Apprenticeship and Industry Training

Landscape Gardener

Apprenticeship Course Outline

4797 (1997)

Alberta

Apprenticeship and
Industry Training

LANDSCAPE GARDENER
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COURSE OUTLINE

Goal of Apprenticeship Training

The goal of apprenticeship training is to develop a competent journeyman through a combination of on-the-job and technical training.

The graduate of the Landscape Gardener apprenticeship training is a journeyman who will be able to:

- apply the principles of landscape design and construction
- construct and install landscape planters, walks and other accessories of various materials.
- handle orders of plant and related materials.
- operate and service the tools and machinery as used in the landscape gardener trade.
- design, install and maintain irrigation systems.
- identify and apply principles for the operation of a greenhouse, nursery, garden centre and sod production.
- apply the principles of landscape maintenance-interior and exterior.
- apply the principles of plant production.
- identify and amend soil types and plant nutrient requirements.
- identify and apply knowledge of pests, disease and controls used by this industry.
- apply knowledge of plant botany and identification.
- relate to other trades working in the same environment, paving crews, underground services, heavy equipment operators, etc.

Procedures for Recommending Revisions to the Course Outline

Any concerned citizen or group in the Province of Alberta may make recommendations for change by writing to:

Apprenticeship and Industry Training
Industry Programs and Standards
10th Floor, Commerce Place
10155 - 102 Street
Edmonton, AB T5J 4L5.

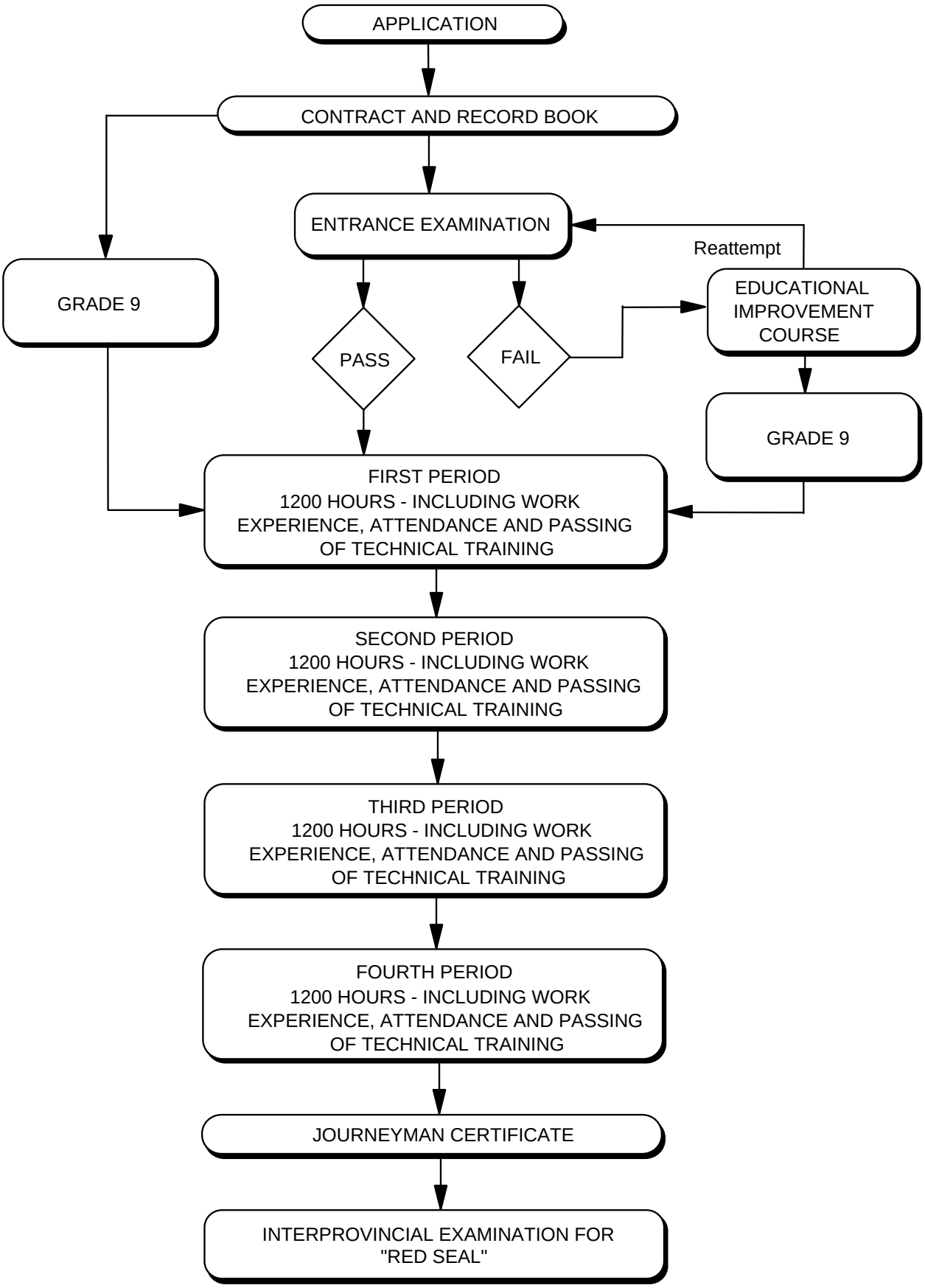
It is requested that recommendations for change refer to specific areas and state references used. Recommendations received will be placed before regular meetings of the Provincial Apprenticeship Committee.

This course outline has been prepared by the Industry Programs and Standards of the Apprenticeship and Industry Training in partnership with the curriculum subcommittee of the Provincial Apprenticeship Committee for the trade.

This course outline was approved on October 24, 1997 under the authority of the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. Valuable input is acknowledged from:

Private Industry
Local Apprenticeship Committees
Technical Training Establishments.

APPRENTICESHIP ROUTE TOWARD CERTIFICATION



Safety Education

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees and the public. Therefore, it is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to or cause an accident or injury.

It is generally recognised that a safe attitude contributes to an accident free environment. Everyone will benefit as a result of a healthy safe attitude towards prevention of accidents.

A tradesperson is possibly exposed to more hazards than any other person in the work force and, therefore, should be familiar with and apply the Occupational Health and Safety Act and Regulations dealing with personal safety and the special safety rules applying to each task.

Legal and Administrative Aspects of Safety

Employer's Responsibilities:

Accident prevention and the provisions of safe working conditions are the responsibilities of an employer. The employer is responsible for:

1. provision and maintenance of safety equipment.
2. provision of protective devices and clothing.
3. enforcement of safe working procedures.
4. safeguards for machinery, equipment and tools.
5. observance of all accident prevention regulations.
6. training of employees in safe use and operation of equipment.

Individual's Responsibilities:

The employee is responsible for:

1. working in accordance with the safety regulations pertaining to job environment.
2. working in such a way as not to endanger themselves or fellow employees.

Government's Responsibilities:

The government is responsible for:

1. ensuring that adequate safety is reflected in the curriculum.
2. ensuring that adequate safety instruction is delivered at the training establishments.
3. periodic inspection of the workplace to ensure that safety regulations for industry are being observed.

Apprenticeship Committee Structure

Provincial Apprenticeship Committees (P.A.C.)

Each trade is guided by a Provincial Apprenticeship Committee which is comprised of employee and employer members who are associated with and knowledgeable in the trade.

This Committee makes recommendations on policies and regulations to the Apprenticeship and Industry Training board.

The P.A.C. also assists in updating of training programs, course outlines and examinations.

Landscape Gardener P.A.C. Members

Mr. R. Oudyk	Edmonton	Presiding Officer
Mr. D. Grice	Edmonton	Employer
Ms. M. Hulme	Edmonton	Employer
Mr. P. Paxton	Calgary	Employer
Mr. W. Retzer	Calgary	Employee
Ms. J. Smith	Edmonton	Employee
Ms. J. Huebner	Red Deer	Employee
Mr. J. Anderson	Red Deer	Employee

Local Apprenticeship Committees (L.A.C.)

The Local Apprenticeship Committees deal with apprenticeship related matters at the local level. They also make recommendations to their respective Provincial Apprenticeship Committee. Members who serve on these committees are nominated by employer or labour organisations. Membership is comprised of employee and employer representatives in accordance with The Apprenticeship and Industry Training Act.

Technical Training Establishments

The Landscape Gardener apprenticeship training program is offered by Alberta Learning, Apprenticeship and Industry Training. Staff and facilities for delivering the program are supplied by Olds College.

LANDSCAPE GARDENER PROGRAM

TECHNICAL TRAINING SUBJECTS AND TIME DISTRIBUTION

The hours stated are for guidance and should be adhered to as close as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

Subjects	Time Distribution in Hours				
	First Period	Second Period	Third Period	Fourth Period	Total
Workplace Safety	8				8
Tools, Machinery and Hydraulics	40				40
Horticulture Soils	40				40
Plant Identification and Use	28	38	46	40	152
Introductory Botany	20				20
Greenhouse Production	26				26
Landscape Construction	66				66
Sales and Communication		24			24
Basic Surveying		28			28
Landscape Construction		46			46
Greenhouse Structures and Environment		20			20
Pests and Pest Management		36			36
Pesticide Use and Safety		10			10
Turf Maintenance		26			26
Landscape Design			30		30
Interior Maintenance			40		40
Herbaceous Ornamentals in the Landscape			14		14
Plant Physiology			22		22
Irrigation			20		20
Arboriculture			32		32
Plant Production			24		24
Landscape Design				32	32
Landscape Construction				38	38
Irrigation				40	40
Estimating, Tendering and Contracts				34	34
Nursery and Sod Production				44	44
Administration and Examination	12	12	12	12	48
Totals	240	240	240	240	960

Landscape Gardener Training Profile

First Period

(8 Weeks 30 Hours Per Week – Total of 240 Hours)

SECTION ONE

WORKPLACE SAFETY

8 Hours

- **A** — Occupational Health and Safety — 4 Hours
- **B** — Workplace Hazardous Materials Information System (WHMIS) — 1 Hour
- **C** — Fire Safety — 2 Hours
- **D** — Safe Work Practices — 1 Hour

SECTION TWO

TOOLS, MACHINERY AND HYDRAULICS

40 Hours

- **A** — Commercial Vehicles — 2 Hours
- **B** — Machinery — 4 Hours
- **C** — Engines — 10 Hours
- **D** — Maintenance — 1 Hour
- **E** — Hydraulic System — 13 Hours
- **F** — Tools — 10 Hours

SECTION THREE

HORTICULTURE SOILS

40 Hours

- **A** — Soil Formation — 4 Hours
- **B** — Soil Separates — 2 Hours
- **C** — Soil Textures — 4 Hours
- **D** — Soil Structure — 3 Hours
- **E** — Organic Matter — 3 Hours
- **F** — Soil Colour — 1 Hour
- **G** — Soil Chemistry — 14 Hours
- **H** — Plant Nutrition — 4 Hours
- **I** — Fertilisers — 3 Hours
- **J** — Mapping — 2 Hours

SECTION FOUR

PLANT IDENTIFICATION AND USE

28 Hours

- **A** — Plant Classification — 2 Hours
- **B** — Plant use in the Landscape — 13 Hours
- **C** — Plant Identification — 13 Hours

SECTION FIVE

INTRODUCTORY BOTANY

20 Hours

- **A** — Cells and Tissues — 1 Hours
- **B** — Stems — 4 Hours
- **C** — Leaves — 4 Hours
- **D** — Roots — 3 Hours
- **E** — Flowers — 4 Hours
- **F** — Fruit — 2 Hours
- **G**

Plant Growth and Development
2 Hours

SECTION SIX

GREENHOUSE PRODUCTION
26 Hours

A	B	C
Containerisation 2 Hours	Greenhouse Environment 5 Hours	Propagation 7 Hours

D	E	F
Growing On 8 Hours	Hardening Off 1 Hour	Plant Health Problems 2 Hours

G
Plant Handling 1 Hour

SECTION SEVEN

LANDSCAPE CONSTRUCTION
66 Hours

A	B	C
Grading 4 Hours	Woody Plant Handling, Installation and Maintenance 26 Hours	Turf 22 Hours

D
Landscape Construction 14 Hours

Second Period

(8 Weeks 30 Hours Per Week – Total of 240 Hours)

SECTION ONE

SALES AND C0MMUNICATION
24 Hours

A	B	C
Oral Communication 6 Hours	Written Communication 6 Hours	Sales Presentations 10 Hours

D
Successful Employees 2 Hours

SECTION TWO

BASIC SURVEYING
28 Hours

A	B	C
Introduction 2 Hours	Application 18 Hours	Interpretation 8 Hours

SECTION THREE

LANDSCAPE CONSTRUCTION
46 Hours

A	B	C
Basic Timber Construction 24 Hours	Basic Precast Units (Pavers) 18 Hours	Concrete 4 Hours

SECTION FOUR

GREENHOUSE STRUCTURES AND ENVIRONMENT
20 Hours

A	B
Structure 12 Hours	Environmental Control 8 Hours

SECTION FIVE

A	B

PLANT IDENTIFICATION — **38 Hours**

- Plant Use in the Landscape — 19 Hours
- Plant Identification — 19 Hours

SECTION SIX

PESTS AND PEST MANAGEMENT — **36 Hours**

- A: Hoilistic Pest Management — 6 Hours
- B: Landscape Insects and their Management — 10 Hours
- C: Landscape Diseases and their Management — 10 Hours
- D: Weeds and Weed Management — 10 Hours

SECTION SEVEN

PESTICIDE USE AND SAFETY — **10 Hours**

- A: Legislation — 2 Hours
- B: Use — 3 Hours
- C: Classification — 4 Hours
- D: Safety — 2 Hours
- E: Resources — 1 Hour

SECTION EIGHT

TURF MAINTENANCE — **26 Hours**

- A: Soil Management — 8 Hours
- B: Turfgrass Fertilisation — 6 Hours
- C: Maintenance Practices — 10 Hours
- D: Athletic Field Maintenance — 2 Hours

Third Period

(8 Weeks 30 Hours Per Week – Total of 240 Hours)

SECTION ONE

LANDSCAPE DESIGN — **30 Hours**

- A: Design Theory — 3 Hours
- B: Design Process — 6 Hours
- C: Drawing Techniques — 6 Hours
- D: Design Project — 10 Hours

SECTION TWO

INTERIOR MAINTENANCE — **40 Hours**

- A: Interiorscape Environment — 10 Hours
- B: Growing Media — 6 Hours
- C: Maintenance — 4 Hours
- D: Plant Material — 20 Hours

SECTION THREE

PLANT IDENTIFICATION AND USE

46 Hours

A	B
Plant Use in the Landscape 23 Hours	Plant Identification 23 Hours

SECTION FOUR

HERBACEOUS ORNAMENTALS IN THE LANDSCAPE

14 Hours

A	B
Design 8 Hours	Plant Selection and Culture 6 Hours

SECTION FIVE

PLANT PHYSIOLOGY

22 Hours

A	B	C
Biochemical Processes 8 Hours	Transport in the Plant 4 Hours	Stress 7 Hours

D
Growth Regulation 3 Hours

SECTION SIX

IRRIGATION

20 Hours

A	B	C
Introduction 1 Hour	Soil – Plant – Water Relationships 3 Hours	Water 2 Hours

D	E	F
System Water Capacity 1 Hour	Irrigation Systems 9 Hours	Pumping Systems 4 Hours

SECTION SEVEN

ARBORICULTURE

32 Hours

A	B	C
Introduction 2 Hours	Tree Biology 4 Hours	Tree/Soil Relations 2 Hours

D	E	F
Tree Selection and Installation 2 Hours	Pruning 4 Hours	Tree Repair 3 Hours

G	H	I
Tree Removal 3 Hours	Tree Hazard Evaluation 2 Hours	Tree Valuating 2 Hours

D	E
Working Aloft 4 Hours	Safety 4 Hours

SECTION EIGHT

PLANT PRODUCTION

24 Hours

A	B	C
Sexual Propagation 10 Hours	Aswxual Propagation 10 Hours	Evaluation Propagation Techniques 4 Hours

Fourth Period

(8 Weeks 30 Hours Per Week – Total of 240 Hours)

SECTION ONE

LANDSCAPE DESIGN
32 Hours

A	B	C
Introduction 2 Hours	Lanscape Working Drawings 4 Hours	Design Scenarios 4 Hours

D
Design Project 22 Hours

SECTION TWO

LANDSCAPE CONSTRUCTION
38 Hours

A	B
Advanced Landscape Construction 24 Hours	Specialty Construction 14 Hours

SECTION THREE

IRRIGATION
40 Hours

A	B	C
Planning for an Irrigation System 1 Hour	Principles of Hydraulics 6 Hours	Design Concepts 4 Hours

D	E	F
Design Factors 8 Hours	Specifications 10 Hours	Installation 4 Hours

G	H
Maintenance 3 Hours	Troubleshooting Systems 4 Hours

SECTION FOUR

ESTIMATING, TENDERING AND CONTRACTS
34 Hours

A	B	C
Estimating 16 Hours	Guarantees and Warranties 4 Hours	Other Contractual Considerations 4 Hours

D	E
Tendering, Contracts and Bonds 6 Hours	Types of Contracts 4 Hours

SECTION FIVE

PLANT IDENTIFICATION AND USE
40 Hours

A	B
Plant Use in the Landscape 20 Hours	Plant Identification 20 Hours

SECTION SIX

NURSERY AND SOD PRODUCTION
44 Hours

A	B	C
Field Production (General) 24 Hours	Production in Containers 12 Hours	Grading and Shipping of Nursery Stock 2 Hours

D
Sod Production 6 Hours

NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the traing establishmen and Apprenticeship and Industry Training.

FIRST PERIOD TECHNICAL TRAINING
LANDSCAPE GARDENER TRADE
COURSE OUTLINE

Due to the nature of the work of the Landscape Gardener, it is imperative that safety be taught on a continuous basis throughout the entirety of this course.

Special emphasis should be placed on weak areas of theory and shop that are evident from progressive tests and examinations administered throughout the course. The time required for such examinations and testing shall be allowed for in each area of instruction.

TOPIC	OBJECTIVES **Upon successful completion of this unit the apprentice should be able to:**
SECTION ONE: ..... WORKPLACE SAFETY ..... 8 HOURS	
A. Occupational Health and Safety	
1. Regulations	1 Describe the relationship between the function of O.H. & S. and the function of WCB.
2. Practices	1. Describe selected personnel protection equipment (PPE).
	2. Describe safe work practices required by O.H. & S.
B. Workplace Hazardous Materials Information System (WHMIS)	
1. Regulations	1. Explain the purpose of WHMIS.
	2. State the 3 requirements of WHMIS.
	3. Explain the role and responsibility of employer, supplier, and workers in enforcing WHMIS regulations.
C. Fire Safety	
1. Types of fire hazard	1. Identify the elements of combustion and classes of fires.
2. Extinguishing fires	1. Identify and describe fire extinguisher, contents, application and maintenance.
	2. Describe procedures for extinguishing a fire.
D. Safe Work Practices	
1. First aid	1. Explain first aid use and certification.
2. Hazard recognition	1. Identify hazards from personal apparel.

		2. Identify machinery and equipment hazards.
		3. Identify air and water hazards.
	3. Hazard reduction	1. Describe safe housekeeping practices.

SECTION TWO: ..... TOOLS, MACHINERY AND HYDRAULICS ..... 40 HOURS

A. Commercial Vehicles

	1. Inspection	1. Describe the pre-trip inspection.
	2. Equipment	1. Identify equipment required for commercial vehicles.
		2. Describe the use of selected hazard warning devices.

B. Machinery

	1. Machinery drive connections	1. Describe three-point hitch classes, parts and adjustments.
		2. Describe PTO coupler shafts and speeds.
		3. Identify machinery protection features.
		4. Describe belt and chain drives.
	2. Maintenance and lubrication	1. Describe maintenance of belt, chain and PTO drives.
		2. Describe machinery lubrication practices.
		3. Describe selected machinery maintenance practices.

C. Engines

	1. Operating principles	1. Identify engine components.
		2. Identify the two and four stroke cycle events for gasoline and diesel engines.
	2. Function and maintenance	1. Explain the function and maintenance of selected: a) lubrication b) exhaust systems c) intake systems d) electrical systems
	3. Start-up and shut-down	1. Identify precautions for cold weather start-up.
		2. Identify precautions for engine shut-down.

D. Maintenance

1. Maintenance intervals	1. Interpret maintenance schedule for an engine or machine.

E. Hydraulic System

1. System components	1. Describe the four characteristics of fluids.
	2. Describe the purpose of the hydraulic pump.
	3. Describe the purpose of the directional control valve.
	4. Describe the purpose of the pressure control valve.
	5. Describe the purpose of the volume control valves.
	6. Describe the purpose of actuators.
	7. Describe the purpose of filters.
	8. Describe the purpose of reservoirs.
	9. Describe the purpose of lines and fittings.
	10. Describe the purpose of other selected components and accessories.
2. Maintenance and safety	1. Select appropriate hydraulic oils for the application requirements.
	2. Describe procedures for locating leaks.
	3. Describe options available for leak repair.
	4. Identify potential hazards during hydraulic system service.
	5. Describe filter selection and replacement.
3. Troubleshooting procedures and operating characteristics	1. Describe daily system checks.
	2. Identify causes of lack of lifting power.
	3. Identify causes of sluggish operation.
	4. Identify the significance of unusual operating sounds.
	5. Describe hydraulic tests to verify operational problems.

F. Tools

1.	Selection and maintenance	1. Describe the selection, use and maintenance of non-cutting hand tools.
		2. Describe the selection, use and maintenance of cutting hand tools.
		3. Describe the selection, use and maintenance of selected electrical and air tools.

SECTION THREE: ..... HORTICULTURE SOILS ..... 40 HOURS

A. Soil Formation

1.	Formation process	1. List the main factors involved in soil formation and describe the influence each one has on formation process.
2.	Soil profile	1. Identify the horizons in the soil profile and describe the general characteristics of each.
3.	Maps	1. Use soil zone and sub-climate zone maps to predict characteristics of soils in various areas of the province.

B. Soil Separates

1.	Characteristics	1. Name the three soil separates and describe the characteristics of each as they relate to plant growth.

C. Soil Texture

1.	Determination of soil texture	1. State the texture of a sample when given the relative percentages of the separates.
		2. Manually estimate the relative percentages of given samples and determine their texture.
2.	Effects of texture	1. Relate the texture of soil to the physical and chemical properties that it exhibits.

D. Soil Structure

1.	Formation of aggregates	1. List the important factors in formation of stable soil aggregates.
2.	Structural types	1. Recognise the horticulturally important types of soil aggregates.
		2. Describe the importance of soil structure to plant growth.

	3. Protection and improvement	1.	Describe procedures for protecting and building favourable soil structure.
E.	**Organic Matter**		
	1. Carbon:Nitrogen Ratio (C:N)	1.	Explain the importance of the C:N ratio as it relates to choosing organic matter for use in field soils.
	2. Types of organic matter	1.	Compare the advantages and disadvantages of various types of organic matter for use in improving field soils.
	3. Composting	1.	Review compost formulas used by industry.
		2.	Conduct moisture determination for a compost mix.
		3.	Describe how to prepare and monitor a compost batch.
		4.	Evaluate end uses of compost.
F.	**Soil Colour**		
	1. Soil colour	1.	Describe how parent material and organic matter affect soil colour.
G.	**Soil Chemistry**		
	1. pH	1.	Explain the importance of soil pH as it relates to plant growth.
		2.	State the standard pH ranges for field soils.
		3.	Describe the characteristics of carbonated and disturbed soils as they relate to soil pH.
		4.	Compare the chemical and physical amendments commonly used in modifying soil pH.
		5.	Carry out pH tests on samples and make recommendations for media improvement, based on test results.
	2. Cation exchange capacity (C.E.C.)	1.	Describe the process of cation exchange.
		2.	Describe the effects that soil texture and the percent and kind of organic matter will have on a media’s nutrient holding capacity.
	3. Soil salts	1.	List the common soil salts.
		2.	Explain how soil salts affect plant growth.
		3.	Perform tests to determine the electrical conductivity (E.C.) of soil and water samples.

		4.	Interpret data from E.C. tests, for field soils and irrigation water.
		5.	Provide recommendations for management and reclamation of problem soils.
		6.	Outline practices necessary when using irrigation water of marginal quality.
H.	**Plant Nutrition**		
	1. Macro and micro-nutrients	1.	List the macro and micro-nutrients and their importance to plant growth.
		2.	Outline the nitrogen cycles in field soils.
		3.	Recognise deficiencies of the macro nutrient, and selected micro-nutrients.
I.	**Fertilizers**		
	1. Analysis	1.	Determine the percentage of actual nutrients in a bag of fertilizer.
	2. Properties of fertilizer	1.	State the nutrient ratio of a given grade.
		2.	Recognise the common formulations and know the uses of each.
		3.	List the analysis and characteristics of common fertilizers.
	3. Storage of fertilizer	1.	Describe the storage procedures for common fertilizers.
J.	**Mapping**		
	1. Legal land description	1.	Locate a piece of property from its legal land description.
	2. Canada Land Inventory (C.L.I.)	1.	Use C.L.I. and other soil capacity maps to give an estimation of land use capability for horticultural purposes.

SECTION FOUR: ..... PLANT IDENTIFICATION AND USE ..... 28 HOURS

A.	**Plant Classification**		
	1. Systematics	1.	Explain the plant classification system.
	2. Terminology	1.	Define plant classification terminology used in the horticulture industry.
B.	**Plant Use in the Landscape**		

1.	Function	1. Identify the functions of plant material in the ornamental landscape.
		2. Analyse the characteristics a plant requires in order to serve selected functions.
2.	Selection	1. For selected plants, describe characteristics that would affect their use in the ornamental landscape, including: a) growth habit b) growing requirements c) hardiness d) maintenance requirements e) landscape value
		2. Evaluate and recommend landscape uses for selected species.

C. Plant Identification

1.	Name	1. Identify selected plants by their family, genus, species, variety, cultivar and common name.
2.	Characteristics	1. Identify selected plants by their: a) form and size b) ornamental characteristics c) winter wood
3.	Coniferous tree list	a) *Larix sibirica* - Siberian Larch b) *Picea glauca* - White Spruce c) *Picea pungens* - Colorado Spruce d) *Picea pungens var. glauca & cvs.* - Colorado Blue Spruce e) *Pinus contorta latifolia* - Lodgepole Pine f) *Pinus sylvestris* - Scots Pine
4.	Deciduous tree list	a) *Acer negundo* - Manitoba Maple b) *Betula papyrifera* - Paper Birch c) *Fraxinus pennsylvanica lanceolata* - Green Ash d) *Populus x jackii* - Northwest Poplar e) *Prunus padus* var. *commutata* - Mayday f) *Salix pentandra* - Laurel Leaf Willow g) *Sorbus americana* - American Mountain Ash h) *Ulmus americana* - American Elm
5.	Coniferous shrub list	a) *Juniperus chinensis 'Aurea'* - Gold Coast Juniper b) *Juniperus horizontalis* - Horizontal Juniper c) *Juniperus sabina* - Savin Juniper d) *Juniperus scopulorum* - Rocky Mountain Juniper e) *Pinus mugo and varieties* - Mugo Pine f) *Thuga occidentalis* - White Cedar
6.	Deciduous shrub list	a) *Caragana arborescens* - Common Caragana and cvs. b) *Cornus sericea (*syn. *C. stolonifera)* - Red Osier Dogwood c) *Cotoneaster acutifolius* – Peking Cotoneaster d) *Potentilla fruticosa* - Shrubby Cinquefoil e) *Prunus triloba 'Multiplex'* - Double Flowering Plum

		f) *Prunus tomentosa* - Nanking Cherry g) *Rosa rugosa* hyb. - Japanese Rose hybrids h) *Sambucus racemosa* - European Red Elder i) *Sambucus racemosa 'Plumosa Aurea'* - Golden Plume Elder j) *Spiraea japonica* (syn. *S. bumalda)* - Japanese Spiraea cultivars k) *Syringa vulgaris* - Common Lilac and French Hybrids l) *Viburnum trilobum* - American Highbush Cranberry
7.	Annual list	a) *Ageratum houstonianum* - Floss Flower b) *Antirrhinum majus* - Snapdragon c) *Begonia* Semperflorens-cultorum hyb. - Wax Begonia d) *Cordyline indivisa* - Spike e) *Senecio cineraria* - Dusty Miller f) *Impatiens walleriana* - Impatiens g) *Lobelia erinus* - Lobelia h) *Lobularia maritima* - Alyssum i) *Pelargonium x domesticum* - Martha Washington Geranium j) *Pelargonium x hortorum* - Bedding Geranium k) *Pelargonium peltatum* - Ivy Geranium l) *Petunia x hybrida* - Petunia m) *Tagetes* spp. & cvs. - Marigolds n) *Viola x wittrockiana* - Pansy

SECTION FIVE: ..... INTRODUCTORY BOTANY ..... 20 HOURS

A. Cells and Tissues

1.	Cells	1. List and describe the role of selected components of a plant cell.
2.	Tissues	1. List selected types of meristematic tissues and describe the purpose of each. 2. List and describe the function of selected permanent tissues.

B. Stems

1.	Morphology	1. Define a stem and outline its main functions. 2. Locate and state the function of the main external features of a stem. 3. Differentiate between old and new growth on a woody stem.
2.	Anatomy	1. Locate selected internal regions of a stem.
3.	Growth	1. Explain the process of primary growth. 2. Explain the process of secondary growth.
4.	Specialised stems	1. Identify different types of specialised stems and discuss their uses.

C. Leaves

1.	Morphology	1. Define and list the main functions of leaves.
		2. Use terminology to identify: a) parts of a leaf b) leaf complexity c) leaf attachment d) leaf arrangement e) leaf blade shape and surface characteristics
2.	Anatomy	1. Locate and explain the role of selected tissues found in a leaf.
3.	Specialised leaves	1. Identify and describe the purpose of selected specialised leaves.

D. Roots

1.	Morphology	1. List the main functions of roots.
		2. Compare the physical and growth characteristics of different types of root systems.
2.	Anatomy	1. Locate and describe the function of selected regions in the internal structure of a root.
3.	Growth and function	1. Describe the process of root growth.
		2. Discuss the factors that promote and inhibit root growth and development.
4.	Specialised roots	1. Recognise and discuss the function of selected specialised roots.

E. Flowers

1.	Functions	1. List the functions a flowers.
		2. Compare the processes of pollination and fertilization.
2.	Morphology	1. Use terminology to: a) locate and describe the functions of the basic flower parts b) identify selected inflorescence types
		2. Compare monocot and dicot flowers.

F. Fruit

1.	Development	1. Outline the process of fruit development.
		2. Compare fruits and seeds.
2.	Morphology and anatomy	1. Identify the major internal parts of a fruit.
3.	Type	1. Identify selected types of fruit.

G. Plant Growth and Development

1.	Life cycles	1. Compare plants in terms of their life cycles: a) annual b) biennial c) perennial

SECTION SIX: ..... GREENHOUSE PRODUCTION ..... 26 HOURS

A. Containerization

1.	Containers	1. Identity selected greenhouse containers and their uses.
		2. Compare advantages and disadvantages of various containers.
2.	Media	1. Describe characteristics of a good container media.
		2. Identify and compare the characteristics of selected containers media components.
		3. Compare soil based to artificial media.
		4. Describe specific greenhouse ‘recipes’.
		5. Describe and demonstrate selected mixing methods.
		6. Identify and compare the purposes of selected media amendments.

B. Greenhouse Environment

1.	Affects on plant growth	1. Describe the relationship between stage of growth and environmental requirements.
		2. Explain how to manipulate photoperiod to control plant growth.

	2. Nutrition	1.	Describe the relationship between stage of growth and nutrient requirements.
		2.	Describe fertilizers used in greenhouse production.
		3.	Demonstrate the use of fertilizer injectors.
		4.	Identify common causes of nutrient deficiencies.
C.	**Propagation**		
	1. Asexual	1.	Practice selected techniques in vegetative propagation.
	2. Sexual	1.	Demonstrate seeding techniques.
		2.	Describe specialised seed types.
		3.	List germination requirements.
		4.	Discuss plug production.
D.	**Growing On**		
	1. Growing on	1.	Practice the transplanting of seedlings.
		2.	Maintain a crop for a determined period of time.
		3.	Demonstrate the potting up of vegetative cuttings.
		4.	Demonstrate repotting.
E.	**Hardening Off**		
	1. Reasons for	1.	Discuss the value of hardening off plants.
	2. Method	1.	Describe procedures used in hardening off plants.
F.	**Plant Health Problems**		
	1. General	1.	Discuss the importance of good sanitation and cultural practices in preventing and controlling pests in the greenhouse.
	2. Insect pests	1.	Identify common greenhouse pests and their damage symptoms.
	3. Disease pests	1.	Review sanitation and cultural practices useful in reducing the incidence of plant disease.
		2.	Describe selected disease problems and means of prevention and control.

	4. Abiotic	1. Describe abiotic causes of poor crop health.

G. Plant Handling

	1. Plant handling	1. Outline common practices in packaging, storage and shipment of crops produced in the greenhouse.

SECTION SEVEN: ..... LANDSCAPE CONSTRUCTION ..... 66 HOURS

The theory in this selection will be applied during an integrated landscape construction lab project where students will demonstrate selected skills.

A. Grading

	1. Drainage	1. Describe the procedures to provide drainage on a given site. a) surface drainage i) slopes ii) swales iii) ditches iv) catch basins v) curbs gutters b) sub surface drainage i) weeping tiles ii) French drains (rock drain) iii) storm sewer system iv) other drainage systems v) soil reports vi) water tables
	2. Estimating volumes	1. Estimate soil volumes by the following methods: a) cut/fill b) solid measure / loose measure c) volume of material piles 2. Describe soil expansion and soil compaction and compute quantities for a given site: a) volume of material piles i) loose ii) settled iii) compacted

B. Woody Plant Handling, Installation and Maintenance

	1. Sourcing	1. Review criteria for selecting plant suppliers and plant material. 2. Relate industry specifications for woody plant material. 3. List and discuss industry organisations related to the production, installation and maintenance of woody plants.

2.	Selecting	1.	List the criteria used in the selection of woody plant material.
3.	Transportation	1.	Describe and demonstrate loading and unloading procedures.
4.	Planting site preparation	1.	Describe proper installation procedures.
5.	Installation	1.	Describe and demonstrate the installation of woody plant material.
		2.	Discuss the importance of proper plant support during the establishment period.
		3.	Demonstrate staking and guying of plants.
		4.	Describe and demonstrate maintenance practices employed during the establishment period.
6.	Pruning	1.	List reasons for pruning.
		2.	Discuss current pruning theory.
		3.	Describe and demonstrate pruning techniques.
		4.	Identify and discuss the use of selected pruning tools and equipment.
7.	Mechanical tree diggers	1.	Identify types of M.T.D.'s.
		2.	Describe operation and practices regarding M.T.D.'s.
8.	Woody plant handling	1.	Describe the short term storage of woody plants.
		2.	Describe the long term storage of woody plants.
		3.	Recognise and discuss the importance of selected administrative forms used when handling woody plants.

C. Turf

1.	Seed mixes	1.	Describe the various types of turfgrass on the prairies and describe their selection considerations: a) common varieties i) Bluegrasses ii) Fescues iii) Crested Wheatgrasses iv) Ryegrasses v) Bentgrasses vi) others (including Legumes)
2.	Seed bed preparation	1.	Describe the process of seed bed preparation. Demonstrate selected parts of the process: a) establishing rough grade b) cultivation

		2. Identify and describe the capability of selected equipment used to cut/fill a landscape site: a) skid steer loaders, tractors b) dozers, trucks c) scrapers, buggies d) scarifiers, rippers e) compactors f) graders
		3. Describe and demonstrate the final preparation (fine grading): a) removal of rocks b) incorporation of peat moss, fertilizer, etc. c) final leveling d) final compaction e) hand raking and corner touch up against walls and hard surfaces
3.	Seeding	1. Describe proper rates and applications. Demonstrate selected procedures: a) rates of application b) methods of application c) mulching d) side hill techniques e) maintenance and care during germination
4.	Hydroseeding	1. Describe the process of hydroseeding: a) areas of application b) site preparation c) seed mixtures d) fertilizers e) mulches f) tackifiers g) rates of application h) maintenance and care during and after germination
5.	Sodding	1. Review preparation procedure for seeding.
		2. Describe the procedures for sod laying: a) harvesting b) shipping c) installation
6.	Weed control	1. Describe the methods of weed control in newly established turf areas: a) cultural methods b) chemical methods i) herbicides ii) pre/post emergence

D. Landscape Construction

1.	Job organization	1. Assist in job sequencing and scheduling of a selected project.
		2. Employ organisational skills in the course of a construction project.

SECOND PERIOD TECHNICAL TRAINING
LANDSCAPE GARDENER TRADE
COURSE OUTLINE

Due to the nature of the work of the Landscape Gardener, it is imperative that safety be taught on a continuous bases throughout the entirety of this course.

Special emphasis should be placed on weak areas of theory and shop that are evident from progressive tests and examinations administered throughout the course. The time required for such examinations and testing shall be allowed for in each area of instruction.

TOPIC	OBJECTIVES **Upon successful completion of this unit the apprentice should be able to:**
SECTION ONE: ..... SALES AND COMMUNICATION ..... 24 HOURS	
A. Oral Communications	
1. Listening skills	1. Employ listening skills.
2. Communication styles	1. Identify selected communication styles. 2. Interpret communication styles.
3. Non-verbal communication skills	1. Interpret forms of non-verbal communication.
4. Diagnostic questioning skills	1. Practice questioning skills.
B. Written Communication	
1. Process	1. Identify and practice the steps required to produce a written document: a) planning b) research c) first draft d) final draft
2. Formats	1. Review accepted forms of written communication: a) business letter b) formal letter of complaint c) proposal letter
C. Sales Presentations	
1. Principles	1. Discuss the principles of a sales presentation: a) customer expectations and approach b) discover needs and motives c) product/service presentation d) various sales techniques

e) closing a sale
f) follow up service

D. Successful Employees

1. Characteristics	1. Identify characteristics of a successful employee: a) punctuality b) professional appearance c) stress management d) accountability

SECTION TWO: ..... BASIC SURVEYING ..... 28 HOURS

A. Introduction

1. Terminology	1. Define basic terminology as used in surveying as it relates to: a) blueprints and contour maps b) legal surveys c) bylaws d) permits e) benchmarks f) site conditions

B. Application

1. Use of survey equipment	1. Describe the use and application of selected survey equipment: a) level and rod b) transit c) hand level d) string level e) hydro level f) laser level g) chains, tapes
2. Site layout	1. Explain the theory involved in laying out a landscape site. 2. Generate, record and apply survey data to a given landscape site.

C. Interpretation

1. Interpretation of survey data	1. Interpret survey/site data: a) grid system i) cut/fill ii) slope, grade iii) cross section

2. Interpret scales and basic landscape plans.
   a) scales (as used in blue-prints)
   b) surveyor's notebook
   c) basic landscape plans

3. Read and use grade stakes.

4. Explain basic procedures of:
   a) cut/fill
   b) slope/grade
   c) cross section

SECTION THREE: ..... LANDSCAPE CONSTRUCTION ..... 46 HOURS

A. Basic Timber Construction

1.	Retaining wall design	1. Describe the design considerations: a) estimating stress loads b) anchoring systems c) tie back systems d) 'Battered' walls e) modular walls f) vertical timber walls
2.	Timber planter design	1. Describe the design factors: a) purpose b) design styles c) estimate stress loads d) corner bracing e) specialised design factors (security, etc.)
3.	Construction	1. Fabricate a selected project using blueprints and specifications: a) estimate materials required i) sizes ii) types iii) quantities b) select and use correct tools c) layout structure d) construct project e) complete surface as required with proper preservatives

B. Basic Precast Units (Pavers)

1.	Uses	1. Describe the use of precast units as it relates to: a) traffic b) pavers shape c) laying patterns

2.	Layout	1. Demonstrate how to layout a selected paver installation project: a) interpret plans b) survey, stake and establish grades
3.	Subgrade capacity	1. Describe and demonstrate subgrade preparation. 2. Interpret proctor density compaction tests.
4.	Installation	1. Estimate materials required for a selected project, including: a) paver quantities i) full and edge pavers ii) wastage 2. Describe and demonstrate the manual installation of precast pavers, to include: a) base preparation b) bedding sand placement c) starting point d) spacing e) sanding f) compensation for finished surface variance g) use of edge restraint h) finish around obstacles i) weed control
5.	Other precast units and natural stone	1. Compare other types of precast units and natural stones used in landscape installations: a) field stone b) flag stone c) marble d) others

C. Concrete

1.	Materials	1. Identify and describe various types of concrete, their additives and their application: a) cement types b) concrete aggregates c) water d) admixtures
2.	Fundamentals and theory	1. Review the fundamentals of making quality concrete: a) additives b) joints c) curing d) strength e) sealants
3.	Finishing concrete flatwork	1. Identify various concrete placement and finishing tools and their uses: a) brooming b) stamping tools c) exposed aggregate

4.	Concrete surface defects	1. Recognise concrete surface defects: a) scaling b) crazing c) dusting d) popouts e) cracking f) blistering g) discolouration
5.	Forming for concrete	1. Describe selected materials and methods of forming for concrete: a) pads b) footings c) installation and purpose of reinforcing steel
6.	Precast concrete and fastening devices	1. Compare precast products available for landscape construction. 2. Compare types and uses of hardware for fastening to concrete.

SECTION FOUR: ..... GREENHOUSE STRUCTURES AND ENVIRONMENT ..... 20 HOURS

A. Structure

1.	Design and orientation	1. Identify the typical designs of greenhouses. 2. List the principles of orientation of greenhouse structures.
2.	Materials	1. Identify the materials used in greenhouse construction and their properties: a) design b) base c) frame d) coverings e) benches f) other accessories

B. Environmental Control

1.	Temperature	1. Explain the principles of temperature control in a greenhouse. 2. Describe selected systems used in the process of: a) heating b) ventilating c) cooling d) humidity control
2.	Water	1. Explain the principles of supplying water to greenhouse crops. 2. Compare selected systems for: a) irrigation b) misting

3.	Light	1. Compare selected lighting systems used in the production of greenhouse crops.
4.	Carbon dioxide	1. Explain the theory of carbon dioxide enrichment of greenhouse crops. 2. Compare selected carbon dioxide injection systems.

SECTION FIVE: ..... PLANT IDENTIFICATION ..... 38 HOURS

A. Plant Use in the Landscape

1.	Selection	1. For selected plants, describe characteristics that would affect their use in the ornamental landscape, including: a) growth habit b) growing requirements c) hardiness d) maintenance requirements e) landscape value 2. Evaluate and recommend landscape uses for selected species.

B. Plant Identification

1.	Name	1. Identify selected plants by their family, genus, species, variety, cultivar and common name.
2.	Characteristics	1. Identify selected plants by their: a) form and size b) ornamental characteristics c) winter wood 2. Review first year plants.
3.	Coniferous tree list	a) *Picea abies* - Norway Spruce b) *Pinus ponderosa* - Ponderosa Pine
4.	Deciduous tree list	a) *Betula pendula and cvs*. - European Weeping Birch b) *Elaeagnus angustifolia* - Russian Olive c) *Fraxinus nigra* - Black Ash d) *Fraxinus mandshurica* - Manchurian Ash e) *Malus baccata* - Siberian Crabapple f) *Malus x adstringens cvs.* - Rosybloom Crabapple g) *Populus sargentii* - Plains Cottonwood h) *Populus x Brooks # 6* - Brooks # 6 Poplar i) *Prunus maackii* - Amur Cherry j) *Prunus virginiana 'Schubert'* - Schubert Chokecherry k) *Sorbus aucuparia* - European Mountain Ash l) *Syringa reticulata* - Japanese Tree Lilac m) *Ulmus pumila* - Manchurian Elm

5.	Coniferous shrub list	a) *Junipers communis* - Common Juniper b) *Juniperus squamata and cvs.* - Squamata Juniper c) *Juniperus horizontalis cvs.* - Horizontal Juniper Cultivars d) *Juniperus sabina cvs.* - Savin Juniper Cultivars e) *Juniperus scopulorum cvs.* - Rocky Mountain Juniper Cultivars f) *Picea abies 'Nidiformis'* - Nest Spruce g) *Thuja occidentalis cvs.* - White Cedar Cultivars
6.	Deciduous shrub list	a) *Acer ginnala* - Amur Maple b) *Amelanchier alnifolia* - Saskatoon c) *Caragana pygmaea* - Pygmy Caragana d) *Cornus alba 'Argenteomarginata'* - Silver-leaf Dogwood e) *Cornus alba 'Sibirica'* - Siberian Coral Dogwood f) *Cornus sericea 'Flaviramea'* - Yellow-twig Dogwood g) *Elaeagnus commutata* - Wolfwillow h) *Hippophae rhamnoides* - Sea Buckthorn i) *Hydrangea arborescens 'Annabelle'* - Annabelle Hydrangea j) *Philadelphus lewisii 'Waterton'* - Waterton Mockorage k) *Physocarpus opulifolius luteus* - Golden Ninebark l) *Prunus x cistena* - Purple-leaf Sandcherry m) *Ribes alpinum* - Alpine Currant n) *Ribes aureum* - Golden Currant o) *Rosa rubrifolia* - Red-leaf Rose p) *Salix purpurea nana* - Purple Osier Willow q) *Spiraea x arguta* - Garland Spirea r) *Spiraea x vanhouttei* - Vanhoutte Spirea s) *Syringa meyeri* - Dwarf Korean Lilac t) *Syringa x prestoniae* - Preston Lilac u) *Syringa villosa* - Late Lilac
7.	Groundcover list	a) *Aegopodium podagraria* - Goutweed b) *Artemisia schmidtiana* 'Silver mound' - Silvermound c) *Ajuga reptans* - Carpet Bugle d) *Cerastium tomentosum* - Snow-in- Summer e) *Festuca ovina glauca* - Blue Sheep's Fescue f) *Vinca minor* - Periwinkle
8.	Perennial list	a) *Achillea millefolium* - Common Yarrow b) *Aquilegia* hybrids - Columbine c) *Bergenia cordifolia* - Heartleaf Bergenia d) *Leucanthemum* x *superbum* - Shasta Daisy e) *Dicentra spectabilis* - Bleeding Heart f) *Dicentra eximia* - Fernleaf Bleeding Heart g) *Delphinium elatum* - Garden Delphinium h) *Aconitum napellus* - Monkshood i) *Gypsophila paniculata* - Baby's breath j) *Hemerocallis* x *hybrida* - Daylily k) *Iris sibirica* - Siberian Iris l) *Paeonia* hybrids - Peony
9.	Vine list	a) *Clematis* cvs. - Clematis b) *Humulus lupulus* - Common Hop c) *Lonicera x brownii* 'Dropmore Scarlet' - Scarlet Trumpet Honeysuckle d) *Parthenicissus quinquefolia* - Virginia Creeper e) *Vitis* cvs. - Hardy Grape

SECTION SIX: ..... PESTS AND PEST MANAGEMENT ..... 36 HOURS

A. Holistic Pest Management

1. Integrated pest management	1. Outline the history of I.P.M. 2. Explain the concept of I.P.M. 3. Describe the implementation of I.P.M.

B. Landscape Insects and their Management

1. Biology	1. Compare insect life cycles. 2. Explain the insect classification system: a) classes b) orders
2. Management	1. Describe selected methods of insect management: a) cultural b) physical c) biological d) chemical
3. Identification	1. Identify selected insect pests: a) Spruce Spider Mite b) Gall Mites c) Plant Bugs d) Aphids e) Spruce Gall Adelgids f) Scale Insects g) Birch Leaf Miner h) Yellow-headed Spruce Sawfly i) Pear Sawfly j) Linden Looper k) Forest tent Caterpillar l) Cankerworm m) Currant Worm n) Spruce Budworm o) Rose Curculio p) White Pine Weevil q) Sod Webworm r) Black Turfgrass Ataenius s) Bronze Birch Borer t) Western Ash Bark Beetle u) Native Elm Bark Beetle v) European Elm Bark Beetle

C. Landscape Diseases and their Management

1.	Biology	1. Describe disease biology: a) fungi b) bacteria
2.	Classification	1. Describe disease classification: a) abiotic b) biotic
3.	Management	1. Discuss selected disease management practices: a) cultural b) physical c) biological d) chemical
4.	Identification	1. Identify selected biotic plant diseases: a) Needle Casts/Rusts b) Juniper Hawthorn Rust c) White Pine Blister Rust d) Western Gall Rust e) Cedar Apple Rust f) Powdery Mildew g) Downy Mildew h) Silver Leaf i) Hypoxylon Canker j) Fireblight k) Black Knot l) Cytospera m) Nectria n) Dutch Elm Disease o) Slime Flux p) Bacterial Blight q) Pink Snow Mold r) Gray Snow Mold s) Cottony Snow Mold t) Fairy Ring 2. Identify selected abiotic plant diseases: a) Yellow bellied sapsucker b) Iron chlorosis c) Herbicide damage d) Frost e) Contaminants

D. Weeds and Weed Management

1.	Biology	1. Describe weed biology: a) seed production b) vegetative propagation

2.	Classification	1 Relate selected means of classifying weeds: a) Weed Control Act of Alberta b) life cycle
3.	Management	1. Describe selected methods of weed management: a) cultural b) physical c) chemical
4.	Identification and weed list	1. Describe weed identification features. 2. Identify selected weeds of common names: a) Annual Bluegrass b) Canada Thistle c) Chickweed d) Common Groundsel e) Creeping Bellflower f) Dandelion g) Field Bindweed h) Foxtail Barley i) Purple Loosestrife j) Hempnettle k) Prostrate Knotweed l) Lambs Quarters m) Wild Mustard n) Redroot Pigweed o) Pineappleweed p) Broad Leaved Plantain q) Purslane r) Quackgrass s) Round Leaved Mallow t) Shepherd's Purse u) Perennial Sow Thistle v) Annual Sow Thistle w) Spotted Knapweed x) Diffuse Knapweed y) Stinkweed z) Toadflax aa) Scentless Chamomile ab) Yellow Star Thistle ac) Red Bartsia ad) Nodding Thistle ae) Field Dodder af) Eurasian Water Milfoil

SECTION SEVEN: ..... PESTICIDE USE AND SAFETY ..... 10 HOURS

A. Legislation

1.	Federal and provincial	1. Related current federal and provincial legislation regulating the use of pesticides as it relates to horticulture industry.

B. Use

1. Toxicity	1. Define terminology used to describe toxicity of pesticide chemicals.
2. Labels	1. Interpret pesticide labels.
3. Formulations	1. Describe commonly used pesticide formulations.
	2. Compare specific characteristics of selected formulations in relation to: a) applicator safety b) selection of application equipment c) potential hazard to the environment

C. Classification

	1. Define basic terminology relating to selected types of pesticides.
	2. Evaluate selected types of pesticides for their potential hazards to the user and the environment.

D. Safety

1. Personal protective equipment	1. Demonstrate the selection and use of P.P.E.
2. Use, handling and transport	1. Describe safe practices in the use, handling and transport of pesticide chemicals.
3. Spill prevention and cleanup	1. Discuss the practices used in preventing pesticide spills.
	2. Practice the steps in containing and cleaning up a pesticide spill.

E. Resources

1. Use	1. Use commonly available resource material to gather and interpret information on pesticide use.

SECTION EIGHT: ..... TURF MAINTENANCE ..... 26 HOURS

A. Soil Management

1. Soil management	1. Describe soil components as they pertain to turfgrass growth: a) mineral composition b) organic matter content c) water

		d) air e) micro-organisms
2.	Structure	1. Describe how turfgrass maintenance procedures affect soil structure.
3.	pH	1. Describe soil pH and its pertains to grounds maintenance: a) sources of soil acidity b) plant tolerance to acidity c) liming acidic oils
4.	Salinity	1. Discuss soil salinity as it relates to grounds maintenance.
5.	Compaction	1. Describe selected causes of soil compaction: a) foot traffic b) vehicle traffic c) maintenance practices 2. Describe the factors influencing compaction potential: a) soil texture b) moisture c) moving height d) thatch layer 3. Evaluate methods of solve compaction problems: a) prevention b) soil amendment c) aeration d) top dressing e) slicing f) renovation

B. Turfgrass Fertilization

1.	Fertility requirements	1. Describe the requirements and effects of turfgrass fertilization.
2.	Soil testing	1. Describe how to collect and prepare soil samples from turfgrass. 2. Interpreting soil test results.
3.	Fertilizer use	1. List and discuss the use of selected types of fertilizers. 2. Choose fertilizers for selected uses and calculate application rates.

C. Maintenance Practices

1.	Mowing	1. Describe the practice of turfgrass mowing and discuss its effects: a) cutting height b) mowing frequency c) clipping removal
2.	Water	1. Describe the role of water in turfgrass management:

a) drought stress
b) excess water
c) precipitation
d) artificial application
e) application rates and frequency

3. Thatch

1. Describe the thatch layers:
   a) thatch components
   b) advantages
   c) causes
   d) mechanical control
   e) biological control

D. Athletic Field Maintenance

1. Field marking

1. Describe how to use and maintain athletic field equipment:
   a) line marking
   b) goal posts and nets
   c) back stops and fences
   d) infields
   e) special field maintenance
   f) golf course marking

THIRD PERIOD TECHNICAL TRAINING
LANDSCAPE GARDENER TRADE
COURSE OUTLINE

Due to the nature of the work of the Landscape Gardener, it is imperative that safety be taught on a continuous bases throughout the entirety of this course.

Special emphasis should be placed on weak areas of theory and shop that are evident from progressive tests and examinations administered throughout the course. The time required for such examinations and testing shall be allowed for in each area of instruction.

TOPIC	OBJECTIVES **Upon successful completion of this unit the apprentice should be able to:**
SECTION ONE: ..... LANDSCAPE DESIGN ..... 30 HOURS	
A. Design Theory	
1. Elements	1. Identify and describe selected design elements: a) form b) line c) colour d) texture
2. Principles	1. Identify and explain selected design principles: a) contrast b) repetition c) rhythm d) harmony e) unity f) balance g) proportion h) scale
B. Design Process	
1. Planning	1. Discuss the importance of landscape planning in respect to: a) action b) utility c) economy d) aesthetics
2. Site Analysis	1. Gather information from a site, including: a) property lines b) utilities locations c) existing vegetation and structures d) views e) macro and microclimates f) soil g) drainage h) other

	3.	Grades	1. Describe how grades are illustrated on a plan.
	4.	Client interview	1. Gather and interpret information on client needs.

C. Drawing Techniques

	1.	Equipment	1. Identify and describe the purpose of various types of drafting equipment.
			2. Use selected equipment to design a selected project.

D. Design Project

	1.	Preliminary	1. Develop circulation patterns or a landscape project.
			2. Establish use areas.
			3. Employ the use of an elevation sketch as a preliminary sales tool.
	2.	Plant material	1. Select plant material to satisfy client needs and site requirements.
			2. Develop a conventional plant list for a design project.
	3.	Hard landscaping features	1. Select hard landscaping features to satisfy client needs and site requirements.
	4.	Details	1. Describe how construction details are represented on landscape drawings.

SECTION TWO: ..... INTERIOR MAINTENANCE ..... 40 HOURS

A. Interiorscape Environment

	1.	Light	1. Describe how the quality and quantity of light affect the growth of plants in an interior landscape.
			2. Practice the use of light meters.
			3. Discuss the use of supplemental lighting in the interior landscape.
	2.	Temperature	1. Describe interior plant response to air temperature.
	3.	Water	1. Review water requirements based on individual plant needs.
			2. Describe and demonstrate watering methods.
			3. Identify symptoms of water stress.
			4. Describe the affect of water temperature on plant uptake and growth.

		5. Describe the negative impact of salts in water used to irrigate interior plants.
		6. Perform chemical analysis to assess quality of irrigation water.
	4. Relative humidity	1. Describe interior plant response to humidity.
		2. Compare methods of controlling humidity in the interior landscape.
B.	**Growing Media**	
	1. Porosity	1. Perform aeration porosity testing on selected interiorscape growing media.
	2. Nutrition	1. Discuss the fertility requirements of plants interior landscapes.
		2. Conduct soil tests to assess the effectiveness of a fertilizer program.
C.	**Maintenance**	
	1. Cosmetic care	1. Demonstrate the following practices: a) trimming b) pruning c) staking d) cleaning e) sanitation
	2. Pests	1. Identify and suggest controls for common insect pests of interior plants.
		2. Discuss the importance of environmental and cultural practices in the prevention of disease.
D.	**Plant Material**	
	1. Identification and use	1. Identify selected interior plants by botanical, cultivar and common name.
		2. Describe specific environmental and cultural practices required by each species.
		3. Describe the possible uses of each species.
	2. Foliage plants	a) *Aglaonema* cvs. - Chinese Evergreen b) *Araucaria excelsa* - Norfolk Island Pine c) *Beaucarnea recurvata* - Ponytail Palm d) *Schefflera actinophylla* - Australian Schefflera e) *Schefflera arboricola* - Hawaiian Schefflera f) *Chamaedorea erumpens* - Bamboo Palm g) *Chlorophytum comosum* - Spider Plant h) *Chrysalidocarpus lutescens* - Areca Palm i) *Cissus rhombifolia* - Grape Ivy j) *Codiaeum variegatum pictum* - Croton

k) *Crassula argentea* - Jade Plant
l) *Dieffenbachia amoena seguine* - Dumbcanel
m) *Dracaena deremensis* 'Janet Craig' - Janet Craig Dracaena
n) *Dracaena deremensis* 'Warneckii' - Warneckii Dracaena
o) *Dracaena fragrans massangeana* - Striped Corn Plant
p) *Dracaena marginata* - Dragon Tree
q) *Epipremnum aureum* - Devils Ivy
r) *Ficus benjamina* - Weeping Fig
s) *Ficus retusa nitida* (syn. *F. microphylla*) - Indian Laurel
t) *Hedera helix* - English Ivy
u) *Nephrolepis exaltata* 'Dallas' - Dallas Fern
v) *Phoenix roebellini* - Date Palm
w) *Sansevieria trifasciata* - Snake Plant
x) *Spathiphyllum* cvs. - Spathiphyllum

3. Flowering plants

a) *Rhododendron* cvs. - Florist's Azalea
b) *Cyclamen persicum* - Cyclamen
c) *Dendranthemum x grandiflorum* - Florist's Chrysanthemum
d) *Euphorbia pulcherrima* - Poinsettia
e) *Kalanchoe blossfeldiana* - Kalanchoe

SECTION THREE: ..... PLANT IDENTIFICATION AND USE ..... 46 HOURS

A. Plant Use in the Landscape

1. Selection

1. For selected plants, describe characteristics that would affect their use in the ornamental landscape, including:
   a) growth habit
   b) growing requirements
   c) hardiness
   d) maintenance requirements
   e) landscape value

2. Evaluate and recommend landscape uses for selected species.

B. Plant Identification

1. Name

1. Identify selected plants by their family, genus, species, variety, cultivar and common name.

2. Characteristics

1. Identify selected plants by their:
   a) form and size
   b) ornamental characteristics
   c) winter wood

2. Review first and second year plants.

3. Coniferous tree and shrub list

a) *Abies balsamea nana* - Dwarf Balsam Fir
b) *Larix laricina* - Tamarack
c) *Microbiota decussata* - Siberian Cypress
d) *Picea omorika* - Serbian Spruce

e) *Pinus aristata* - Bristlecone Pine
f) *Pinus cembra* - Swiss Stone Pine
g) *Pinus flexilis* - Limber Pine
h) *Pinus strobus* - Eastern White Pine
i) *Pseudotsuga menziesii* - Douglas Fir

4. Deciduous tree list

a) *Betula fontinalis* - River Birch
b) *Crataegus succulenta* - Long Spined Hawthorn
c) *Crataegus x mordenensis* cvs. - Morden Hawthorn
d) *Populus balsamifera* - Balsam Poplar
e) *Populus x canescens* 'Tower' - Tower Poplar
f) *Populus tremula erecta* - Swedish Columnar Aspen
g) *Prunus pensylvanica* - Pincherry
h) *Prunus virginiana melanocarpa* - Western Chokecherry
i) *Pyrus ussuriensis* - Ussurian Pear
j) *Quercus macrocarpa* - Bur Oak
k) *Salix acutifolia - Sharpleaf Willow*
l) *Salix alba vitellina* - Golden Willow
m) *Tilia x flavescens* 'Dropmore' - Dropmore Linden

5. Deciduous shrub list

a) *Aesculus glabra* - Ohio Buckeye
b) *Alnus tenuifolia* - River Alder
c) *Caragana frutex* 'Globosa' - Globe Caragana
d) *Corylus cornuta* - Beaked Hazelnut
e) *Euonymus nanus* 'Turkestanicus' - Dwarf Burning Bush
f) *Forsythia ovata* - Forsythia
g) *Lonicera caerulea edulis* - Sweetberry Honeysuckle
h) *Lonicera* tatarica 'Arnold Red' - Arnold Red Honeysuckle
i) *Lonicera x xylosteoides* 'Clavey's Dwarf' - Clavey's Dwarf Honeysuckle
j) *Rosa acicularis* - Prickly Rose
k) *Rosa spinossisima* - Scotch Rose
l) *Salix brachycarpa* - Blue Fox Willow
m) *Salix exigua* - Coyote Willow
n) *Shepherdia argentea* - Silver Buffaloberry
o) *Shepherdia canadensis* - Canada Buffaloberry
p) *Symphoricarpos occidentalis* - Western Snowberry
q) *Viburnum lantana* - Wayfaring Tree
r) *Viburnum lentago* - Nannyberry
s) *Viburnum opulus* 'Nanum' - Dwarf European Cranberry
t) *Weigela florida* - Weigela

6. Annual list

a) *Begonia* Tuberhybrida Hyb.- Hybrid Tuberous Begonia
b) *Dianthus chinensis* - Annual Pink
c) *Kochia scoparia trichophylla* - Kochia
d) *Lavatera trimestris* - Lavatera
e) *Mesembryanthemum crystallinum* - Ice Plant
f) *Papaver* spp. - Annual Poppy
g) *Salpiglossis sinuata* - Painted Tongue
h) *Salvia splendens* - Salvia
i) *Salvia farinacea* - Mealy Cup Sage
j) *Zinnia elegans* - Zinnia

7. Groundcover list

a) *Arctostaphylos uva ursi* - Bearberry
b) *Convallaria majalis* - Lily of the Valley

		c) Hosta cvs. - Hosta d) *Lysimachia nummularia* - Moneywort e) *Matteucia struthiopteris* - Ostrich Fern f) *Pachysandra terminalis* - Japanese Spurge g) *Paxistima canbyii* - Cliff Green h) *Phalaris arundinacea picta* - Ribbongrass i) *Polygonum reynoutria* (syn. *P. japonica compacta*) - Japanese Fleeceflower j) *Sedum* spp. - Stonecrops k) *Stachys byzantina* - Lamb's Ears l) *Thymus serphyllum* - Mother-of-Thyme
8.	Herbaceous perennial list	a) *Astilbe* hyb. - Astilbe b) *Campanula carpatica* - Carpathian Bellflower c) *Dianthus plumarius* - Cottage Pink d) *Geranium* spp. - Hardy Geraniums e) *Heuchera sanguinea* - *Coral Bells* f) *Iris germanica* hyb. - Bearded Iris g) *Phlox subulata* - Moss Phlox h) *Pulmonaria saccharata* - Bethleham Sage i) *Sempervivum tectorum* - Hens and Chicks j) *Trollius cvs.* - Globeflower k) *Veronica* spp. - *Speedwell*
9.	Bulbs, corms, and tuber list	a) *Allium* spp. - Ornamental Onion b) *Crocus* spp. - Crocus c) *Dahlia* spp. - *Dahlia* d) *Gladiolus* spp. - *Gladiolus* e) *Hyacinthus* spp. - *Hyacinth* f) *Muscari armeniacum* - Grape Hyacinth g) *Narcissus* spp. - Daffodil h) *Scilla sibirica* - Siberian Squill i) *Tulipa* spp. - Tulip

SECTION FOUR:..... HERBACEOUS ORNAMENTALS IN THE LANDSCAPE .....14 HOURS

A. Design

1.	Use of colour	1. Discuss colour theory as it relates to the use of herbaceous ornamentals in the landscape.
2.	Elements and principles	1. Review the elements and principles of design as they relate to a herbaceous planting.
3.	Process	1. Review the design process as it relates to herbaceous ornamental plantings. 2. Design an annual border. 3. Design a herbaceous perennial border.
4.	Professional associations	1. List and discuss professional associations involved in the production and use of herbaceous plants.

B. Plant Selection and Culture

1.	Selection	1. Select appropriate species to incorporate into a herbaceous planting, based on: a) site conditions b) design style c) sequence and duration of bloom d) client preference e) level of maintenance
2.	Quality	1. Describe the characteristics to look for when selecting quality plants. 2. Outline the care required to maintain plant health up to time of installation.
3.	Installation	1. List the steps in bed preparation prior to planting. 2. Describe planting methods and immediate aftercare.
4.	Maintenance	1. Describe cultural practices employed in maintaining herbaceous plantings in the landscape: a) irrigation b) fertilization c) pinching, deadheading, pruning d) pest control e) weed control f) winterizing the planting g) other

SECTION FIVE: ..... PLANT PHYSIOLOGY .....22 HOURS

A. Biochemical Processes

1.	Photosynthesis	1. Describe the basic stages in the process of photosynthesis: a) light reaction b) dark reaction c) role of pigments 2. List factors affecting the rate of photosynthesis. 3. Analyse how selected horticultural practices and environmental factors affect the rate of photosynthesis.
2.	Respiration	1. Describe the basic process of respiration. 2. Explain the purpose of respiration in relation to plant metabolism. 3. Compare the different respiration pathways. 4. List the factors affecting the rate of respiration.

		5. Describe how selected horticultural practices and environmental factors affect the rate of respiration.
	3. Biochemical products	1. List and describe the basic roles of selected biochemical products: a) sugars b) carbohydrates c) amino acids d) proteins e) fats, oils

B. Transport in the Plant

	1. Xylem	1. Explain how water moves into and through the plant.
		2. List factors that affect water uptake.
	2. Phloem transport	1. Describe how sugars, growth hormones and other substances are transported through the phloem.

C. Stress

	1. Water	1. Describe how drought stress affects plant growth.
		2. Analyse horticultural practices in relation to drought stress.
	2. Low temperature	1. Describe the affect of low temperature on plant tissue.
		2. List the biochemical steps in the hardening process.
		3. Compare levels of cold hardiness between plants.
		4. Analyse horticultural practices and environmental factors in relation to cold tolerance.

D. Growth Regulation

	1. Hormones	1. List and describe the roles of selected hormones in plant growth and development.
		2. List the commercial uses of selected plant growth regulators.

SECTION SIX: ..... IRRIGATION .....20 HOURS

A. Introduction

	1. Use	1. Describe the main purpose of irrigation and explain the many other uses of irrigation technology:

a) history
b) purpose of irrigation systems
c) other uses of irrigation systems

B. Soil - Plant - Water Relationships

1. Irrigation requirements

1. Be able to relate irrigation requirements to plant and soil type.

2. Describe the relationship between operating times and application rates, examining:
   a) soil types
   b) plant coefficients
   c) evapotranspiration rates

C. Water

1. Quality

1. Describe the primary factors involved with water quality:
   a) salts, mineral content
   b) total dissolved solids
   c) sodium absorption ratio

2. Interpret and assess the suitability of water for irrigation purposes.

D. System Water Capacity

1. Calculations

1. Calculate capacity requirements considering water requirements and availability:
   a) assess amount of available water
   b) calculate the required water demand

E. Irrigation Systems

1. System components and operation

1. Describe the types and operation of the following:
   a) sprinklers-types (shrub bubblers, spray and rotary; gear vs. impact drive), specifications and application rates
   b) backflow preventers - types, code requirements
   c) controllers - types, operation of
   d) wiring - types, codes

F. Pumping Systems

1. Types

1. List and explain the operation of various types of irrigation pumps.

2. Operation and application

1. Explain the use and application of irrigation pumps:
   a) centrifugal pumps
   b) vertical turbine pumps

	c) submersible pumps d) booster/jockey pumps	
	2. Be able to interpret pump performance curves.	

SECTION SEVEN: ..... ARBORICULTURE .....32 HOURS

A. Introduction

1. Industry	1. Discuss the scope of the arboriculture industry	
	2. Identify industry and professional arboriculture associations.	

B. Tree Biology

1. Anatomy	1. Review tree anatomy.	
2. Growth	1. Describe tree phenology.	
	2. Examine tree growth and structure.	
	3. Define C.O.D.I.T.	
	4. Interpret the body language of trees.	

C. Tree/Soil Relations

1. Soil	1. Describe the relationships between soil conditions and tree growth.	
2. Water	1. Describe the relationship between water and tree growth.	
3. Fertility	1. Describe the nutritional requirements of trees.	
	2. Discuss the selection and application of fertilizers.	

D. Tree Selection and Installation

1. Site conditions	1. Evaluate site conditions that affect tree selection and installation.	
2. Installation	1. Review tree planting.	

E. Pruning

1. Principles	1. Review the reasons for pruning.	

		2. Describe the effects of pruning.
	2. Technique	1. Define pruning terminology.
		2. Outline the procedure for pruning of young trees.
		3. Outline the procedure pruning of mature trees.
		4. Describe and perform specialty pruning.
F. Tree Repair		
	1. Technique	1. Describe tree bolting, bracing, cabling.
		2. Compare tree cavity treatments.
		3. Compare tree wound dressing treatments.
		4. Describe means of lightening protection.
G. Tree Removal		
	1. Technique	1. Describe and demonstrate tree falling.
		2. Describe tree removal rigging.
H. Tree Hazard Evaluation		
	1. Principles	1. Describe the hazard evaluation process.
		2. Evaluate tree health and stress.
	2. Liability	1. Discuss arboriculture and the law.
I. Tree Valuating		
	1. Assessment	1. Describe how tree value is determined.
		2. Compare recognised techniques for valuating trees.
	2. Inventory	1. Discuss the tree inventory process.
J. Working Aloft		
	1. Technique	1. Tie selected knots and describe their uses.

2. Identify climbing gear and equipment.
3. Describe and/or demonstrate climbing techniques.
4. Describe aerial lift service operation.

K. Safety

1. Practices
   1. Discuss aerial rescue.
   2. Identify high voltage.
   3. Review general chainsaw use and safety.
   4. Discuss the benefits of teamwork.

SECTION EIGHT: ..... PLANT PROPAGATION .....24 HOURS

A. Sexual Propagation

1. Sexual reproduction
   1. Describe sexual reproduction in plants:
      a) seeds
         i) pollination
      b) seed source
         i) hardiness of genetic stock
      c) storage
         i) viability and testing
         ii) storage environment
      d) germination
         i) scarification
         ii) stratification

B. Asexual Propagation

1. Asexual reproduction
   1. Describe asexual reproduction in plants:
      a) vegetative
      b) clone selection
      c) division
      d) cuttings
         i) hardwood
         ii) semi-hardwood
         iii) softwood
      e) layering
      f) grafting
      g) budding
      h) micro propagation

C. Evaluating Propagation Techniques

TOPIC	OBJECTIVES
1. Choosing a method of propagation	1. Describe propagation as part of the nursery operation in relation to: a) physiological state of plants b) facilities c) scheduling

FOURTH PERIOD TECHNICAL TRAINING
LANDSCAPE GARDENER TRADE
COURSE OUTLINE

Due to the nature of the work of the Landscape Gardener, it is imperative that safety be taught on a continuous bases throughout the entirety of this course.

Special emphasis should be placed on weak areas of theory and shop that are evident from progressive tests and examinations administered throughout the course. The time required for such examinations and testing shall be allowed for in each area of instruction.

TOPIC	OBJECTIVES **Upon successful completion of this unit the apprentice should be able to:**
SECTION ONE: ..... LANDSCAPE DESIGN ..... 32 HOURS	
A. Introduction	
1. Review	1. Review third year material.
B. Landscape Working Drawings	
1. Detail	1. Interpret construction details for the following: a) deck b) fences c) benches d) shade structures e) paving f) retaining walls g) steps h) water features i) lighting
C. Design Scenarios	
1. Requirements	1. Analyse selected scenarios in relation to their design, installation, and maintenance requirements: a) residential b) shopping centers c) public institutions d) parks e) schools f) urban renewal g) golf courses h) reclamation projects

D. Design Project

1.	Design	1. Describe a landscape plan for a selected scenario. 2. Prepare a planting plan.
2.	Budget	1. Discuss the development of a budget for a landscape project. 2. Develop a budget for a landscape project.
3.	Construction scheduling	1. discuss the process of construction scheduling. 2. Develop a chart (e.g. Gaant chart) to schedule the construction sequence of a given landscape project.
4.	Specifications and bid documents	1. Describe and discuss the importance of these documents.

SECTION TWO: ..... LANDSCAPE CONSTRUCTION ..... 38 HOURS

A. Advanced Landscape Construction

1.	Estimating materials	1. Estimate the quantities and types of material needed to construct a selected project: a) decks b) fences c) garden furniture
2.	Blueprints	1. Demonstrate an understanding of blueprint details for construction of the following: a) garden furniture b) fences c) decks
3.	Construction	1. Fabricate a given project using blueprint specifications and previous theory instruction: a) estimate materials b) select and use correct tools c) layout structure d) cut and secure components with appropriate fasteners e) finish surface as required with proper preservative and/or finish

B. Specialty Construction

1.	Water features	1. Develop and install a water feature: a) describe the functions of water in a landscape b) identify and assess available water feature products

c) develop water project construction plan
d) install water feature

2. Exterior lighting

1. Develop and install a lighting project:
   a) describe the functions of lighting in a landscape
   b) identify and assess available lighting styles and designs
   c) develop lighting project construction plan
   d) install lighting project

SECTION THREE: ..... IRRIGATION ..... 40 HOURS

A. Planning for an Irrigation System

1. Relate and describe factors involved in planning an irrigation system:
   a) individual requirements
   b) site conditions
   c) monetary restrictions

B. Principles of Hydraulics

1 Be able to relate pressure and elevation and use hydraulic data to property design sprinkler irrigation systems.

2. Be able to determine paper sizes and miscellaneous equipment pressure losses:
   a) hydraulics and friction loss
   b) surge pressure
   c) sizing valves, backflow preventers, etc.
   d) total head requirements
   e) nursery examples

C. Design Concepts

1. Explain the theory of various design concepts and design simple turf irrigation systems using the principles of:
   a) block system
   b) quick coupler system

2. Design a complete irrigation system for a residential landscape installation.

D. Design Factors

1. Explain specific design factors relative to:
   a) residential sites
   b) commercial properties
   c) nursery/production

E. Specifications

1. Read and understand basic irrigation specifications.

F. Installation

1. Describe the installation procedures for various types of equipment used in irrigation design and indicate advantages of certain procedures
   a) methods and techniques pipes
   b) connecting
   c) installation details
   d) controllers and wiring
   e) programming a simple controller

G. Maintenance

1. List the factors to be considered when maintaining an irrigation system:
   a) cleaning sprinkler head screens, nozzles, and drive mechanisms; checking delivery patterns and head alignment
   b) cleaning control valves
   c) winterising/blowing out the system

H. Troubleshooting Systems

1. List and describe factors to consider when troubleshooting an irrigation system.

SECTION FOUR: ..... ESTIMATING, TENDERING AND CONTRACTS ..... 34 HOURS

A. Estimating

1. Interpreting blueprints/specifications
   1. List the features of a project cost estimate.
   2. Prepare a project cost estimate:
      a) quantity take off
         i) hard landscaping - patios, fences, walls, planters, benches, irrigation systems, walks, decks, etc.
         ii) soft landscaping - grading, soil, seed, sod, plant materials and other related material
2. Site meetings
   1. Review site conditions as required for bidding purposes.
3. Sources of landscape materials (unit prices)
   1. Estimate unit costs from various sources.

4.	Labour costs	1.	Describe labour cost breakdown for estimating the following: a) basic wage b) U. I. C. c) W C. B. d) C.P.P. e) holiday pay f) medical insurance g) travel time (etc.) out of town expenses h) unavoidable delays (weather, etc.) i) overtime charges j) downtime (machinery, etc.)
5.	Equipment costs	1.	Describe equipment costing: a) capital costs (depreciation) b) rental costs c) break-even costs d) operating cost (operator, fuel, etc.) e) maintenance costs f) downtime cost g) composite rate(s)
6.	Production rates	1.	Describe production rates: a) units per hour b) cycle time c) production rates d) use of data book
		2.	Describe construction schedule.
7.	Overhead costs	1.	Describe various overhead, administrative costs: a) office (rent, supplies, and salaries) b) management (time) c) yard (parking and storage) d) insurance(s) e) equipment finances (bank charges) f) advertising (etc.) g) other (unforeseen) h) taxes and permits
8.	Miscellaneous cost allowances	1.	Describe other cost allowances: a) out of town expenses b) weather c) competition d) guarantees e) bonding f) contingencies
9.	Sub-contracting	1.	Describe sub-contracting: a) advantages b) disadvantages c) how/when to make use of
10.	Mark up (gross profit)	1.	Describe - what determines the percentage required/desired.

11.	Feedback	1. Describe the necessity for feed back: a) review tender results i) successful ii) unsuccessful iii) during construction iv) after completion

B. Guarantees and Warranties

1.	Supplier's guarantee	1. Describe what supplier's guarantees cover.
2.	Contractor’s guarantee	1. Describe what contractor's guarantees cover. 2. Explain the maintenance aspect of a contract as it relates to a guarantee.
3.	Garden center/retailer guarantee	1. Describe what retailer's guarantees cover.
4.	Organisations a) Landscape Alberta Nursery Trades Association and C.N.T.A.	c) List the functions of L.A.N.T.A. 2. List the functions of C.N.T.A.
	b) Alberta Construction Association	1. List the functions of A.C.A.
	c) other organisations	d) List the functions of other organisations: a) Alberta Association of Landscape Architects e) Alberta Public Works, Supply and Services Division c) Canadian Nursery Trades Association (specifications) f) Better Business Bureau e) Yellow Pages g) C.S.A. Canadian Standards Association g) C.C.A. Canadian Construction Association
5.	Protection of the guarantor	1. List the various ways the guarantor can be protected: h) photo of completed work i) exact data records j) site inspection following substantial completion k) other methods

C. Other Contractual Considerations

1.	Government regulations	1. Explain government regulations: l) Construction Payment Act b) Consumer and Corporate Affairs m) Workers’ Compensation Board d) others, etc.

2.	Ethics	1.	Describe the trade association's code of ethics and its value.
3.	Insurance claims	1.	Explain insurance as it relates to: n) liability b) acts of God (endorsements, etc.) o) fire and theft d) vandalism
4.	Bonding	1.	Describe bonding procedures and requirements: p) bid bonds b) sureties q) labour and material payment bond r) performance bond e) guarantee bond
5.	Deposits	1.	Explain deposits, their purpose and method of posting and forfeiture.
6.	Holdbacks	1.	Explain holdbacks, and how they affect contract administration, bidding, etc.
7.	Inspections		s) Describe the various inspection certificates issued: a) deficiency list t) Construction Completion Certificate (C.C.C.) c) Final Acceptance Certificate (F.A.C.)

D. Tendering, Contracts and Bonds

1.	Tender procedures		u) Describe the procedure for: a) notice of tender v) invitation w) newspaper iii) negotiation x) tender deposits c) establish tender price y) tender closing process i) bid bonds z) letter of surety iii) open or closed bid aa) letter of intent bb) contract award i) start-up meetings
2.	Subcontracts, purchase orders	1.	Describe subcontracts and purchase orders.
3.	Proposed change notice (P.C.N.) and change orders (C.O.)	1.	Describe P.C.N. and C.O.
4.	Deficiency list and guarantees	1.	Describe deficiencies and guarantees.
5.	Construction Completion Certificates (C.C.C.)	1.	Describe C.C.C.

6.	Final Acceptance Certificates (F.A.C.)	1. Describe F.A.C.
7.	Release of holdback	1. Describe holdback, its purpose and the procedures needed to obtain its release.
8.	Alberta Construction Tendering Systems	cc) Describe the Alberta Construction Tendering Systems dd) rules and regulations b) membership
9.	Principles of Contract Law	1. Describe the legal entities that are required for a complete contract as ft relates to landscaping: ee) binding contracts b) legal actions ff) Builders Lien Act d) Alberta/Canada Public Works Act

E. Types of Contracts

1. Describe various types of contracts used in landscape construction and maintenance:
   - gg) landscape contractor as a
     - i) 'General Contractor'
   - hh) 'Sub contractor' (to-form)
     - iii) 'Sub Sub Contractor'
   - b) landscape management contract (project manager)

SECTION FIVE: ..... PLANT IDENTIFICATION AND USE ..... 40 HOURS

A. Plant Use in the Landscape

1.	Landscape function	1. Recommend landscape uses for selected species.
2.	Maintenance	1. Describe the cultural and maintenance requirements of selected species.
3.	Aquatic ecosystems	1. Describe how to establish an aquatic ecosystem in a water garden.

B. Plant Identification

1.	Name	1. Identify selected plants by their family, genus, species, variety, cultivar and common name.
2.	Characteristics	ii) Identify selected plants by their: a) form and size jj) ornamental characteristics c) winter wood

2. Evaluate and recommend uses for selected species.

3. Review all plant materials studies in years one through three.

3. Woody plant list

a) *Celtis occidentalis* - Hackberry
b) *Daphne cneorum* - Rose Daphne
c) *Genista* spp. - Broom
d) *Juglans cinerea* - Butternut
e) *Rhamnus* spp. - Buckthorn
f) *Rhus spp.* - Sumac
g) *Rhododendron* hyb. - Rhododendron/Azalea
h) *Viburnum* spp. - other noteworthy Viburnums

4. Annual list

a) *Brassica oleracea* - Ornamental Kale and Cabbage
b) *Brachycombe iberidifolia* - Swan River Daisy
c) *Fuchsia* hyb. - Fuchsia
d) *Matthiola incana* - Stocks
e) *Nicotiana alata* - Flowering Tobacco
f) *Portulaca grandiflora* - Portulaca
g) *Schizanthus x wisetonensis* - Schizanthus
h) *Verbena spp*. - Verbena

5. Herbaceous perennial list

a) *Alchemilla mollis* - Lady's Mantle
b) *Anemone sylvestris* - Snowdrop Anemone
c) *Echinacea purpurea* - Purple Coneflower
d) *Euphorbia epithymoides* (syn. *E. polychroma*) - Cushion Spurge
e) *Gaillardia x grandiflora* - Gaillardia
f) *Lamium maculatum* - Spotted Dead Nettle
g) *Liatris spicata* - Blazing Star
h) *Ligularia* spp. - Ray Flower
i) *Lilium* spp. - Lily
j) *Linum perenne* - Blue Flax
k) *Lupinus polyphyllus* - Lupin
l) *Monarda didyma* - Beebalm
m) *Macleaya cordata* - Plume Poppy
n) *Papaver orientale* - Oriental Poppy
o) *Penstemon* spp. - Beardtongue
p) *Primula* spp. - Primula
q) *Saponaria ocymoides* - Rock Soapwort
r) *Thalictrum* spp. - Meadowrue

6. Ornamental grasses list

a) *Bromus inermis* 'Skinners Golden' - Skinner's Golden Brom Grass
b) *Calamagrostis acutiflora* 'Stricta' - Feather Reed Grass
c) *Helictrotrichon sempervirens* - Blue Oat Grass
d) *Molinia caerulea* - Moor Grass
e) *Pennisetum alopecuroides* - Fountain Grass

7. Aquatics list

a) *Butomus umbellatus* - Pink Flowering Rush
b) *Caltha palustris* - Marsh Marigold
c) *Equisetum hyemale* - Scouring Rush
d) *Hippurus vulgaris* - Mare's Tail
e) *Iris pseudacorus* - Yellow Flag Iris
f) *Menyanthes trifoliata* - Bog Bean
g) *Nymphaea* spp. - Water Lily
h) *Sagittaria cuneata* - Arrowhead
i) *Typha latifolia* - Common Cattail

SECTION SIX: ..... NURSERY AND SOD PRODUCTION ..... 44 HOURS

A. Field Production (General)

1. Choosing a suitable site	1. Describe the soil type as it pertains to type of production and ease of cultivation.
	2. Identify and compare the types of exposures as they relate to nursery crops.
	3. Recognise the importance of drainage in various types of nursery production.
	4. Describe the importance of water quality, quantity, etc.
2. Layout a) roads - circulation and parking	1. Identify the importance of road design, traffic movement, etc.
b) buildings	1. Identify essential buildings for various types of nurseries.
c) block sizes and row spacings	1. Describe various block sizes, row spacings, lengths, orientation, etc.
d) shelterbelts	1. Recognise the value and importance of climate modification in nursery production.
3. Develop a 40-acre (16 hectares) nursery site (non class time assignment)	1. Design a nursery site showing roads, buildings, parking, shelterbelts, irrigation feeder lines, block plan, production items, row spacings, etc.
4. Long-term rotations	1. Compare caliper tree rotations, shrubs, herbaceous perennials as they pertain to nursery production.
	2. Develop a production schedule for various nursery crops.
5. Fertilization and soil amendments	1. Analyse soil test results. amendments
	2. Recognise the importance of intercropping and use of forages and soil builders.
	3. Evaluate soil amendments as to feasibility, cost, benefits, etc.
	4. Recommend fertilizer analysis and rates.
6. Planting a) seed beds	1. Describe field preparation and planting procedures.
	2. Know planting depths of various tree and shrub seeds.
	3. Describe use of shapers, packers, seeders, sanders, etc.
b) seedlings and liners	1. Describe field preparation and planting procedures.

		2. Evaluate and describe various types of mechanical planters for seedlings and liners.
	c) Transplants and larger stock	1. Describe field preparation, row marking, planting procedures for transplants and stock for caliper tree production.
		2. Analyse one and two row planters, augers, ditchers for planting larger trees.
	d) care of stock	1. Understand the requirements of bare root stock, potted stock, seedlings, etc.
		2. Develop a design of a holding area for temporary heeling-in.
		3. Describe handling procedures for stock being shipped to the field for planting.
		4. Describe care procedures for newly-planted stock.
	e) planting procedures	1. Describe proper depth of planting.
		2. Describe distribution of the root system (i.e. unilateral root systems etc.).
7.	Cultivation, maintenance and weed control	1. Describe mechanical cultivation methods commonly used in nurseries.
		2. Evaluate various nursery cultivation equipment for its potential in Alberta nurseries.
		3. Recognise sources of weed seeds in storage areas, roadsides, around buildings, etc.
		4. Know and use herbicides and insecticides effectively and when necessary.
		5. Understand the relative costs of chemical vs. mechanical cultivation for weed control.
8.	Watering	1. Describe basic irrigation systems as they pertain to nursery production in a field situation.
		2. Recognise the need to protect the water supply from contamination.
		3. Understand the importance of sufficient water supply for a given nursery operation.
		4. Analyse the irrigation requirements for various nursery crops.
9.	Pruning and training of nursery stock	1. Describe pruning and staking procedures for deciduous trees in nursery production.
		2. Describe pruning and staking procedures for evergreen trees in nursery production.
		3. Describe pruning procedures for deciduous and evergreen shrubs.

10.	Root pruning and harvesting of nursery stock	1. Describe root pruning and the equipment involved. 2. Understand the benefits of root pruning. 3. Understand the procedures involved in the harvesting of bare root nursery stock. 4. Compare the types of diggers available for digging bare root nursery stock and evaluate the economics involved. 5. Understand the procedures and economics of digging caliper tree stock and B & B evergreen tree material
11.	Storage of nursery	1. Appreciate the various types of controlled environment storage facilities for stock. 2. Understand the procedures for heeling-in nursery stock for overwintering. 3. Describe the physiological conditions which must exist for the harvesting of nursery plants. 4. Know the reasons for chemical defoliation and which special crops may be treated with defoliants.
12.	Shipping of nursery stock	1. Describe the shipping procedures for bare root nursery stock under a stock variety of climatic situations. 2. Describe loading and protection procedures for the shipping of large caliper trees.
13.	Inventory control and marketing of nursery stock	1. Understand production schedules, duration of crop to maturity, etc. 2. Appreciate wholesale, retail and contract growing.

B. Production in Containers

1.	Choosing a location	1. Recognise the importance of the water source in choosing a site. 2. Describe the necessity of good drainage. 3. Recognise the value of natural shelter on a site. 4. Analyse the impact of exposure on what you can grow. 5. Determine what your major market area will be. 6. Evaluate the availability of skilled labour in the area. 7. Determine proximity to existing transportation routes.
2.	Layout	1. Design a layout for a container growing area. 2. Recognise the importance of good road and bed design.

		3.	Incorporate parking and loading areas in the design.
		4.	Describe the importance of a proper grading plan.
		5.	Describe suitable species to use in developing wind protection.
3.	Essential buildings	1.	Describe the purpose of and materials used in shadehouse design.
		2.	List and analyse the essential buildings in a container product operation.
		3.	Discuss the strategic location of potting and mixing areas.
4.	Irrigation	1.	Describe water sampling, testing, quality and volumes.
		2.	Describe the various water sources suitable for container growing.
		3.	Discuss various pump types and applications.
		4.	Recognise the necessity of a back-up system.
		5.	Familiarise yourself with various pipe and sprinkler options.
		6.	Analyse the usefulness and application of trickle systems.
5.	Containers	1.	Learn the advantages and disadvantages of various nursery containers.
		2.	Know the various sizes of nursery pots which are available.
		3.	Understand the importance of proper storage and cleanliness of nursery pots.
		4.	Describe the perils of mixing containers within a specific crop.
		5.	Evaluate the impact of pot color on growth and performance of various species.
6.	Media	1.	List the components and various blends of media in use for container growing in Alberta.
		2.	Describe the importance of pot weight as ft relates to shipping.
		3.	Understand the importance of a uniform mix.
		4.	Recognise the value of soil tests for media.
		5.	Understand what constitutes suitable aeration porosity.
		6.	Know how to measure water-holding capacity.
7.	The potting operation	1.	Compare production and cost per pot relationship in potting plants.
		2.	Evaluate various automatic systems.
		3.	Analyse the information collected in order to make the right choice.
		4.	Discuss the mechanics of proper potting.

		5.	Describe the essentials of plant care at potting time.
		6.	Describe loading and shipping.
		7.	Evaluate labour force and maximising the production of the work force.
8.	Fertilization	1.	Discuss various fertilizer injector systems.
		2.	Compare fertilizers incorporated into the mix to liquid feeding.
		3.	Understand how various controlled release fertilizers work.
		4.	Know the importance of micro-nutrients in artificial media.
		5.	Discuss the methods of determining the proper amount of nutrients and how to correct under or over feeding.
9.	Production techniques and shading	1.	Understand the climatic needs of various crops.
		2.	Discuss the optimum size change for various stages of a crop.
		3.	Know how to shape and prune container crops.
		4.	Understand the importance and timing of spacing.
		5.	Evaluate the impact of pot colour on the performance of various crops.
		6.	Discuss the species which have potential for container production in Alberta.
10.	Production schedules	1.	Recognise the importance of a continuous supply for sale.
		2.	Understand the problems of spiraling roots and root-bound soil balls.
		3.	Understand schedules and timing.
		4.	Understand market trends and demand.
		5.	Recognise the methods of increasing production and shortening production time.
11.	Over-wintering of container plants	1.	Recognise the importance of good shelterbelts.
		2.	Describe use of shading structures for winter snow retention, etc.
		3.	Discuss the merits and applications of various mulches for winter protection.
		4.	Evaluate the usefulness of structures for protection.
		5.	Compare the advantages of microfoam with costs and effectiveness of other methods.
12.	Weed and insect control	1.	Describe chemicals for use in container weed control.
		2.	Know means and methods of controlling insect infestations.

		3.	Discuss segregation and monitoring plants for disease problems.
13.	Pricing plants	1.	Do a cost analysis for a container crop.
		2.	Understand pricing strategies.
14.	Shipping container grown plants	1.	Describe selecting and moving plants to a staging area. grown plants.
		2.	Describe stacking procedures.
		3.	Recognise problem climatic conditions and route.

C. Grading and Shipping of Nursery Stock

1.	Maintenance of stock	1	Describe the maintenance of nursery stock prior to shipping: a) bare root i) root cellar ii) heeling in iii) controlled environment b) containers c) ball and burlap
2.	Grading and standards a) Canadian Nursery Trades Association	1.	Describe the procedures for storing and grading of nursery stock.
3.	Packing and shipping	1.	Describe the considerations for packing and shipping.

D. Sod Production

1.	Site selection	1.	Discuss the factors to be considered in choosing a site for sod production: a) topography b) soil type, depth, uniformity c) weeds d) irrigation
2.	Selection of cultivars	1.	State the characteristics of the cultivars used in seed mixtures in the Alberta sod industry.
3.	Crop establishment	1.	Outline the steps necessary in preparing a seed bed.
		2.	Know the recommended rates and methods for seeding. a) field preparation b) seeding
4.	Sod cultivation	1.	Understand thatch management practices.
		2.	Compare the uses of various types of mowing equipment.
		3.	Discuss the timing and rates of application for fertilizer and water.
		4.	Review the requirements for off active weed control.

5.	Sod quality	1.	State the standard specifications for sod.
		2.	Describe techniques useful in improving sod quality and decreasing cycling time.
6.	Harvesting	1.	List the pieces of equipment necessary for sod harvesting.
		2.	Outline the harvesting procedure.
7.	Shipping	1.	Explain how cultural practices affect keeping quality.
		2.	Specify methods used to protect the harvested sod to be shipped.

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