • Spark plugs • Belts • Pull cords
7. Check and adjust air pressure in components	<ul style="list-style-type: none"> • Tires • Air compressors
8. Check and tighten components	<ul style="list-style-type: none"> • Loose connections • Loose fittings



LEARNING TASKS

9. Check cutting height and adjust

10. Apply preventive maintenance procedures

CONTENT

- According to client expectations
- Turf needs

- Equipment maintenance
 - Clean fuel
 - Clean air
 - Clean lubricating oil
- Maintenance schedule
- Maintain a lawn mower or edger: Every three months or 50 hours
 - Change engine oil
 - Replace or service air filter
 - Sharpen blade
 - Check spark plug
 - Check and adjust controls and drive mechanisms
 - Lube controls and drive mechanisms
 - Clean cooling fins
 - Tighten bolts
- Maintain a hedge or string trimmer
- Mixing gas and oil

Achievement Criteria

Performance The learner will service motorized equipment (at the instructor's discretion).

Conditions The learner will be given any of the motorized equipment listed:

- Lawn mower
- Edger
- Dethatcher
- Rototiller
- String trimmer
- Hedger
- Chainsaw
- Backpack blower
- Aerator

Criteria The learner will score a passing grade of 70% or better on a rating sheet according to the following criteria:

- Inspected power equipment to manufacturers' specifications
- Checked position of safety features to manufacturers' specifications
- Checked and replaced fluids according to manufacturers' specifications
- Cleaned and/or replaced air and oil filters to manufacturers' specifications
- Cleaned and/or replaced spark plugs to manufacturers' specifications
- Adjusted carburetor, if required, to manufacturers' specifications



Line (GAC): C **ORGANIZES WORK**
Competency: C6 **Communicate with others**

Objectives

To be competent in this area, the individual must be able to:

- Effectively communicate verbally and in written form.
- Effectively communicate trade related information to various people.

LEARNING TASKS

1. Use effective verbal and written communication

2. Relay information

CONTENT

- Effective communication:
 - Four basic communication skills (listening, speaking, reading, writing)
 - Communication process
 - Active listening
 - Non-verbal communication
 - Barriers to communication
 - Preparing for meetings
- Relaying information to
 - Co-workers
 - Clients
 - Suppliers
 - Office staff
- Relaying information in laypersons' terms to
 - Clients
 - Public



Line (GAC): **C ORGANIZES WORK**
Competency: **C10 Maintain safe work environment**

Objectives

To be competent in this area, the individual must be able to:

- Assess site hazards and apply appropriate safety procedures.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Assess site hazards | <ul style="list-style-type: none"> • High voltage • Motorized equipment • Working at heights |
| <ol style="list-style-type: none"> 2. Identify PPE and safety equipment | <ul style="list-style-type: none"> • For task |
| <ol style="list-style-type: none"> 3. Maintain worksite to avoid injuries to self and others | <ul style="list-style-type: none"> • Clean • Tidy |



Line (GAC): **C ORGANIZES WORK**
Competency: **C11 Examine interpersonal and supervisory skills**

Objectives

To be competent in this area, the individual must be able to:

- Describe the basic interpersonal and supervisory skills based on time stress management, ethics, communication, power and teams.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Manage time
 2. Explain stress management
 3. Recognize ethical and social responsibility issues in the work place
 4. Communicate effectively
 5. Describe conflict management
 6. Examine the concept of power in an organization | <ul style="list-style-type: none"> • Role of the supervisor • Ability to effectively manage personal and work time
 • Individual • Organizational • How organizations can help manage stress
 • Ethical and social consequences of work place practices <ul style="list-style-type: none"> ○ Personal experience ○ Religious beliefs impact personal ethics ○ Culture affects ethical norms ○ Internal reflection ○ Organizational ethics ○ Legal responsibilities ○ BC Acts
 • Identifying and using verbal and non-verbal communication techniques (review Level One C6 – <i>Communicate with others</i>)
 • Defining conflict • Sources of conflict • Basic styles for managing conflict • Conflict management strategies • Guidelines of managing interpersonal conflict
 • Recognizing power structure in the organization and how power is applied within the organization |
|--|--|



LEARNING TASKS

7. Describe characteristics of an effective team

CONTENT

- Characteristics of a high performing crew/team
- Recognizing ineffective work crews
- Supervisory role



Line (GAC): E **ANALYZES AND MAINTAINS PLANT HEALTH**
Competency: E1 **Identify plants and plant requirements**

Objectives

To be competent in this area, the individual must be able to:

- Identify a wide range of plants, morphological characteristics, growing requirements, use and availability.

LEARNING TASKS

1. Recognize a range of plant materials commonly used in commercial horticulture
2. Employ correct naming and plant identification terminology
3. Name the plant family for each plant identified

CONTENT

- Life cycle of a plant
- Plant growth patterns
 - Annuals
 - Biennials
 - Perennials
 - Herbaceous perennials
 - Woody perennials
- Deciduous and evergreen plants
 - Deciduous plants
 - Evergreens
 - Broadleaf evergreens
 - Coniferous evergreens
- Climbing plants
 - Stems specialized for climbing
 - Monocarpic plants
- Origin of plant naming systems
 - Common names
 - Nomenclature
 - Binomial system for naming plants
 - Plant taxonomy
 - Writing botanical names
- Plant families
- Plant families commonly found in British Columbia
 - ASTERACEAE – Aster Family
 - CARYOPHYLLACEAE – Pink Family
 - ERICACEAE – Heath Family
 - LAMIACEAE – Mint Family
 - LILIACEAE – Lily Family
 - RANUNCULACEAE – Buttercup Family
 - ROSACEAE – Rose Family



LEARNING TASKS

4. Recognize and describe bud, bark, foliage, flower and fruit characteristics

5. Use a dichotomous key for plant identification

6. Identify and describe 50 woody and non-woody plants.

CONTENT

- SAPINDACEAE – Soapberry Family

- Plant morphology
- Morphology descriptors for leaves
- Leaf arrangement
- Needles
- Scales and awls
- Patterns of inflorescence
- Descriptors for flowers
- Plant types
- Descriptors for fruit
- Woody stems

- Limitations of plant keys
- Conifer key
- Deciduous key

- Using botanical terms
- According to its cultural and maintenance requirements



Line (GAC): **E ANALYZES AND MAINTAINS PLANT HEALTH**
Competency: **E3 Manage pests and diseases**

Objectives

To be competent in this area, the individual must be able to:

- Identify signs and symptoms of living and non-living factors that cause plant stress.

LEARNING TASKS

CONTENT

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Define plant stress 2. Describe conditions that lead to plant stress | <ul style="list-style-type: none"> • Causes and symptoms |
| <ol style="list-style-type: none"> 3. Categorize plant pest types and broadly associate the symptoms of biotic plant stress with type of plant | <ul style="list-style-type: none"> • Abiotic factors <ul style="list-style-type: none"> ○ Light temperature ○ Humidity ○ Air ○ Water supply ○ Mechanical damage ○ Nutrition ○ Other common symptoms of abiotic plant stress • Distinguishing between biotic and abiotic causes of plant stress • Biotic plant stress <ul style="list-style-type: none"> ○ Common indicators • Biotic plant stress factors <ul style="list-style-type: none"> ○ Common plant insect indicators ○ Common plant disease indicators • Susceptibility to biotic stress factors (insects and diseases) • Potential stress-inducing environmental conditions |
| <ol style="list-style-type: none"> 4. Describe the life stages of example pests | <ul style="list-style-type: none"> • Major plant pest types including: <ul style="list-style-type: none"> ○ Plant feeding pests ○ Plant feeding animals ○ Diseases ○ Weeds • Damage caused by various pests |
| <ol style="list-style-type: none"> 5. Describe basic arthropod morphology and identify typical examples of arthropod to order | <ul style="list-style-type: none"> • Lifecycle of typical pests • Disease lifecycles |
| | <ul style="list-style-type: none"> • Basic arthropod morphology • Eight orders of insects |



LEARNING TASKS

6. Identify the four types of plant-pathogens

7. Describe the characteristics that make plants weeds

8. Describe established methods for controlling pests (IPM)

CONTENT

- Categories of pathogens:
 - Fungi
 - Bacteria
 - Viruses
 - Nematodes

- Defining weeds
 - Competition
 - Common characteristics
- Classification of weeds by life histories
 - Annuals
 - Biennials
 - Herbaceous perennials
 - Woody perennials

- Integrated Pest Management (IPM)
- Six steps of IPM
 - Prevention
 - Identification
 - Monitoring
 - Thresholds
 - Treatments
 - Evaluation
- Establishing methods for controlling pests
 - Cultural
 - Biological
 - Chemical



Line (GAC): **E ANALYZES AND MAINTAINS PLANT HEALTH**
Competency: **E4 Describe plant science as it applies to horticulture**

Objectives

To be competent in this area, the individual must be able to:

- Explain plant morphological characteristics, life cycles, and adaptations as they apply to plant identification, plant propagation, arboriculture and turf maintenance.

LEARNING TASKS

CONTENT

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Describe the external parts of herbaceous and woody stems 2. Describe the parts of a leaf and variations in shape 3. Describe parts of the flower 4. Identify typical inflorescences 5. Identify typical fruit 6. Describe stages in the life cycle of a flowering plant 7. Describe parts of a seed and seedling | <ul style="list-style-type: none"> • Plant identification using features of a stem <ul style="list-style-type: none"> ○ Woody and herbaceous stems • Parts of a simple leaf • Leaf shapes • Leaf tips • Leaf margins • Leaf surfaces • Pattern of veins within the leaf blade • Simple and compound leaves • Flower structure <ul style="list-style-type: none"> ○ Complete and incomplete flowers ○ Perfect vs. imperfect flowers ○ Monoecious vs. dioecious plants ○ Flower symmetry • Inflorescence types • Placing fruit types <ul style="list-style-type: none"> ○ Fleshy fruits ○ Dry fruits • Dehiscent and indehiscent fruits • Reproduction • Monocot seed development • Dicot seed development • Dicot seedling development • Monocot seedling development |
|--|---|



LEARNING TASKS

8. Identify stem, root, and leaf modifications

9. Identify plant adaptations to environmental effects

10. Describe basic growth responses to plant hormones

CONTENT

- Roots
 - Root systems
 - Specialized underground storage structures

- Plant adaptations
- Stem modifications for protection
- Stems specialized for colonizing

- Response to hormones
 - Auxins
 - Gibberellins (GA)
 - Cytokinins
 - Ethylene
 - Abscisic acid (ABA)



Line (GAC): E **ANALYZES AND MAINTAINS PLANT HEALTH**
Competency: E5 **Describe physical and biological characteristics of soil and soilless media**

Objectives

To be competent in this area, the individual must be able to:

- Recognize soil and soil management as keys to the successful practice of horticulture.
- Examine soil formation, the physical and biological properties of soils, and soilless media as they relate to use, soil quality, and plant growth.

LEARNING TASKS

CONTENT

- | | |
|--|---|
| 1. Define soil | <ul style="list-style-type: none"> • Soil • Soil formation • Parent material • Biotic – living organisms • Topography • Time |
| 2. Define soil quality | <ul style="list-style-type: none"> • Soil quality and the importance of soil quality, relative to plant growth and environmental sustainability |
| 3. Describe a soil profile | <ul style="list-style-type: none"> • Soil profiles <ul style="list-style-type: none"> ○ LFH horizon ○ A horizon ○ B horizon ○ C horizon |
| 4. Explain the physical properties of soil and soilless medias | <ul style="list-style-type: none"> • Texture • Structure • Density • Porosity • Soil compaction • Soil structure and plant growth • Soilless media |
| 5. Describe the behaviour of water in soil | <ul style="list-style-type: none"> • Water in soils • Soil water holding capacity • Available water • Water movement through soil • Wetting front • Hydrolic conductivity of a soil |



LEARNING TASKS

6. Examine the key soil biological processes and their effects on plant growth and soil quality

7. Explain the role of organic matter in soil

8. Describe composting methods

CONTENT

- Water retention and flow in layered soils
- Water movement in urban soils
- Managing soils in the urban landscape

- Biological process in soil
- Plants
- Soil animals
- Other organisms
- Role of soil organisms in soil quality
- Promoting beneficial soil organisms

- Basic composition of soil organic matter
- Key roles of soil organic matter relative to soil chemical and physical behaviour

- Composting processes
- Aerobic vs. anaerobic microorganisms
- Food web of the compost pile
- Use of compost



Level 2

Horticulture Technician Foundation



Line (GAC): **A** **USES OCCUPATIONAL SKILLS**
Competency: **A5** **Demonstrate basic horticultural skills**

Objectives

To be competent in this area, the individual must be able to:

- Assess plant quality.
- Demonstrate plant-handling requirements.

LEARNING TASKS

CONTENT

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Perform plant-grading according to the Canadian Standard for Nursery Stock and British Columbia Landscape Standard 2. Identify containers used for growing and shipping ornamental plant material 3. Describe standards for root ball sizing 4. Prepare balled and burlapped plants 5. Securely load plant material 6. Prepare plant materials | <ul style="list-style-type: none"> • Assessing and grading plants according to standards for plant: • Foliage density <ul style="list-style-type: none"> ○ Caliper ○ Height ○ Width ratios • Calculating container volume and comparing results to the standards • Calculating root ball sizes for: <ul style="list-style-type: none"> ○ Containers ○ Field grown stock • Rootballs: <ul style="list-style-type: none"> ○ Digging ○ Wrapping ○ Tying • Safely and efficiently lifting and carrying plant material to avoid physical damage to self and plants • Methods of harvesting plant material for field grown stock • Safety • Loading • Unloading • Securing plant material to a truck • Removal of containers • Scarifying root ball |
|--|---|



LEARNING TASKS

- 7. Demonstrate proper planting procedures for bare root stocks

- 8. Operate truck and trailer

CONTENT

- Appropriate depth and width of the planting hole
- Placing the plant in hole and back filling with appropriate material
- Appropriate post-planting maintenance requirements
- Appropriate storage of dormant and non-dormant plant material
- Appropriate storage onsite

- Safety
- Coupling the truck/tractor and trailer
- Operating either combination in reverse
- Securely parking the vehicle
- Compliance to guidelines established in Certified Horticulture Technician Program (CHT)



Line (GAC): **B USES AND MAINTAINS TOOLS AND EQUIPMENT**
Competency: **B1 Use and maintain hand tools and power tools**

Objectives

To be competent in this area the individual must be able to:

- Demonstrate safe use and maintenance of hand tools.
- Demonstrate safe use and maintenance of power tools.

LEARNING TASKS

1. Identify hand and power tools for basic horticultural tasks for Level Two technical training
2. Demonstrate hand tool maintenance
3. Demonstrate power tool maintenance

CONTENT

- (see the list of *Tools and Equipment* for Level Two, detailed in the *Training Provider Standards* of this Program Outline)
- Review Level One *B1 - Use and maintain hand tools and power tools.*
- Review Level One *B1 - Use and maintain hand tools and power tools.*



Line (GAC): B USES AND MAINTAINS TOOLS AND EQUIPMENT

Competency: B3 Operate vehicles and motorized equipment

Objectives

To be competent in this area, the individual must be able to:

- Examine vehicle and motorized equipment designs and functions.
- Operate and apply safe work practices as related to horticulture task requirements.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| <p>1. Identify horticulture vehicle and motorized equipment engine components and function</p> | <ul style="list-style-type: none"> • Differences between gas and diesel engines • Carburetor • Alternator • Radiator • Piston • Compression |
| <p>2. Describe and demonstrate personal safety as related to large multiple cylinder equipment</p> | <ul style="list-style-type: none"> • Safe lifting and moving techniques • Entry onto and exit from machinery using the three point contact • Appropriate personal protective equipment • Work place hazards and mitigation of the risk of accident and injury • General shop safety |
| <p>3. Describe and demonstrate safe operating procedures for horticulture equipment</p> | <ul style="list-style-type: none"> • General points for safe tractor operation • Tractor precautions: <ul style="list-style-type: none"> ○ Starting, speed and slopes ○ Hitch attachments ○ Transfer of tractors and equipment ○ Tractor transfer warnings • Operating a skid steer loader and zero turn walk behind machine • Power take-off precautions • Connecting attachments |

Achievement Criteria

- Performance The learner will safely operate a vehicle.
- Conditions The learner will be given a skid steer and specified attachments (e.g., bucket, forks).
- Criteria The learner will score a passing grade of 70% or better on a rating sheet according to the following criteria:
- Performed a circle check
 - Used three point contact when entering and exiting
 - Hooked up appropriate attachments
 - Started and maneuvered machine and attachments safely



Line (GAC): **B USES AND MAINTAINS TOOLS AND EQUIPMENT**
Competency: **B4 Maintain vehicles and motorized equipment**

Objectives

To be competent in this area, the individual must be able to:

- Perform basic maintenance on larger multiple cylinder engines and equipment as applied to horticulture.
- Apply safe work practices as related to horticulture equipment.

LEARNING TASKS

CONTENT

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Use hand tools to maintain horticulture equipment 2. Practice preventive maintenance and troubleshooting procedures 3. Perform and document circle check of vehicles and motorized equipment 4. Inspect equipment 5. Check position of safety features 6. Check and replace fluids according to manufacturers' specifications 7. Check and replace components | <ul style="list-style-type: none"> • Sockets and wrenches • Ignition tester • Multimeter • Battery charger • Tire gauge • Hydrometer • Tune up equipment • Diagnose work or defective parts • Lights • Plates • Brakes • Inspecting visually for: <ul style="list-style-type: none"> ○ Damage and wear ○ Lock out and tag out as necessary • Inspecting equipment to ensure efficient functioning • Lockout devices • Chutes • Trimmer and belt guards • Rollover protection devices (ROP) • Operator presence switches • Oil • Coolant • Hydraulic fluids • Spark plugs • Belts • Pull cords |
|--|--|



LEARNING TASKS

CONTENT

- | | |
|--|--|
| 8. Check and adjust air pressure in components | <ul style="list-style-type: none"> • Tires • Air compressors |
| 9. Check and tighten components | <ul style="list-style-type: none"> • Loose connections • Loose fittings |
| 10. Check cutting height and adjust components | <ul style="list-style-type: none"> • According to client expectations • Turf needs |
| 11. Develop a preventive maintenance plan | <ul style="list-style-type: none"> • Performing preventive maintenance every 3 months or 50 hours <ul style="list-style-type: none"> ○ Checking engine oil ○ Changing engine oil ○ Checking air filter ○ Oil-bathing air filter ○ Greasing fittings ○ Checking hydraulic oil ○ Checking tire pressures ○ Testing coolant ○ Checking belts ○ Checking hoses |

Achievement Criteria

Performance The learner will practice preventive maintenance on vehicles and motorized equipment.

- Conditions** The learner will be given:
- Skid steer loader
 - Gear tractor
 - 3 - reel turf mower
 - Gas powered utility vehicle (Gator)
 - Electric powered utility vehicle

Criteria The learner will score a passing grade of 70% or better on a rating sheet according to the following criteria and in accordance with manufacturers' specifications:

- Checked engine oil
- Changed engine oil
- Checked air filter
- Oil-bathed air filter
- Greased fittings
- Checked hydraulic oil
- Checked tire pressures
- Tested coolant
- Checked belts
- Checked hoses



Line (GAC): **B USES AND MAINTAINS TOOLS AND EQUIPMENT**
Competency: **B5 Use and maintain equipment attachments**

Objectives

To be competent in this area, the individual must be able to:

- Safely use equipment attachments for the appropriate task.
- Maintain equipment attachments.

LEARNING TASKS

1. Identify, select and use the appropriate equipment attachments for the task

2. Maintain equipment attachments

CONTENT

- (see the list of *Equipment Attachments* for Level Two, detailed in the *Training Provider Standards* of this Program Outline)

- Greasing fittings on equipment such as trailers, aerators and cultivators
- Inspecting attachments for damage and wear and lock-out and tag-out as necessary
- Adjusting attachments for parking, travel and operation
- Checking hydraulic fluids to ensure optimum and safe operation of equipment
- Cleaning and disinfecting attachments such as drop spreaders, sprayers and mowers
- Replacing damaged and worn components such as bushings, blades and tines
- Performing a circle check of equipment attachments to check for items such as lights, plates and brakes
- Checking operation of safety brake pin on trailers

**Achievement Criteria**

Performance The learner will inspect and service equipment.

Conditions The learner will be given equipment such as trailers, aerators and rototillers.

Criteria The learner will score a passing grade of 70% or better on a rating sheet according to the following criteria:

- Greased fittings on equipment
- Inspected attachments for damage and wear and locked-out and tagged-out as necessary
- Adjusted attachments for parking, travel and operation
- Checked hydraulic fluids to ensure optimum and safe operation of equipment
- Cleaned and disinfected attachments such as drop spreaders, sprayers and mowers
- Replaced damaged and worn components such as bushings, blades and tines
- Performed a circle check of equipment attachments to check for items such as lights, plates and brakes
- Checked operation of safety brake pin on trailers



Line (GAC): **C ORGANIZES WORK**
Competency: **C6 Communicate with others**

Objectives

To be competent in this area, the individual must be able to:

- Effectively communicate trade related information to various people.
- Use a variety of communication techniques such as hand signals, communication equipment, and communication skills.

LEARNING TASKS

1. Use communication skills

2. Use communication equipment

3. Use universal hand signals to communicate visually

CONTENT

- Mentoring apprentices
- Ensuring co-workers understand instructions using methods such as
 - Mirroring
 - Repeating back
- Practicing active listening skills
- Reporting discrepancies and seeking direction from supervisor

- Two-way radios
- Computers
- Cell phones

- Communicating with
 - Machine operators
 - Truckers
 - Crane operators
- WorkSafeBC requirements



Line (GAC): C **ORGANIZES WORK**
Competency: C9 **Organize plants, materials and equipment**

Objectives

To be competent in this area, the individual must be able to:

- Inspect and verify plants, materials and equipment.
- Receive, unload, record, protect and store plants, materials and equipment.
- Lay out plants on site.
- Perform final checks of plants, materials and equipment.

LEARNING TASKS

CONTENT

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Inspect and verify plants and materials | <ul style="list-style-type: none"> • Accuracy • Quality • Quantity |
| <ol style="list-style-type: none"> 2. Remove and inspect monitoring devices when necessary | <ul style="list-style-type: none"> • Temperature recorders • Environmental recorders |
| <ol style="list-style-type: none"> 3. Receive, unload, record and protect materials and products in an organized fashion | <ul style="list-style-type: none"> • Plant materials <ul style="list-style-type: none"> ○ Group/match plants by size and species ○ Place received products in designated areas to maintain product quality • Other materials <ul style="list-style-type: none"> ○ Wood chips ○ Soil ○ Aggregates ○ Store in designated areas to avoid contamination • Products <ul style="list-style-type: none"> ○ Soils ○ Seed ○ Plugs ○ Roots ○ Labels ○ Containers |
| <ol style="list-style-type: none"> 4. Allocate specified storage areas for equipment and hazardous materials | <ul style="list-style-type: none"> • Equipment • Hazardous materials |
| <ol style="list-style-type: none"> 5. Lay out plants on site | <ul style="list-style-type: none"> • According to landscape plans |



LEARNING TASKS

- 6. Perform final check onsite

- 7. Process substandard materials

CONTENT

- Required
 - Plants
 - Materials
 - Equipment

- Quarantine
- Reject
- Dispose of

Achievement Criteria

- Performance** The learner will organize plant materials and equipment onsite.
- Conditions** The learner will be given the appropriate plants, materials and equipment to handle a range of ornamental plant material.
- Criteria** The learner will score a passing grade of 70% or better on a rating sheet according to the following criteria:
- Sourced and selected plants
 - Laid out plants according to landscape plans
 - Performed final check
 - Processed substandard materials



Line (GAC): C **ORGANIZES WORK**
Competency: C10 **Maintain safe work environment**

Objectives

To be competent in this area, the individual must be able to:

- Assess site hazards and follow specified safety procedures.

LEARNING TASKS

CONTENT

1. Coordinate task with other workers	<ul style="list-style-type: none"> • Avoiding injury to <ul style="list-style-type: none"> ○ Self ○ Co-workers ○ Others
2. Follow safety procedures when working in high traffic areas	<ul style="list-style-type: none"> • Flagging • Pylons • Signage
3. Handle hazardous materials in accordance with government regulations and WHMIS procedures	<ul style="list-style-type: none"> • Disposing • Labelling • Using PPE
4. Participate in safety meetings and discussion	<ul style="list-style-type: none"> • Ensuring that information is recorded and distributed to all team members
5. Report unsafe conditions to supervisor	<ul style="list-style-type: none"> • Recognizing • Reporting
6. Recognize safety warning signals	<ul style="list-style-type: none"> • Back-up signals • Back-up alarms • Warning lights
7. Contain and dispose of spill contaminants	<ul style="list-style-type: none"> • According to regulations
8. Coordinate with other agencies	<ul style="list-style-type: none"> • Private and public line locators • Emergency response teams



Line (GAC): **C ORGANIZES WORK**
Competency: **C11 Examine interpersonal and supervisory skills**

Objectives

To be competent in this area, the individual must be able to:

- Demonstrate supervisory skills based on leadership, motivation, and delegation.
- Describe safety management and managing in a diverse workplace.

LEARNING TASKS

CONTENT

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Describe leadership in the organization
 2. Describe leadership skills
 3. Describe safety culture
 4. Describe managing a diverse workplace
 5. Interpret the employment standards | <ul style="list-style-type: none"> • Definition of leadership • Role of leaders • Characteristics of leaders
 • Motivational theories • Delegation learning • Skills needed for effective delegation • Setting goals for effective delegation and employee commitment • Team management: coaching and training
 • Role of WorkSafeBC • Safety culture in the workplace
 • Managing diversity <ul style="list-style-type: none"> ○ Characteristics of culture ○ Elements of cultural difference ○ Cultural orientation • Legal Requirements <ul style="list-style-type: none"> ○ Canadian Charter of Rights And Freedoms ○ Canadian Human Rights Act of 1985 ○ BC Human Rights Code • Enforcement of Human Rights
 • Impacts of the Employment Standards Act on horticultural operations |
|--|---|



Line (GAC): E **ANALYZES AND MAINTAINS PLANT HEALTH**
Competency: E2 **Manage growing conditions**

Objectives

To be competent in this area, the individual must be able to:

- Describe managing a variety of growing conditions.

LEARNING TASKS

1. Describe managing growing conditions as applicable to interior and exterior horticulture operations

CONTENT

- Determining exposure to conditions such as
 - Light
 - Wind
 - Heating
 - Ventilation
 - Air conditioning (HVAC) systems
 - Moisture
 - Reflective heat load based on location
- Using light meters for measuring light level for interior plants
- Collecting growing media samples using core samplers
- Checking growing media samples manually or by lab analysis for
 - Texture
 - Drainage
 - pH
 - Nutrients
 - Contaminants
- Determining air quality that might affect interior and exterior plants
- Taking corrective measures such as
 - Fertilization
 - Liming
 - Adding organics
 - Neutralizing water
 - Correcting drainage



Line (GAC): **E ANALYZES AND MAINTAINS PLANT HEALTH**
Competency: **E3 Manage pests and diseases**

Objectives

To be competent in this area, the individual must be able to:

- Examine biological characteristics of weeds, plant feeders and pathogens.
- List control strategies.

LEARNING TASKS

CONTENT

- | | |
|---|--|
| <p>1. Describe and distinguish between the major plant pest types</p> | <ul style="list-style-type: none"> • Weeds as pests • Invertebrates as pests • Vertebrates as pests • Pathogens as pests |
| <p>2. Describe characteristics that make plants weeds</p> | <ul style="list-style-type: none"> • Review what is a weed • Weeds as competitors • Weed classification • Hidden effects of weeds • Seeds of weedy plants |
| <p>3. Describe characteristics that make vertebrates pests</p> | <ul style="list-style-type: none"> • Wildlife management • Vertebrate plant-feeding pests <ul style="list-style-type: none"> ○ Birds ○ Deer ○ Rodents |
| <p>4. Describe characteristics that make invertebrates pests</p> | <ul style="list-style-type: none"> • Pest ecology • Insect pest success • Common invertebrate pests <ul style="list-style-type: none"> ○ Aphids ○ Leafhoppers ○ Scales ○ Weevils and beetles ○ Caterpillars and moths ○ Lacebugs ○ Sawflies ○ Thrips ○ Mites ○ Fungus gnats ○ Leaf miners ○ Slugs and snails |



LEARNING TASKS

5. Describe the characteristics that make pathogens pests

6. Describe the principles of cultural control methods as applied to horticultural plant pests

7. Describe the principles of biological control methods as applied to horticultural plant pests

8. Describe the principles of chemical control methods as applied to horticultural plant pests

9. Describe the integrated strategies and tactics for control of viruses

10. Describe integrated strategies and tactics for the control of bacteria

CONTENT

- Pathogen success
- The disease triangle
- The disease cycle
- Common diseases
 - Diseases caused by bacteria
 - Fungal diseases
 - Diseases caused by nematodes
 - Diseases caused by viruses

- Cultural methods of controlling weeds
 - Organic mulches
 - Non-organic mulches
 - Weed control in established plantings
- Cultural control of plant feeding pests
- Cultural control of pathogens

- Biological control of weeds
- Biological control of plant-feeding pests
- Beneficial organisms
- Biological agents
- Biological control of pathogens

- Chemical control of plant pests
 - Pesticides
- Chemical control of weeds
 - Herbicides
- Chemical control of plant feeding pests
 - Horticultural oil
 - Botanicals
 - Inorganics
 - Insecticidal soaps
 - Synthetic pesticides (organic)

- Integrated control strategies for common plant viral diseases
- Methods for the exclusion and eradication of plant pest vectors
- Management of virus-infected plants

- Biological control
- Cultural control method



LEARNING TASKS

11. Describe integrated strategies and tactics for the control of fungi

12. Describe the integrated strategies and tactics for the control of plant-feeding pests

CONTENT

- Biological control
- Cultural control
- General prevention

- Biological control
- Cultural control
- Plant-feeding pests
- Invertebrates
- Nematodes (invertebrates)
- Arthropod plant feeding pest (invertebrates)
- Vertebrate plant feeding pests and control



Line (GAC): **E ANALYZES AND MAINTAINS PLANT HEALTH**
Competency: **E4 Describe plant science as it applies to horticulture**

Objectives

To be competent in this area, the individual must be able to:

- Examine the internal anatomy of stems, roots and leaves as they relate to photosynthesis, respiration, and transpiration.

LEARNING TASKS

1. Describe the internal anatomy of stems, roots, and leaves

2. Describe plant part anatomy

3. Describe the movement of sap through a plant and the effects of environment on the rate of flow

4. Describe the flow of sugars, produced in photosynthesis, through the plant

CONTENT

- The plant cell
- Cell types, tissues, and their functions
- Primary growth
- Secondary growth

- Stems
 - Herbaceous stems
 - Woody stems
 - Bark
- Roots
 - Root apical meristems
 - Root cap
 - Epidermis
 - Cortex
 - Endodermis
 - Pericycle
 - Vascular tissue
 - Adventitious roots
 - Secondary growth
- Leaves
 - Anatomy of a leaf

- Water movement
 - Diffusion
 - Osmosis
 - Capillary attraction
 - Active transport

- Photosynthesis
 - Chlorophyll
 - Translocation for sugars
 - Respiration

**LEARNING TASKS**

5. Explain the influence of temperature, water availability, and light on the rates of photosynthesis and respiration

6. Describe the growth response to external stimuli

CONTENT

- Influence of environmental factors
- Effect of light, carbon dioxide availability, water, and nutrient availability on the rate of photosynthesis
- Environmental effects on the plant growth
- Effect of temperature on plant development
- Effect of water stress on plant growth

- Photoperiod and flower production
 - Photoperiod
 - Tropisms and plant growth



Line (GAC): **E ANALYZES AND MAINTAINS PLANT HEALTH**
Competency: **E6 Describe chemical characteristics of soil and soilless media**

Objectives

To be competent in this area, the individual must be able to:

- Examine soil and soil management in horticulture.
- Examine the chemical properties of soil and soilless media (soil reaction, soil salinity, soil fertility).
- Sample soils.

LEARNING TASKS

CONTENT

<ol style="list-style-type: none"> 1. Describe how soil colloids determine soil chemical properties 2. Behaviour of nutrients in soil 3. Acquisition of nutrients by plants 4. Measure soil reaction (pH) 5. Manage soil reaction 6. Explain how soil reaction (pH) relates to soil fertility 7. Measure and manage salinity and sodicity 8. Describe soil salinity and sodicity and impact on soil properties 	<ul style="list-style-type: none"> • Soil colloids • Soil pH and colloidal material • Cations and plant roots • Mineral nutrients • Primary macronutrients • Secondary macronutrients • Micronutrients • Nutrient uptake • The nitrogen cycle • Root absorption • Define pH • Testing soil for pH • Adjusting the pH of soil • Buffering capacity • Plant growth and pH tolerance <ul style="list-style-type: none"> ○ Importance of pH to plant growth ○ Phosphorus ○ Pathogens and pH • Salinity in soils • Measurement of salinity and sodicity • Measurement of electrical conductivity • Sodic soils • Impact of salinity and sodicity on soil physical and chemical characteristics
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LEARNING TASKS

9. Discuss nutrient management

10. Sample soils

11. Interpret soil test information

12. Interpret fertilizer label information

CONTENT

- Nutrient management
 - Slow-release fertilizers
 - Water soluble fertilizers
- Field stock and landscape fertilizer management
- Turf fertilizer management
- Organic fertilizers and amendments
- Inorganic fertilizers

- Soil testing
 - Collecting soil samples in field crops and on landscape sites
 - Procedures of soilless media samples
- Limitations of soil nutrient analysis

- Interpreting basic soil test results
- Calculate fertilizer application rates

- Classifications of fertilizers
- Fertilizer labeling

Achievement Criteria

Performance	The apprentice will examine soil samples and identify chemical properties.
Conditions	The learner will be given soil samples and testing equipment.
Criteria	<p>The learner will score a passing grade of 70% or better on a rating sheet according to the following criteria:</p> <ul style="list-style-type: none"> • Performed sodic and salinity analysis • Performed pH analysis • Performed nutrient management analysis



Section 4

TRAINING PROVIDER STANDARDS



Facility Requirements

LEVEL ONE

Classroom Area

- Approximately 900 square feet
- Comfortable seating and tables suitable for training, teaching, lecturing and drafting
- Compliance with all local and national fire code and occupational safety requirements
- Lighting controls to allow easy visibility of projection screen while also allowing students to take notes
- Windows must have shades or blinds to adjust sunlight
- Heating/Air conditioning for comfort all year round
- In-room temperature regulation to ensure comfortable room temperature
- In-room ventilation sufficient to control training room temperature
- Acoustics in the room must allow audibility of the instructor
- White marking board with pens and eraser (optional: flipchart in similar size)
- Projection screen or projection area at front of classroom
- Overhead projector and a multi-media (data) projector

Shop Area

- Access to a service bay – approximately 600 square feet
- Access to a site for equipment operation – minimum 1 acre
- Access to all tools and equipment as listed for Level One

Lab Requirements

- Botany or Science teaching lab outfitted with compound and dissecting microscopes - approximately 600 square feet
 - Access to live 'in situ' plant material as well as herbaria, and visual samples (slides, photographic databases, etc.)
 - Microscope slides of showing root, stem and leaf anatomy (monocot and dicot)
 - Microscope slides showing woody stem growth
 - Hand lens (10X)
 - Glassware, lamps, stir plate (with heating capacity)
 - Refrigerator and microwave
 - Collection of arthropods, disease organisms, and examples of plant stress
- Soil Science or Chemistry teaching lab - approximately 600 square feet
 - Glassware, lamps, stir plate (with heating capacity)
 - Refrigerator, drying oven and microwave
 - Nested sieves, shakers, scales
 - Hydrometers and sedimentation cylinders
 - Munsell colour books

**Student Facilities**

- Adequate lunch room as per WorkSafeBC requirements
- Adequate washroom facilities as per WorkSafeBC requirements
- Personal storage lockers

Instructor's Office Space

- Suitable space and office furniture necessary for instructor to prepare lessons and secure file records

Other

- Access to botanical gardens



LEVEL TWO

Classroom Area

- Approximately 900 square feet
- Comfortable seating and tables suitable for training, teaching, lecturing and drafting
- Compliance with all local and national fire code and occupational safety requirements
- Lighting controls to allow easy visibility of projection screen while also allowing students to take notes
- Windows must have shades or blinds to adjust sunlight
- Heating/Air conditioning for comfort all year round
- In-room temperature regulation to ensure comfortable room temperature
- In-room ventilation sufficient to control training room temperature
- Acoustics in the room must allow audibility of the instructor
- White marking board with pens and eraser (optional: flipchart in similar size)
- Projection screen or projection area at front of classroom
- Overhead projector and a multi-media (data) projector

Shop Area

- Access to a service bay – approximately 600 square feet
- Access to a site for equipment operation – minimum 1 acre
- Access to all tools and equipment as listed for Level Two

Lab Requirements

- Botany or Science teaching lab outfitted with compound and dissecting microscopes - approximately 600 square feet
 - Access to live 'in situ' plant material as well as herbaria, and visual samples (slides, photographic databases, etc.)
 - Microscope slides showing root, stem and leaf anatomy (monocot and dicot)
 - Microscope slides showing woody stem growth
 - Hand lens (10X)
 - Glassware, lamps, stir plate (with heating capacity)
 - Refrigerator and microwave
 - Collection of arthropods, disease organisms, and examples of plant stress
- Soil Science or Chemistry teaching lab - approximately 600 square feet
 - Glassware, lamps, stir plate (with heating capacity)
 - Refrigerator, drying oven and microwave
 - Nested sieves, shakers, scales
 - Hydrometers and sedimentation cylinders
 - Munsell colour books
 - pH meters
 - Soil sampling equipment

**Student Facilities**

- Adequate lunch room as per WorkSafeBC requirements
- Adequate washroom facilities as per WorkSafeBC requirements
- Personal storage lockers

Instructor's Office Space

- Suitable space and office furniture necessary for instructor to prepare lessons and secure file records

Other

- Access to a botanical garden
- Access to container nursery stock
- Access to field-grown stock/plant material that can be prepared for transplanting
- Trailer and tractor nursery equipment
- Access to large tree transplanting equipment
- Nursery hand carts and tree dollies
- Multiple nursery stock containers



Tools and Equipment

LEVEL ONE

Shop Equipment

Motorized Equipment

- Baggers for leafs
- Blowers (backpack, hand held, push, earth auger)
- Dethatcher
- Edgers
- Hedge trimmer (extension, long reach)
- Lawn/weed trimmers (gas & electric)
- Pressure washer
- Soil screener
- String trimmer
- Sterilizers

Shop (Facility) Tools

Standard Power Tools

- Chainsaw
- Grinder
- Pole chainsaw
- Pallet Jack
- Power cultivator (rototiller)
- Vacuum (wet/dry, leaf)
- Walk-behind aerator

Standard Hand Tools

- Brooms
- Cultivator (manual)
- De-thatching rake
- Garden forks
- Grease guns
- Handheld watering equipment
- Landscape rakes
- Loppers
- Mallet
- Microscope
- Pickaxes
- Picks
- Pitch forks
- Pliers (various types)
- Pruning shears
- Rakes (various types)
- Screwdrivers (various types)
- Seed/fertilizer spreader
- Sharpening tools
- Shovels (coal, clam, scoop/barn, spade, garden)
- Spades (various types)
- String line
- Tarps
- Trowels
- Weed digger
- Wheelbarrow
- Wrenches



Specialty (Facility) Tools

Measuring Equipment

- EC meters Levels
- Hydrometer
- Levels
- pH meter
- Scales
- Sedimentation cylinder
- Tape measure
- Thermometers
- Tire pressure meter

Student Equipment (supplied by school)

Required - PPE and Safety Equipment

- Ear protection
- Eye protection (glasses, shields)
- Eye wash kit
- Fall protection (harness)
- Fire extinguisher
- First Aid kits
- Flares
- Hardhat
- Lanyard
- Particle masks
- Reflective shirts, jackets
- Respirators
- Safety vests
- Spill kit
- Traffic cones

Office Equipment

Recommended

- Camera
- Communication devices
- Computers

Student Tools (supplied by student)

Required

- CSA-approved steel-toed footwear
- Calculator
- Hand lens (10x)
- Secateurs

Recommended

- Work gloves
- Rainwear



LEVEL TWO

Shop Equipment

Motorized Equipment

- 3-reel turf mower
- Backhoe
- Baggers for leafs
- Blowers (backpack, hand held, push, earthauger)
- Brush cutter
- Clearing saw
- Edgers
- Electric powered utility vehicle
- Elevated work platforms
- Excavator
- De-thatcher
- Flat filler
- Fork lift
- Front end loader
- Gas powered utility vehicle (Gator)
- Hedge trimmer (extension, long reach)
- Lawn/weed trimmers (gas & electric)
- Pot filler
- Powered rollers
- Pressure washer
- Pumps
- Ram compactor (jumping jack)
- Riding mowers/mulchers
- Skid steer loader
- Soil screener
- Sterilizers
- String trimmer
- Tractors
- Trucks
- Turf and tree sprayer

Required – Attachments

- Bucket
- Forks
- Trailer
- Spray equipment

Recommended – Attachments

- Aerator
- Auger/post hole digger
- Blade
- Cultivator
- Discer
- Harrow
- Leaf vacuum
- Overseeder
- Plough
- Power sweeper
- Rototiller
- Snow blower
- Soil profiler
- Top dresser
- Tow behind de-thatcher
- Tow behind thatcher
- Tree spade
- U-blade
- Vacuum



Shop (Facility) Tools

Standard Power Tools

- Chainsaw
- Electric drill
- Fertilizer injector
- Grinder
- Hammer drill
- Mower/mulcher
- Power cultivator (rototiller)
- Power sprayer
- Vacuum (wet/dry, leaf)
- Walk-behind aerator

Standard Hand Tools

- Axes
- Backpack sprayer
- Boxcutters
- Brick carriers
- Brick splitter
- Brooms
- Bulb planters
- Cart
- Chains
- Chisels
- Clearing axes
- Core samplers (probe)
- Crimpers
- Crowbars
- Cultivator (manual)
- De-thatching rake
- Dolly
- Files
- Flags
- Garden forks
- Grease guns
- Hammers (hand, sledge)
- Hand tamper
- Handheld watering equipment
- Landscape rakes
- Loppers
- Mallet
- Microscope
- Pickaxes
- Picks
- Pitch forks
- Pliers (various types)
- Pry bar
- Punch
- Rakes (various types)
- Screwdrivers (various types)
- Seed/fertilizer spreader
- Sharpening tools
- Shovels (coal, clam, scoop/barn, spade, garden)
- Side cutters
- Soil screener
- Spades (various types)
- String line
- Tap and die
- Tape measure
- Tarps
- Tie-downs (straps, chains)
- Tree cart
- Trowels
- Water key
- Weed digger
- Wheelbarrow
- Wheel chocks
- Wrenches



Specialty (Facility) Tools

Measuring Equipment

- Anemometer
- EC meter
- Hydrometer
- Hygrometer
- Levels (line, hand, zip laser)
- Light meter
- pH meter
- Tape measure
- Thermometer
- Tire pressure meter

Student Equipment (supplied by school)

Required - PPE and Safety Equipment

- Cones
- Chemical protection suits
- Ear protection
- Eye protection (glasses, shields)
- Eye wash kit
- Face shields
- Fall protection (harness)
- Fire extinguisher
- First Aid kits
- Flares
- Goggles
- Hard hat
- Lanyard
- Particle masks
- Reflective shirts, jackets
- Respirators
- Rubber gloves
- Safety vests
- Spill kit
- Traffic cones

Recommended - Office Equipment

- Camera
- Communication devices
- Computers

Student Tools (supplied by student)

Required

- CSA-approved steel-toed footwear

Recommended

- Calculator
- Hand lens (10x)
- Work gloves
- Rainwear



Reference Materials

LEVEL ONE

Required Reference Materials

- Kwantlen University College School of Horticulture Plant identification Database, www.kwantlen.ca/horticulture/
<https://plantdatabase.kpu.ca/>
- Botany for Gardeners - Latest edition. Capon, Brian. Timber Press, Portland, OR.
- Soil Science and Management - Latest edition. Plaster J. Edward. Thomson/Delmar Learning, Clifton Park, NY
- British Columbia Landscape Standard - Latest edition. BC Landscape and Nursery Association and the British Columbia Association of Landscape Architects, Surrey, BC
- Identify Plants and Describe Their Use – Module 1, HEBC 2012
- Communication and Organizational Skills – Module 1, HEBC 2012
- Equipment Maintenance and Safety – Module 1, HEBC 2012
- Plant Science for Horticulture – Module 1, HEBC 2012
- Plant Stress – Signs and Symptoms, HEBC 2012
- Soil and Soilless Media – Physical and Biological Characteristics – Module 1, HEBC 2012
- Horticultural Skills – Module 1, HEBC 2012

Recommended Resources

- Integrated Pest Management Manual for Landscape Pests in British Columbia. Gilkeson, Linda A. 2000. Pollution and Remediation Branch, Victoria, BC.
- WorkSafeBC Website (<http://www.worksafebc.com/>)
- Equipment Manufacturers Websites (Internet)

**Suggested Texts**

- Abiotic Disorders of Landscape Plants : A Diagnostic Guide - Costello, Laurence Raleigh. 2003. University of California, Agriculture and Natural Resources, Oakland, CA
- Home and Garden Pest Management Guide for British Columbia - B.C. Ministry of Agriculture Fisheries and Food Latest edition. Crown Publications, Victoria, BC
- B.C. Nursery and Landscape Pest Management and Production Guide - Latest edition. B.C. Ministry of Environment, Lands, and Parks. Latest Edition, Crown Publications, Victoria BC
- Ball Identification Guide to Greenhouse Pests and Beneficials - Gill, Stanton. 1998. Ball Publishing, Batavia, Ill.
- Field Guide to Noxious and Other Selected Weeds of British Columbia - Cranston, Roy. 2002. Ministry of Agriculture, Food and Fisheries; Ministry of Forests, Victoria, BC (Also available online at <http://www.agf.gov.bc.ca/cropprot/weedguid/weedguid.htm>)
- Pacific Northwest; Plant Disease Management Handbook - 2000. Extension Services of Oregon State University, Washington State University, and the University of Idaho
- Soil Management Handbook for the Lower Fraser Valley - Bertrand, R.A., G.A. Hughes-Games, and D.C. Nikkel. 1991. Ministry of Agriculture, Fisheries & Food, Abbotsford, B.C.
- Western Fertilizer Handbook - Soil Improvement Committee, California Fertilizer Association. Latest edition (Horticulture ed.) Interstate Publishing Inc., Danville, Illinois
- Groundskeepers Safety Guide - Latest edition. Canadian Centre for Occupational Health and Safety, Hamilton, ON.
- Outdoor Power Equipment, Latest Edition, Webster, Jay, Nelson. Canada, Scarborough ON

NOTE:

This list of Reference Materials is for training providers. Apprentices should contact their preferred training provider for a list of recommended or required texts for this program.



LEVEL TWO

Required Reference Materials

- Kwantlen University College School of Horticulture Plant identification Database, <http://www.kpu.ca/hort>
<https://plantdatabase.kpu.ca/>
- Botany for Gardeners - Capon, Brian. Latest edition. Timber Press, Portland, OR.
- Integrated pest management manual for landscape pests in British Columbia - Gilkeson, Linda A. 2000. Pollution and Remediation Branch, Victoria, BC.
- Soil Science and Management - Latest edition. Plaster J. Edward. Thomson/Delmar Learning, Clifton Park, NY
- British Columbia Landscape Standard - Latest edition. BC Landscape and Nursery Association, BC Society of Landscape Architects, BC
- Canadian Standards for Nursery Stock - Latest edition. Canadian Nursery and Landscape Association
- Identify Plants and Describe Their Use – Module 2, HEBC 2012
- Leadership and Organizational Skills – Module 2, HEBC 2012
- Equipment Maintenance and Safety – Module 2, HEBC 2012
- Plant Science for Horticulture – Module 2, HEBC 2012
- Plant Stress – Causes and Controls – Module 2, HEBC 2012
- Soils and Soilless Media – Chemical Characteristics – Module 2, HEBC 2012
- Horticultural Skills – Plant Quality and Handling – Module 2, HEBC 2012

Recommended Resources

- Kwantlen University College School of Horticulture Plant identification Database, <http://www.kpu.ca/hort>
<https://plantdatabase.kpu.ca/>
- Field Guide to Noxious and Other Selected Weeds of British Columbia - Cranston, Roy. 2002. Ministry of Agriculture, Food and Fisheries; Ministry of Forests, Victoria, BC (Also available online at <http://www.agf.gov.bc.ca/cropprot/weedguid/weedguid.htm>)
- WorkSafeBC Website (<http://www.worksafebc.com/>)
- Equipment Manufacturers Websites (Internet)

Suggested Texts

- B.C. Nursery and Landscape Pest Management and Production Guide - Latest edition. B.C. Ministry of Environment, Lands, and Parks. Latest Edition, Crown Publications, Victoria BC
- Home and Garden Pest Management Guide for British Columbia - B.C. Ministry of Agriculture Fisheries and Food Latest edition. Crown Publications, Victoria, BC
- Abiotic disorders of landscape plants: a diagnostic guide - Costello, Laurence Raleigh. 2003. University of California, Agriculture and Natural Resources, Oakland, CA
- Ball Identification Guide to Greenhouse Pests and Beneficials - Gill, Stanton. 1998. Ball Publishing, Batavia, Ill.
- Pacific Northwest; Plant Disease Management Handbook - 2008. Extension Services of Oregon State University, Washington State University, and the University of Idaho



- Handbook for Pesticide Applicators and Pesticide Dispensers - Latest edition. Provincial Ministry of Environment, BC
- Western Fertilizer Handbook - Soil Improvement Committee, California Fertilizer Association. Latest edition. (Horticulture Ed.) Interstate Publishing Inc., Danville, Illinois
- Soil Fertility Manual - Latest edition. Potash & Phosphate Institute and the Foundation for Agronomic Research. Province of British Columbia Ministry of Skills, Training and Labour and the Centre for Curriculum and Professional Development, Norcross, GA
- Considerations for their use - Ministry of Education, Skills and Training and the Ministry of Labour and the Centre for Curriculum and Professional Development. 1995. BC.
- Outdoor Power Equipment, Latest Edition, Webster, Jay, Nelson. Canada, Scarborough ON



Instructor Requirements

Occupation Qualification

The instructor must possess:

- Subject matter competence as demonstrated by a Horticulture Trades Qualification/Apprentice Certificate or Horticulture Diploma
- Teaching competence as demonstrated by successful completion of Provincial Instructor Diploma (PIDP) or equivalent or regular faculty status at an institution which has a defined faculty review process (as specified by institutional policy) or contract faculty who have at least completed the Instructional Skills Workshop (PIDP 3102) or equivalent.

Work Experience

- Instructors with the Landscape Horticulture C of Q must have a minimum 2 years experience working in the industry as a journey person
- Or credentials for related subject matter competence

ADDITIONAL CREDENTIALS AND EXPERIENCE RECOMMENDED FOR SPECIFIC SUBJECT MATTER

LEVEL ONE

Subject Matter: Plant Identification and Use

Subject matter competence as demonstrated by a Horticulture Trades Qualification/Apprentice Certificate or Horticulture Diploma or Baccalaureate Degree in Horticulture and 2 years of plant identification experience.

Subject Matter: Communication and Supervision

Subject matter competence as demonstrated by a Business Diploma with Human Resource or Organizational Behaviour specialty or Baccalaureate Degree in with a minor in Business or Certified Landscape Professional.

Two years supervisory or management experience in a private or public organization.

Subject Matter: Equipment Operation and Maintenance

Subject matter competence as demonstrated by an Outdoor Power Equipment Trades Qualification/Apprentice Certificate.

5 years of relevant industry experience.

Subject Matter: Plant Science

Subject matter competence as demonstrated by a Baccalaureate Degree in Horticulture, Botany, Agronomy, Plant Biology, Forestry, or Crop Science and/or a Diploma in Horticulture, Agriculture or Forestry with a minimum of 5 years of experience in plant science.

Subject Matter: Analyze and Maintain Plant Health

Subject matter competence as demonstrated by a Horticulture Diploma or Baccalaureate Degree in Horticulture, Agronomy, Forestry, Crop Science, or Pest Management and/or a Diploma in Agriculture or Forestry with a minimum of 5 years of experience in analyzing and maintaining plant health.

**Subject Matter: Physical and Biological Characteristics of Soil and Soilless Media**

Subject matter competence as demonstrated by a Baccalaureate Degree in Soil Science Horticulture, Agronomy, Forestry, or Crop Science and/or a Diploma in Horticulture, Agriculture or Pest Management with a minimum of 5 years of experience in analyzing physical and biological characteristics of soil and soilless media.

Subject Matter: Practical Horticultural Skills

Subject matter competence as demonstrated by a Horticulture Trades Qualification/Apprentice Certificate or Horticulture Diploma or Baccalaureate Degree in Horticulture and 2 years of practical landscape or nursery experience

LEVEL TWO**Subject Matter: Plant Identification and Use**

Subject matter competence as demonstrated by a Horticulture Trades Qualification/Apprentice Certificate or Horticulture Diploma or Baccalaureate Degree in Horticulture and 2 years of plant identification experience.

Subject Matter: Communication and Supervision

Subject matter competence as demonstrated by a Horticulture Trades Qualification/Apprentice Certificate or Horticulture Diploma or Baccalaureate Degree in with a minor in Business or Certified Landscape Professional. Two years of relevant industry experience.

Subject Matter: Equipment Operation and Maintenance

Subject matter competence as demonstrated by an Outdoor Power Equipment Trades Qualification/Apprentice Certificate or equivalent within Horticulture training or education, with a minimum of 2 years of relevant industry experience.

Subject Matter: Plant Science

Subject matter competence as demonstrated by a Baccalaureate Degree in Horticulture, Botany, Agronomy, Plant Biology, Forestry, or Crop Science and/or a Diploma in Horticulture, Agriculture or Forestry with a minimum 5 years of experience in plant science.

Subject Matter: Analyze and Maintain Plant Health

Subject matter competence as demonstrated by a Horticulture Diploma or Baccalaureate Degree in Horticulture, Agronomy, Forestry, Crop Science, or Pest Management and/or a Diploma in Agriculture or Forestry with a minimum of 5 years of experience in analyzing and maintaining plant health.

Subject Matter: Chemical Characteristics of Soil and Soilless Media

Subject matter competence as demonstrated by a Baccalaureate Degree in Soil Science Horticulture, Agronomy, Forestry, or Crop Science and/or a Diploma in Horticulture, Agriculture or Pest Management with a minimum of 5 years of experience in analyzing physical and biological characteristics of soil and soilless media.

Subject Matter: Practical Horticultural Skills

Subject matter competence as demonstrated by a Horticulture Trades Qualification/Apprentice Certificate or Horticulture Diploma or Baccalaureate Degree in Horticulture and 2 years of practical landscape or nursery experience.