Saskatchewan
Learning

# Horticulture 10, 20, 30
## Curriculum Guide
## A Practical and Applied Art

**Saskatchewan Learning**
**2002**
**ISBN:** 1-894116-47-X

# Acknowledgements

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Saskatchewan Learning wishes to thank many others who contributed to the development of these guidelines:

- Ken and Debbie Beattie, contracted developer/writers;
- Jay Dolmage, seconded developer/writer, Indian Head School Division #19
- Noreen Pinder, teacher, contracted developer/writer, Regina School Division #4
- the Practical and Applied Arts Program Team; and,
- field test teachers.

This document was completed under the direction of the Science and Technology Unit, Curriculum and Instruction Branch, Saskatchewan Learning.

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# Introduction

Within Core Curriculum, the Practical and Applied Arts (PAA) is a major area of study that incorporates five traditional areas of Business Education, Computer Education, Home Economics Education, Industrial Arts Education and Work Experience Education. Saskatchewan Learning, its educational partners, and other stakeholders have collaborated to complete the PAA curriculum renewal. Some PAA curriculum guidelines have been updated; some components have been integrated, adapted, or deleted; some Locally Developed Courses have been elevated to provincial status; and some new guidelines have been developed.

A companion *Practical and Applied Arts Handbook* provides background on Core Curriculum philosophy, perspectives, and initiatives. The Handbook articulates a renewed set of goals for PAA. It presents additional information about the PAA area of study, including guidelines about work study and related Transition-to-Work dimensions. In addition, a PAA Information Bulletin provides direction for administrators and others regarding the implementation of PAA courses. Lists of recommended resources for all guidelines will be compiled into a PAA Bibliography with periodic updates.

# Philosophy and Rationale

Horticulture 10, 20, 30 will provide the students with a strong knowledge base in the field of horticulture. Five strands of course material are developed to expand student awareness and invite the participants to explore this diverse field. This course series emphasizes understanding the theory and practical application of the knowledge. The optional work study component at the 20 and 30 levels provide an opportunity for students to develop and enhance horticultural skills learned in the classroom and apply them to a workplace environment.

Horticulture 10, 20, 30 relies on a resource-based learning approach. A variety of instructional approaches are augmented with guest speakers, career development opportunities, video and out-of-classroom experiences. The horticulture programs have been designed to meet with Canadian industry standard with particular emphasis on life long learning. The development of sufficient curriculum in concert with the industry may provide opportunities for entry level status in current apprenticeship programs. Students will be exposed to specific areas of the field such as greenhouse culture, landscape gardening and construction, interior plantscaping and urban forestry.

# Aim, Goals and Foundational Objectives

**Aim**

The aim of Horticulture 10, 20, 30 is to provide students with an understanding of the scope of the industry and the potential for employment within the industry in the western provinces.

**Goals**

**Skill Development:** To develop progressive, tangible skill sets pertinent to the horticulture industry.

**Careers Development:** To cultivate an awareness of the career opportunities within the field of horticulture throughout Canada.

**Personal Skills:** To develop a sense of pride in developing skills to enhance community and personal surroundings.

**Entrepreneurial Opportunities:** To create an awareness of the opportunity to start your own business.

**Multi-disciplinary approach:** To promote a relationship among a variety of related courses that support horticulture (such as drafting, housing, biology, etc.).

**Foundational Objectives**

Foundational objectives are the major, general statements that guide what each student is expected to achieve for the modules of the PAA curriculum guidelines. Foundational objectives indicate the most important knowledge, skills, attitudes/values, and abilities for a student to learn in a subject. Both the Foundational Objectives for Horticulture 10, 20, 30 and the Common Essential Learnings (CELs) Foundational Objectives to be emphasized are stated in this document. Some of these statements may be repeated or enhanced in different modules for emphasis. The Foundational Objectives of the Core Modules of the Horticulture 10, 20, 30 curriculum include:

- To introduce students to the fundamentals of horticulture.
- To foster responsibility and self-confidence through the production of a horticultural design.
- To afford students the opportunity to produce landscape plans, budgets and tender documents.
- To expand students' knowledge of career opportunities that may lead to securing employment in the horticulture industry.
- To recognize health and safety hazards in the workplace so that the potential for personal injury and damage to equipment or the environment is minimized.
- To examine relationships between plant species and humans and how populations are affected by the relationship.
- To develop knowledge and appreciation for horticulture and its role in our society.
- To develop skills in horticulture that may lead to securing employment.
- To demonstrate skills with the tools, equipment and techniques used in the horticulture industry.
- To use and understand horticulture terminology in context.
- To develop skills that allow students to appreciate the natural world through direct experience.
- To enable students to identify, using industry standards, common floral designs used for various occasions.

All of the subject and CELs Foundational Objectives are stated explicitly at the beginning of each module.

## Common Essential Learnings (CELs)

The incorporation of the Common Essential Learnings (CELs) into the instruction and assessment of the Practical and Applied Arts (PAA) curriculum offers many opportunities to develop students knowledge, skills, and abilities. The purpose of the CELs is to assist students with learning concepts, skills, and attitudes necessary to make transitions to career, work, and adult life.

The CELs establish a link between the Transition–to-Work dimensions and Practical and Applied Arts curriculum content. The Transition-to-Work dimensions included in the PAA curricula are: apprenticeship, career exploration/development, community project(s), employability skills, entrepreneurial skills, occupational skills, personal accountability, processing of information, teamwork, and work study/experience. Throughout the PAA curricula, the CELs objectives are stated explicitly at the beginning of each module and are coded in this document, as follows:

| | | |
|---|---|---|
| COM | = | Communication |
| NUM | = | Numeracy |
| CCT | = | Critical and Creative Thinking |
| TL | = | Technological Literacy |
| PSVS | = | Personal and Social Values and Skills |
| IL | = | Independent Learning. |

It is anticipated that teachers will find additional ways to incorporate the CELs into their classroom instruction.

## Course Components and Considerations

The curriculum strands represent the industry's occupations: greenhouse technician; journeyperson landscape gardener; landscape constructor; interior plantscaper and urban forester. Wherever possible, students in Horticulture 10 should have the opportunity to focus their work placement choices within one of the five occupations. Exploration of and exposure to the remaining occupations could be provided in Horticulture 20 and 30. Horticulture is one of the most recently designated trades in Saskatchewan.

### Work Study Component

Work Study provides students with an opportunity to enhance personal skills and to develop skills using industry equipment and standards not available in a school setting. The work study module is available in each of the Horticulture 10, 20, 30 courses. Refer to the Work Study Guidelines, a section of the *Practical and Applied Arts Handbook* and to the *Career and Work Exploration 10, 20, A30, B30 Curriculum Guide* for information on required and best practices for student preparation, employer partnerships, and teacher responsibilities.

### Portfolios

A portfolio is a valuable organizer of student projects and assignments. It encourages students to collect examples of their work as they progress through the various activities, labs, and projects. Selecting particular items to include in a portfolio encourages students to reflect on what they have learned or accomplished and what they have yet to learn. Portfolio items may include: journal notes, drafts, photographs, audio or videotapes, computer discs, sketches and drawings, etc. Portfolios may be used for peer, teacher and self-assessment, and as a format to present selected works to parents, post-secondary institutions, or potential employers. In addition, the portfolio can demonstrate the link between home, school and community in the students' education. Each student should have a portfolio representing his or her work during the course.

The portfolio can help students:
- reflect on personal growth and accomplishment
- see links among home, school and community education and activities
- collect materials to prepare applications for post-secondary education and scholarship program entrance
- collect materials to prepare for employment applications
- focus on career planning.

The portfolio can help teachers:
- provide a framework for independent learning strategies for the student
- communicate student learning from one school year to another in a specific area of study
- identify career planning needs for students
- assess and evaluate the student's progress and achievement in a course of study.

The portfolio can help post-secondary institutions:
- determine suitable candidates for awards and scholarships
- evaluate candidates for program entrance
- evaluate prior learning for program placement.

The portfolio can help community:
- reflect on the involvement in a student's education and the support offered to learners
- demonstrate the link among the home, school, and community in education.

The portfolio can help potential employers:
- identify employable skills desired in future employees
- provide evidence of knowledge and skill development of potential employees.

For purposes of Practical and Applied Arts courses, two kinds of portfolios may be valuable: a "working portfolio" to collect ideas observations, notes and critiques, and a "presentation portfolio" to maintain completed work. By keeping track of this material, students are able to monitor their level of achievement. Additions to and revisions of the portfolio should be done at the end of each module.

**Working Portfolio**

Students collect work over time in a working folder. Each student should also keep a journal of observations, critiques, ideas, and reflections as part of his or her working portfolio. Items in this portfolio may be used for the purpose of reflection, ongoing and summative evaluation, peer, teacher and self-evaluations.

Working portfolios may be used for purposes of conferencing between student and teacher, teacher and parent, teacher and teacher, or student and student. When a teacher examines a student's portfolio in order to make a decision regarding student progress, the information it contains may become documented evidence for the evaluation.

A daily journal may also become a part of a working portfolio as a means of tracking the student's use of time and to record progress on ideas that are being developed. This will provide the student with a focus for self-directed or independent learning as well as an anecdotal record for part of the course evaluation.

**Presentation Portfolio**

To compile a presentation portfolio, students should select items from their working portfolio. The presentation portfolio should cover the range of students' experiences and should display their best efforts. The preparation of a presentation portfolio can be an assessment strategy. It is strongly suggested that students at the 30 level prepare a presentation portfolio suitable for submission to potential employers or post-secondary institutions. Through collecting, selecting and reflecting, students are able to compile presentation portfolios that display their best collection of work.

A daily journal may also become a part of a working portfolio as a means of tracking the student's use of time and to record progress on ideas that are being developed. This will provide the student with a focus for self-directed or independent learning as well as an anecdotal record for part of the course evaluation.

## Extended Study Modules

The extended study module is designed to provide schools with an opportunity to meet current and future demands that are not provided by current modules in the renewed PAA curriculum.

The flexibility of this module allows a school or school division to design one new module per credit to complement or extend the study of existing pure core modules and optional modules. The extended study module is designed to extend the content of the pure courses and to offer survey course modules beyond the scope of the selection of PAA modules.

The list of possibilities for topics of study or projects for the extended study module approach is as varied as the imagination of those involved in using the module. The optional extended study modules should be used to strengthen the knowledge, skills, and processes of horticulture in this document.

It is recommended that a summary of any extended study module be sent to the Regional Superintendent of Curriculum and Instruction to establish a resource bank of module topics.

Guidelines for the use of the extended study module, are in the *Practical and Applied Arts Handbook.*

### Resources

To support the principle of Resource-based Learning, a variety of instructional resources have been evaluated and recommended for the teaching and learning of Horticulture 10, 20, 30. See the initial list of implementation materials for Horticulture 10, 20, 30 or the *Practical and Applied Arts Bibliography.*

Teachers should also check the department's Learning Resources Distribution Centre (LRDC) catalogue. An on-line ordering service is available.

The on-line version of this Guide is accessible at www.sasked.gov.sk.ca/docs/paa.html. It will be "Evergreened", as appropriate.

## Assessment and Evaluation

There are three main types of student evaluation: Formative, Summative, and Diagnostic. Formative evaluation is an ongoing classroom process that keeps students and educators informed of students' progress. Summative evaluation occurs most often at the end of a module to determine what has been learned over a period of time. Diagnostic evaluation usually occurs at the beginning of the school year or before commencing a module, to identify prior knowledge, interests, or skills in the subject area.

Evaluation throughout the course should be based on the learning objectives outlined in the course of study. It is important to use a variety of evaluation strategies to ensure an accurate assessment of the student. The design of an evaluation matrix should reflect the amount of time devoted to each of the modules taught in the course. For example, if the visual design display module were offered in the course, it could represent 5% of the student's evaluation in a 100 hour course offering.

An example of an evaluation weighting is as follows:

| | |
|---|---|
| Written Tests | 25% |
| Projects and Research | 35% |
| Homework and Assignments | 10% |
| Portfolios | 20% |
| Classroom Presentations | 10% |

Regular program evaluation could include a survey involving parents, students, and employers to determine program effectiveness and needs for change, if any. Information specific to program evaluation is found in Saskatchewan Education's *School-Based Program Evaluation Resource Book* (1989) and the *Practical and Applied Arts Handbook*.

For more information about student evaluation refer to the *Student Evaluation*: A *Teacher Handbook* (Saskatchewan Education, 1991) or the *Practical and Applied Arts Handbook*, (Draft 2002).

For information about curriculum evaluation refer to *Curriculum Evaluation in Saskatchewan* (Saskatchewan Education, 1991).

## Module Overview

| Module Code | Modules | Suggested time (hours) |
|---|---|---|
| HORT01A | Module 1A: Botany (Core) | 5-15 |
| HORT01B | Module 1B: Botany (Core) | 5-15 |
| HORT01C | Module 1C: Botany (Core) | 5-15 |
| HORT02A | Module 2A: Soils Characteristics (Core) | 5-15 |
| HORT02B | Module 2B: Soils Characteristics (Core) | 5-10 |
| HORT02C | Module 2C: Soils Characteristics (Core) | 5-10 |
| HORT03A | Module 3A: Indoor and Outdoor Plant Identification (Core) | 5-15 |
| HORT03B | Module 3B: Indoor and Outdoor Plant Identification (Core) | 5-10 |
| HORT03C | Module 3C: Indoor and Outdoor Plant Identification (Core) | 5-10 |
| HORT04A | Module 4A: Safety - Recognizing Hazards (Core) | 3-9 |
| HORT04B | Module 4B: Safety – Risk Control (Core) | 5-10 |
| HORT04C | Module 4C: Safety – WHMIS (Core) | 3-5 |
| HORT05 | Module 5: Career Opportunities in Horticulture (Core) | 2-5 |
| HORT06A | Module 6A: Business Management (Optional) | 3-5 |
| HORT06B | Module 6B: Intermediate Business Management (Optional) | 5-15 |
| HORT06C | Module 6C: Advanced Business Management (Optional) | 3-5 |
| HORT07 | Module 7: Plant Production (Core) | 5-15 |
| HORT08 | Module 8: Artificial Flower Floral Design (Optional) | 15-20 |
| HORT09 | Module 9: Floral Care and Handling (Optional) | 10-15 |
| HORT10 | Module 10: Introductory Floral Design (Optional) | 5-10 |
| HORT11 | Module 11: Floral Aesthetics (Optional) | 10-15 |
| HORT12 | Module 12: Floral Arrangement Design (Optional) | 15-20 |
| HORT13 | Module 13: Interior Plantscapes (Optional) | 5-15 |
| HORT14A | Module 14A: Landscape Design (Optional) | 5-15 |
| HORT14B | Module 14B: Advanced Landscape Design (Optional) | 10-15 |
| HORT15 | Module 15: Container Gardening (Optional) | 5-10 |
| HORT16 | Module 16: Water Gardens (Optional) | 5-10 |
| HORT17 | Module 17: Landscape Construction (Optional) | 5-15 |
| HORT18 | Module 18: Pest and Disease Management (Optional) | 5-15 |
| HORT19 | Module 19: Arboriculture (Optional) | 5-15 |
| HORT20 | Module 20: Stock Handling and Sales (Optional) | 5-15 |
| HORT21 | Module 21: Herbs and Medicinal Plants (Optional) | 3-5 |
| HORT22 | Module 22: Turf Management (Optional) | 5-10 |
| HORT23 | Module 23: Flower Gardens (Optional) | 15-20 |
| HORT24 | Module 24: Vegetable Gardens (Optional) | 15-20 |
| HORT25 | Module 25: Fruit Production (Optional) | 5-10 |
| HORT26 | Module 26: Floral Arrangements for Weddings (Optional) | 15-20 |
| HORT27A, B, C | Module 27A, B, C: Work Study Preparation and Follow-up Activities (Optional) | 5-10 |
| HORT28A, B, C | Module 28A, B, C: Work Study (Optional) | 25-50 |
| HORT88 | Module 88: Apprenticeship in Horticulture (Optional) | 2-5 |
| HORT99A, B, C | Module 99A, B, C: Extended Study (Optional) | 5-20 |

## Suggested Course Configuration

| Module Code | Modules | Suggested time (hours) |
|---|---|---|
| | **Horticulture 10** | |
| HORT01A | Module 1A: Botany (Core) | 5-15 |
| HORT02A | Module 2A: Soils Characteristics (Core) | 5-15 |
| HORT03A | Module 3A: Indoor and Outdoor Plant Identification (Core) | 5-15 |
| HORT04A | Module 4A: Safety - Recognizing Hazards (Core) | 3-9 |
| HORT05 | Module 5: Career Opportunities in Horticulture (Core) | 2-5 |
| HORT06A | Module 6A: Business Management (Optional) | 3-5 |
| HORT07 | Module 7: Plant Production (Core) | 5-15 |
| HORT08 | Module 8: Artificial Flower Floral Design (Optional) | 15-20 |
| HORT09 | Module 9: Floral Care and Handling (Optional) | 10-15 |
| HORT13 | Module 13: Interior Plantscapes (Optional) | 5-15 |
| HORT15 | Module 15: Container Gardening (Optional) | 5-10 |
| HORT22 | Module 22: Turf Management (Optional) | 5-10 |
| HORT24 | Module 24: Vegetable Gardens (Optional) | 15-20 |
| HORT27A | Module 27A: Work Study Preparation and Follow-up Activities (Optional) | 5-10 |
| HORT28A | Module 28A: Work Study (Optional) | 25-50 |
| HORT99A | Module 99A: Extended Study (Optional) | 5-20 |
| | **Minimum** | **100hrs** |
| | **Horticulture 20** | |
| HORT01B | Module 1B: Botany (Core) | 5-15 |
| HORT02B | Module 2B: Soils Characteristics (Core) | 5-10 |
| HORT03B | Module 3B: Indoor and Outdoor Plant Identification (Core) | 5-10 |
| HORT04B | Module 4B: Safety – Risk Control (Core) | 5-10 |
| HORT06B | Module 6B: Intermediate Business Management (Optional) | 5-15 |
| HORT10 | Module 10: Introductory Floral Design (Optional) | 5-10 |
| HORT11 | Module 11: Floral Aesthetics (Optional) | 10-15 |
| HORT14A | Module 14A: Landscape Design (Optional) | 5-15 |
| HORT15 | Module 15: Container Gardening (Optional) | 5-10 |
| HORT20 | Module 20: Stock Handling and Sales (Optional) | 5-15 |
| HORT21 | Module 21: Herbs and Medicinal Plants (Optional) | 5-10 |
| HORT23 | Module 23: Flower Gardens (Optional) | 15-20 |
| HORT27B | Module 27B: Work Study Preparation and Follow-up Activities (Optional) | 5-10 |
| HORT28B | Module 28B: Work Study (Optional) | 25-50 |
| HORT99B | Module 99B: Extended Study (Optional) | 5-20 |
| | **Minimum** | **100hrs** |

| Module Code | Modules | Suggested time (hours) |
|---|---|---|
| | **Horticulture 30** | |
| HORT01C | Module 1C: Botany (Core) | 5-15 |
| HORT02C | Module 2C: Soils Characteristics (Core) | 5-10 |
| HORT03C | Module 3C: Indoor and Outdoor Plant Identification (Core) | 5-10 |
| HORT04C | Module 4C: Safety – WHMIS (Core) | 3-5 |
| HORT06C | Module 6C: Advanced Business Management (Optional) | 3-5 |
| HORT12 | Module 12: Floral Arrangement Design (Optional) | 15-20 |
| HORT14B | Module 14B: Advanced Landscape Design (Optional) | 10-15 |
| HORT16 | Module 16: Water Gardens (Optional) | 5-10 |
| HORT17 | Module 17: Landscape Construction (Optional) | 5-15 |
| HORT18 | Module 18: Pest and Disease Management (Optional) | 5-15 |
| HORT19 | Module 19: Arboriculture (Optional) | 5-15 |
| HORT25 | Module 25: Fruit Production (Optional) | 5-10 |
| HORT26 | Module 26: Floral Arrangements for Weddings (Optional) | 15-20 |
| HORT27B | Module 27B: Work Study Preparation and Follow-up Activities (Optional) | 5-10 |
| HORT28B | Module 28B: Work Study (Optional) | 25-50 |
| HORT88 | Module 88: Apprenticeship in Horticulture (Optional) | 2-5 |
| HORT99C | Module 99C: Extended Study (Optional) | 5-20 |
| | **Minimum** | **100hrs** |

# Core and Optional Modules

## Module 1A, B, C: Botany (Core)

**Foundational Objectives**
- To introduce students to some fundamentals of horticulture in relation to plants.
- To enable students to understand that culturing plants successfully requires a basic knowledge of plant anatomy and functions.
- To use and understand horticulture terminology in context.

**Common Essential Learnings Foundational Objective(s)**
- To use a wide range of language experiences for developing students' knowledge of horticulture. (COM)
- To understand basic plant physiology information. (CCT)

## Module 1A: Botany (Core)

**Suggested time:** 5-15 hours
**Level:** Introductory
**Prerequisite:** None

| | Learning Objectives | Notes |
|---|---|---|
| 1.1 | To understand the nature and function of roots, stems, leaves, flowers, fruits, and seeds. (CCT) | Every student could "adopt-a-plant" to create a focus for this module. Plants could be a "weed", annual, perennial, bulb or vine. It might be a good idea to suggest that the students select plants that are easy to grow. Have the students maintain a journal of the plant's growth and development.<br><br>Have the students research and discuss answers to the following questions based on observations they make of their plant:<br>• What are the basic needs of every plant?<br>• What structures do plants use to survive?<br>• How do plant systems function?<br>Then have students compare their observations with other students. (IL)<br><br>Have the students:<br>• Define morphology and anatomy. (COM)<br>• Locate and state the functions of the main internal and external features of primary and secondary stem growth.<br>• Identify and describe the primary function of a leaf.<br>• List and identify compound and single flowers, seed formation and seed dispersal methods. |

| | Learning Objectives | Notes |
|---|---|---|
| 1.2 | To understand the functions of the leaf. (CCT) | Have students list the main functions of leaves. Collect a variety of leaves and identify the structures under a microscope.<br><br>Use accepted horticulture terminology to describe the parts of a leaf, including complexity, attachment, arrangement blade shape and surface characteristics. (COM)<br><br>Present a collection of pressed leaf specimens in an accepted botanically format. (Herbarium specimens). Have the students prepare pressed leaf specimens. |
| 1.3 | To provide examples of plant life cycles. | Compare plants in terms of their life cycles (annual, biennial, perennial).<br><br>Students could compile lists of examples of each, perhaps with accompanying sketches or leaf specimens. |
| 1.4 | To review the processes of respiration, transpiration, photosynthesis in plants. | Consult with the biology teacher for sample approaches to this topic.<br><br>Have the students investigate how these processes are affected by sun, weather and water.<br><br>In a journal, describe the effects of various pollutants on plants. Describe the recent changes to the ozone layer and how they affect plant growth.<br><br>Have the students conduct experiments to determine the effects that different parts of the different wavelengths of light, have on the growth of plants. Why are leaves green? (TL) |
| 1.5 | To understand the processes of fertilization and pollination. | Discuss the Mendelian ratio, based in Mendel's two fundamental laws of genetics.<br><br>Have the students express Mendelian ratio using a model or a chart.<br><br>Have the students draw and label a diagram of a simple flower showing the fertilization process.<br><br>List several methods of fertilization and give plant examples for each. |

## Module 1B: Botany (Core)

**Suggested time:** 5-15 hours
**Prerequisite:** Module 1A

**Level:** Intermediate

| | Learning Objectives | Notes |
|---|---|---|
| 1.6 | To understand how plants react to various stimuli and adapt to their surroundings. | Discuss the evolution of plants with a review of prehistoric plant life and the relationship to plants growing now.<br><br>Explore examples of plant mimicry, adaptations, and evolution.<br><br>Students could research and write a report on a plant adaptation that fascinates them. (COM) |
| 1.7 | To develop an understanding of methods of improving plant production. (CCT) | Describe the process and benefits of grafting.<br><br>Define cross pollination? What are the benefits of cross pollination?<br><br>Investigate some other methods of plant production.<br><br>Students could design an orchard that would enhance cross pollination using varieties suitable for their area. For variety they might try to design an orchard for a different ecosystem, perhaps in the north or the tropics. |

## Module 1C: Botany (Core)

**Suggested time:** 5-15 hours
**Prerequisite:** Module 1B

**Level:** Advanced

| | Learning Objectives | Notes |
|---|---|---|
| 1.8 | To demonstrate that plants have an ability to adapt. (TL) | Have the students research geotropism and phototropism and design an experiment to demonstrate geotropism and phototropism.<br><br>List practical horticultural applications for both phenomena. |
| 1.9 | To determine the importance plants have in the life cycle of earth. | Describe the science of Paleobotany. (COM)<br><br>Research and present a current scientific belief based on recent paleobotanical discoveries.<br><br>Have the students build a model to depict plant life in Saskatchewan during the Jurassic or other geologic time period.<br><br>Many plants that grow on earth today have been around for a long time. Students could research different plants, such as ferns or rhubarb, to find out how long they have been around. |

## Module 2A, B, C: Soils Characteristics (Core)

**Foundational Objectives**
- To introduce students to some fundamentals of horticulture in relation to soils.
- To determine the functions of soil and to learn the effects of major soil components on plants. (TL)

**Common Essential Learnings Foundational Objectives**
- To enable students to understand and use the vocabulary related to horticulture.
- To strengthen students' understanding within horticulture through applying knowledge of numbers and their interrelationships.
- To develop an understanding of how knowledge is created, evaluated, refined and changed within horticulture.

## Module 2A: Soils Characteristics (Core)

**Suggested time:** 5-15 hours
**Level:** Introductory
**Prerequisite:** Module 1A

| | Learning Objectives | Notes |
|---|---|---|
| 2.1 | To identify separate soil samples**.** | Have the students describe the characteristics and composition of soil samples. (COM)<br><br>Students could separate soil samples with a screen sieve set to see the quantities of different particle sizes in the samples. Then have the students determine and explain if the soil is suitable for plant growth. (CCT)<br><br>Have the students research and discuss soil erosion and practical ways that it might be prevented. |
| 2.2 | To understand how soil texture is determined. (COM) | Have students make their own copy of a soil textural triangle and then identify soil types using a soil textural triangle.<br><br>Use a textural triangle to determine the ideal mix for an assigned crop or indoor plant requirement. (CCT)<br><br>Have the students examine the structure of sand, loam, clay and organic matter. |

| | Learning Objectives | Notes |
|---|---|---|
| 2.3 | To recognize the structural types of soil. | Discuss the formation of different soil types.<br><br>Describe the shape, profile, and location of different soil types. Have the students prepare diagrams of different soil profiles. The edge of a hill that has been washed out or cut away will provide a suitable profile for this exercise.<br><br>Have students brainstorm the influence that each soil type might have on plant growth. |
| 2.4 | To understand the function of organic matter. | Experiment to determine the appropriate carbon/nitrogen ratio for odorless decomposition.<br><br>Have students discuss the use of "green manure" and fallow as organic matter sources. The former primarily is used in horticultural work and the latter in larger crop production operations.<br><br>Explain the procedure for creating compost. Have students build a compost box. Construction plans for compost bins are readily available at garden and home improvement centres or on the Internet. There are always materials available at a school that can be used to make compost!<br><br>If possible visit a compost site in the community to see the benefits of this type of recycling.<br><br>Have the students discuss the use of various fibres such as peat moss or coconut fiber as soil amendments.<br><br>Have the students research and report on the peat industry in Canada. They could investigate the economic benefits and the positive effects of mulching shrubs, trees, perennials and vegetables. |
| 2.5 | To understand primary soil chemistry. | Have students describe or define pH values and their importance to soil structure. Conduct tests of soils with different pH values to determine the soil pH. Acids and bases and pH occur several places in the science curriculum. This might provide an opportunity for collaboration with a chemistry class.<br><br>Conduct experiments to alter soil pH chemically and determine the outcome effect for a variety of plants.<br><br>Discuss causes and give examples of local problem soils. Create a map indicating local soils. Have students discuss a potential soil amendment program for a local homeowner.<br><br>Discuss cation exchange capacity (CEC) as it affects a soil's ability to hold nutrients in the soil. |

## Module 2B: Soils Characteristics (Core)

**Suggested time:** 5-10 hours **Level:** Intermediate
**Prerequisite**: Module 1B

| | Learning Objectives | Notes |
|---|---|---|
| 2.6 | To determine the water holding capacity of soils. (TL, NUM) | Have the students do an experiment to show the water holding capacity of organic matter, sand, loam and clay and graph the results. Interpretation of the results should include graphs. (NUM)<br><br>Consider using computer-based graphing software to display results. (TL) |
| 2.7 | To determine the function and practicality of mulch. (TL) | Have students prepare a list of examples of organic and inorganic mulches that are used as soil additives. (COM)<br><br>Conduct experiments using different mulches to determine which conserves the most water for the soil type in the area.<br><br>Have the students investigate the cost of water in their area. A comparison of urban and rural cost might be interesting to students.<br><br>Determine the average amount of water a predetermined landscape area would require, with and without mulch.<br><br>Calculate how much water and money could be saved if mulch was incorporated. (NUM) |
| 2.8 | To establish the relationship between plant growth and soil type. (TL) | Establish four planting containers, each with one component, sand, loam, clay, or organic matter in it. Plant a geranium or suitable houseplant in each of the 4 components. Record the progress and discuss the results.<br><br>A second experiment might be conducted using different mixes of the soil components to find a soil mixture that produces the best growth. Compare a commercially available soil with the results and determine the similarities. (CCT)<br><br>The Prairie Farm Rehabilitation Administration (PFRA) has resource materials about soils. |
| 2.9 | To determine the affects of soil erosion. | Review the most prevalent soil erosion factors in the Prairie provinces.<br><br>Have students investigate soil conservation methodologies that are useful for urban and rural situations in the prairie provinces. Which methods are appropriate for the local area? (CCT)<br><br>Climate change has the potential to have a major impact on soil use and conservation. Students could conduct research online or through their library and discuss current research and knowledge of climate change. (IL) |

| | Learning Objectives | Notes |
|---|---|---|
| 2.10 | To determine if water conservation practices are feasible within an urban greenspace project. (CCT) | If possible, contact the local parks department and, if possible, arrange field trips in your area.<br><br>Have students research and report on the water conservation practices that other Canadian cities incorporate. (COM)<br><br>Have student determine the types of mulch that are available and, if possible, what material is used in local parks.<br><br>Have students conduct research into what it costs to maintain local parks. A comparison of different parks looking at plant types, water useage, and maintenance requirements could be done. |

## Module 2C: Soils Characteristics (Core)

**Suggested time:** 5-10 hours **Level:** Advanced
**Prerequisite:** Module 1C

| | Learning Objectives | Notes |
|---|---|---|
| 2.11 | To evaluate the benefits of hydroponics plant culture and compare to those of soil culture. (CCT) | Explore hydroponics and cite commercial examples utilizing this technology. (COM)<br><br>Have the students research and report on the greenhouse tomato industry and the field tomato industry, then compare the two industries.<br><br>Have the students design and build a small hydroponics system and grow plants, perhaps tomatoes, then compare results with plants grown in a soil mix. (TL) |
| 2.12 | To recognize the horticultural benefits of soil aggregates. | Define a “French Drain” system.<br><br>Prepare a model of a “French Drain” to demonstrate how it would be used in a practical application such as a golf course.<br><br>Have the students do research to determine a soil mixture for use in a vegetable planter or a raised bed garden. |
| 2.13 | To demonstrate the effects of proper soil composition. (TL) | Have students design and build a raised planter incorporating sound drainage components and using the appropriate soil mixture found in their research. (IL, CCT)<br><br>Develop a planting plan for the planter and install soil and selected plants.<br><br>Develop a maintenance log for the planter and keep records. |

## Module 3A, B, C: Indoor and Outdoor Plant Identification (Core)

**Foundational Objectives**
- To introduce students to the fundamentals of horticulture.
- To develop a knowledge and appreciation for horticulture and its role in our society.
- To develop skills that allow students to appreciate the natural world through direct experience.
- To examine relationships between plant species and humans and how populations are affected.

**Common Essential Learning Foundational Objectives**
- To use a wide range of language experiences for developing students' knowledge of horticulture.
- To enable students to understand and use the vocabulary related to horticulture.
- To enable students to identify, using industry standards, common interior and exterior landscape plants.

## Module 3A: Indoor and Outdoor Plant Identification (Core)

**Suggested time:** 5-15 hours **Level:** Introductory
**Prerequisites:** None

| | Learning Objectives | Notes |
|---|---|---|
| 3.1 | To identify common, non-woody, indoor or outdoor plants, including vegetables. (COM) | Using all available resources, have students select and identify family, genus, species and variety or trade name, where applicable, for several:<br>• low light tolerant plants<br>• plants requiring moderate light<br>• plants requiring high light conditions<br>• indoor trees<br><br>Discuss and use ways to organize this knowledge. |
| 3.2 | To identify common landscape trees suitable for this region. | Have the students select a variety of deciduous and coniferous trees available at tree nurseries. |
| 3.3 | To identify common landscape shrubs. | Have the students select a variety of deciduous and coniferous or evergreen shrubs available at nurseries suitable for the prairie region. Their selection of deciduous shrubs should include flowering and non-flowering varieties.<br><br>The evergreen shrubs should include ground cover plants. |
| 3.4 | To determine suitability for interior or exterior use related to shape, form and outstanding features. (CCT) | Have the students suggest a variety of indoor and outdoor plants, trees and shrubs suitable for use in our climate.<br><br>The student should build a portfolio of this information. |

## Module 3B: Indoor and Outdoor Plant Identification (Core)

**Suggested time:** 5-10 hours **Level:** Intermediate
**Prerequisite:** Module 3A

Note: Review module 3A objectives with the students and enhance with activities that include expanding the numbers and varieties of plants, shrubs and trees that the students are able to identify.

If possible, visit a greenhouse to observe its operation and to examine plant varieties for this module.

## Module 3C: Indoor and Outdoor Plant Identification (Core)

**Suggested time:** 5-10 hours **Level:** Advanced
**Prerequisites:** Module 3B

Note: Review module 3A objectives with the students and enhance with activities that include expanding the numbers and varieties of plants, shrubs and trees that the students are able to identify.

If possible, visit a greenhouse to examine plants for this module. Arrange a tour of a landscaping company, if possible, to see the variety of equipment and materials used in landscaping.

## Module 4A: Safety – Recognizing Hazards (Core)

**Suggested time:** 3-9 hours **Level:** Introductory
**Prerequisite:** None

**Foundational Objectives**
- To introduce students' to the fundamentals of horticulture.
- To recognize health and safety hazards in the workplace so that the potential for personal injury and damage to equipment and the environment is minimized.

**Common Essential Learning Foundational Objectives**
- To promote students ability to recognize potential hazards and proceed with work in a safe and orderly manner. (PSVS)
- To foster a safety consciousness through equipment familiarity and Proper Job Instruction (PJI). (IL)

| | Learning Objectives | Notes |
|---|---|---|
| 4.1 | To determine potential safety hazard. (PSVS) | Identify any potential hazards in these situations: poor housekeeping, horse play and practical jokes, loose and inappropriate clothing, air quality, water quality, open flame, noise, compressed air, natural gas, propane gas, and pneumatic equipment. Discuss ways to ensure the risks from these hazards are eliminated or minimized.<br><br>Discuss hearing loss from loud or constant noise and the need for protective equipment that is to be worn as part of Personal Protective Equipment (PPE). |
| 4.2 | To identify the hazards of fire. (TL, COM) | Have the students identify the elements of combustion.<br><br>Define the classes of fires and the proper procedure to follow to extinguish different types of fires.<br><br>Discuss spontaneous combustion and safe storage of oily rags, chemicals and combustibles (pressurized containers). |
| 4.3 | To determine how to extinguish a fire. (TL) | Have the students list potential fire hazards within the instructional venue.<br><br>Have the students identify different types of fire extinguishers, their contents, method of application and proper maintenance.<br><br>Discuss the procedures for leaving the school should there be a fire.<br><br>If possible, have the local fire department do a presentation on the proper use of a fire extinguisher. Have the students draft a Proper Job Instruction to outline the process of extinguishing a fire. |

## Module 4B: Safety – Risk Control (Core)

**Suggested time:** 5-10 hours **Level:** Intermediate
**Prerequisite:** Module 4A

| | Learning Objectives | Notes |
|---|---|---|
| 4.4 | To establish safe work practices. (IL) | Identify the location of the "First Aid" supplies as well as eye washers and shower facilities. Students should be encouraged to report any accident that occurs. Describe the necessity for safe housekeeping practices.<br><br>Remind students that they should not try to do something, unless they have received instruction and are confident they know how to do it safely.<br><br>Have the students brainstorm to identify different types of hazards that exist in the horticulture industry. These should include power equipment and machines as well as air, water and chemical hazards.<br><br>Identify potential hazards with regard to personal apparel and grooming. |
| 4.5 | To establish safety procedures for vehicular use. | Describe a pre-use vehicle inspection. This should be viewed as a daily maintenance procedure. Have the students develop a safety checklist that could be used for a variety of different vehicles. Discuss potential accidents that may occur if one is negligent checking a vehicle for safety.<br><br>Describe and demonstrate the use of selected hazard warning devices. |
| 4.6 | To establish safety procedures for machinery use. (TL) | Develop a safety checklist for a chainsaw, gasoline powered lawn mower, garden tractor, a hydraulic system, and a water pump.<br><br>Demonstrate the pre-inspection and post-inspection procedure for each piece of equipment to be used in the class. |

## Module 4C: Safety – Workplace Hazardous Materials Information System (WHMIS) (Core)

**Suggested time:** 3-5 hours
**Prerequisite:** Module 4B

**Level:** Advanced

| | Learning Objectives | Notes |
|---|---|---|
| 4.7 | To understand WHMIS and the role of each of the participants. (PSVS) | Saskatchewan Labour produces a wide range of resources that will be valuable for this module, see the bibliography for additional information and check the department website.<br><br>Explain what Material Safety Data Sheet (MSDS) is, its purpose and limitations.<br><br>Explain the roles and responsibilities of the employer, employee and the suppliers.<br><br>Understand what is meant by *prohibited*, *restricted* and *controlled* products. |
| 4.8 | To describe the safety resources that are available and their proper use. | Have the students review a number of MSDSs; discuss the purpose and limitations that that they uncover. |
| 4.9 | To demonstrate a practical use for safety instruction. (TL, COM). | Have the students prepare a MSDS catalogue that pertains to the chemicals and hazardous goods that the students might encounter in a variety of horticulture businesses.<br><br>Have students list the potential safety hazards in the workplace. Develop MSDSs for the hazardous materials that would be involved with these safety situations. Prepare and deliver a demonstration on the methods used to control and prevent such a hazard from occurring. |

## Module 5: Career Opportunities in Horticulture (Core)

**Suggested time:** 2-5 hours **Level:** Introductory
**Prerequisite:** None

**Foundational Objective**
- To be aware of the career and development opportunities in the field of horticulture that exist in Saskatchewan and other provinces.

**Common Essential Learnings Foundational Objectives**
- To identify personal interests and aptitudes in order to initiate career exploration. (IL, PSVS)
- To evaluate ideas related to occupational choices. (CCT)
- To develop technological skills to access career information. (TL, IL)

| | Learning Objectives | Notes |
|---|---|---|
| 5.1 | To develop a list of career development opportunities related to the field of horticulture. (IL) | Students may list many different career development opportunities in the professional, semi-professional and skilled trade areas related to the field of horticulture. They should begin by listing all of the guest speakers who have made presentations throughout the course, then list workers within the field of horticulture in the community or in the province. Encourage students to use a variety of sources of information such as guidance counsellors, career software packages, personal interviews and websites. |
| 5.2 | To identify personal skills and interests that may lead to career exploration. (PSVS, IL) | Ask each student to create an inventory of favourite activities and interests. Have students examine their lists to determine how these activities and interests might be job-related. This task of creating an interest inventory may be done using a variety of software packages. Once students have determined areas of interest related to horticulture, they should research horticulture careers using available resources in the library, community or Internet. (PSVS)<br><br>Websites that will be of interest when conducting research are in the bibliography. Consult the "Evergreen Curriculum" for online resources and bibliography at: www.sasked.gov.sk.ca. |
| 5.3 | To determine skills and interests that would enhance occupational choices. (CCT) | Using the interest inventory created, students may select two choices of possible occupations for further research. Investigate the career choices including:<br>• description of work duties<br>• personal qualities an individual must possess to succeed in the occupation<br>• process to become certified within the occupation<br>• length of education and training<br>• school locations<br>• cost of education and up-grading<br>• trends within the business or career cluster<br>• best and worst parts of the job<br>• beginning salary<br>• opportunities for advancement. |

| Learning Objectives | Notes |
| --- | --- |
| | If a work study is to be done, the student may investigate links within the community for possible work study placement. The student may interview individuals within the community as part of the career research and may seek a work study placement with such an identified expert.<br><br>Refer to Appendix B, Career Research Interview Questions.<br><br>For more information on work study opportunities refer to Modules 27 and 28 of this curriculum guide. |

## Module 6A, B, C: Business Management (Optional)

**Foundational Objectives**
- To introduce students to some fundamentals of horticulture.
- To develop skills in horticulture that may lead to securing employment.
- To expand students' knowledge of career opportunities that may lead to a career in the horticulture industry.

**Common Essential Learnings and Foundational Objective(s)**
- To instill and foster a positive work ethic through familiarity with standard business practices. (PSVS)
- To enable students to understand and use the vocabulary, structures, and forms of expression that characterize the horticulture industry.

## Module 6A: Business Management (Optional)

**Suggested time:** 3-5 hours **Level:** Introductory
**Prerequisite:** None

| | Learning Objectives | Notes |
|---|---|---|
| 6.1 | To develop an awareness of basic documentation and personal requirements necessary for employment. (IL) | Discuss with the students the need for a Social Insurance Number (SIN) and how to apply for one, if they do not already have one.<br><br>Discuss setting up a personal bank account. Many businesses now make direct deposits for payroll. Some businesses do so only through banks they do business with so students may have to open a new account, even if they have an existing account in another bank or credit union.<br><br>Have the students determine the deductions that they will have to pay out of their earnings. Include income tax, Canada Pension Plan (CPP) and other deductions like union dues, if they are required to belong to a union.<br><br>Review an example income tax form. Have the students use it in the calculation of their deductions. |
| 6.2 | To understand the various classifications of business. | Research and define a limited corporation, a partnership, and a proprietorship.<br><br>Locate an example of each in the local community.<br><br>Contact a representative from the local Chamber of Commerce to speak to the class about business opportunities. |
| 6.3 | To gain an appreciation for punctuality and reliability. (PSVS) | Develop a staffing model using a local landscape contractor, turf maintenance company or a retail restaurant as an example.<br><br>Develop a staff schedule for a two week work period.<br><br>Manipulate the staff model and estimate the effects of staff illness, unexplained absences, overtime, and tardiness, from an employer's point of view. |

## Module 6B: Intermediate Business Management (Optional)

**Suggested time:** 5-15 hours
**Level:** Intermediate
**Prerequisite:** Module 6A

| | Learning Objectives | Notes |
|---|---|---|
| 6.4 | To become familiar with the various agencies within the workplace. | Have the students research and define the role of organized labour within Saskatchewan. They might interview a member of a union to determine the benefits of belonging to a union. As well, they might interview a non-union member to determine his or her opinion of organized labor.<br><br>Interview a manager of a unionized workplace to determine the role of a union in the workplace from a management perspective.<br><br>Have the students research the following: Saskatchewan Labour, Saskatchewan Labour Force Development Board, Better Business Bureau, Worker's Compensation Board, Apprenticeship and Trade Certification Commission, and Chamber of Commerce to see what role each has in business. |
| 6.5 | To appreciate the differences of opinion that exist in the workplace and develop strategies to cope with disagreement. (CCT, PSVS) | Have students use information from interviews and develop a role-play situation wherein a union and management disagreement exists. Develop strategies to resolve the conflict. |
| 6.6 | To develop an appreciation for punctuality and reliability. | Have the students develop a staffing model using a local landscape contractor, turf maintenance company or a golf course and prepare a staff schedule for a two-week work period for a staff of eight.<br><br>Manipulate the staff model and provide reasonable solutions to reflect staff illness, unexplained absences, overtime and tardiness. (PSVS) |

## Module 6C: Advanced Business Management (Optional)

**Suggested time:** 3-5 hours **Level:** Advanced
**Prerequisite:** Modules 6A and 6B

| | Learning Objectives | Notes |
|---|---|---|
| 6.7 | To describe standard business systems. (COM) | Define and establish models of inventory, staff time reconciliation and payroll forms.<br><br>Discuss the workings of a modern cash register and, if possible, practice on a machine. |
| 6.8 | To appreciate and develop the skills required to meet with a banker. (CCT) | Have the students develop a fictional company, and prepare a profit and loss statement and balance sheet and a projection of income for the next fiscal year. Then prepare a report requesting financing for a capital expansion in your business.<br><br>For additional information on operating a business refer to the *Entrepreneurship 30 Curriculum Guide.*<br><br>Meet with a bank or credit union manager and discuss the procedure to request a business loan. |

## Module 7: Plant Production (Core)

**Suggested time:** 5-15 hours **Level:** Introductory
**Prerequisite:** None

**Foundational Objectives**
- To expand students' knowledge of career opportunities that may lead to securing employment in the horticultural industry.
- To demonstrate skills with the tools, equipment and techniques used in the horticulture industry.
- To develop skills in horticulture that may lead to securing employment.

**Common Essential Learnings Foundational Objectives**
- To provide students the opportunity to experience the immediate results of proper or less than proper plant care. (CCT, PSVS)
- To develop the basic skills required to cultivate a plant in a greenhouse or indoor environment. (TL)
- To foster responsibility and self-confidence in students through the production of a horticultural crop. (TL, IL)
- To instill an appreciation for the diverse roles of horticulture in our society.

| | Learning Objectives | Notes |
|---|---|---|
| 7.1 | To grow a plant. (TL) | Have students select an easily grown houseplant to use as a project. For each plant develop a cultural guide including light and water requirements and a nutrient schedule. (CCT)<br><br>Cultivate the plants and propagate them by the method that is typical for the species. |
| 7.2 | To understand different ways that plants are propagated. (CCT) | Have students establish cuttings in water and in a rooting mix. Determine which roots more quickly and chart the progress of the plant. (NUM)<br><br>Rooting and potting herbaceous cutting – have students use geraniums.<br><br>Propagation from seed – have students sow a selection of annuals and perennials.<br><br>Reproduction using bulbs, corms and rhizomes. Have students plant tulips, gladiolus, and dahlias. |
| 7.3 | To develop and share the skills required to cultivate and nurture different plants. (PSVS) | Cultivate a selection of plants that have a variety of different cultural requirements; e.g., hanging baskets, high humidity, low light, watering requirements, selecting from vegetables, cut flowers, and foliage plants.<br><br>Demonstrate and present to the class the cultural requirements, and results of the crops. |

## Module 8: Artificial Flower Floral Design (Optional)

**Suggested time:** 15-20 hours **Level:** Intermediate
**Prerequisite:** None

**Foundational Objectives**
- To enable students to identify common floral designs used for various occasions using industry standards.
- To use and understand horticulture terminology in context.

**Common Essential Learnings Foundational Objectives**
- To introduce students to the single focal flower that will give quality and definition to the arrangement style. (TL)
- To develop the student's abilities to meet personal learning goals. (IL)
- To enable students to understand and use the vocabulary, structures, and forms of expression that characterize the horticulture industry.

| | Learning Objectives | Notes |
|---|---|---|
| 8.1 | To familiarize students with the basic terms and definitions used throughout the industry. (COM) | Have the students prepare a list of characteristics of an artificial flower.<br><br>Identify and demonstrate the functions of the stem wire, tape point, flower pick, sprig and cluster. |
| 8.2 | To enable students to choose the basic floral materials needed to design a single artificial flower arrangement. (IL) | Explain the purpose of the basic and most versatile materials, that will determine the shape and size of the arrangement (a corsage, for example).<br><br>Have the student decide on the need for decorative cording, tubing and other accessories for the design.<br><br>Have the students demonstrate the various stemming methods used in the construction of the flower. These methods would include side-by-side method, piercing method, hook method and floral pick method. |
| 8.3 | To construct and position a bow on a bouquet of artificial flowers. (TL) | Stress that the bow is constructed in proportion to the size of the floral design.<br><br>Have the students prepare their own design, or conduct research to collect information on traditional and current floral arrangements. Select a single artificial arrangement from the collection they have gathered and demonstrate the relationship of the bow to the flowers to create the focal point for the selected design.<br><br>When the arrangement is completed have the students present the assignment to the class. This may be an opportunity to allow students to conduct critiques of one another's work. Ideas that would be helpful for conducting a critique may be found in the *Photographics10, Photography 20, 30 and Graphic Arts 20, 30 Curriculum Guide* (Saskatchewan Learning 2002). |

## Module 9: Floral Care and Handling (Optional)

**Suggested time:** 10-15 hours **Level:** Introductory
**Prerequisite:** Module 8

**Foundational Objectives**
- To introduce students to some fundamentals of horticulture.
- To enable students to become aware of the industry standards for the care and handling of delivered flowers and foliage.

**Common Essential Learnings Foundational Objective(s)**
- To develop the student's abilities to meet their personal learning goals. (IL)

| | Learning Objectives | Notes |
|---|---|---|
| 9.1 | To determine the treatment needed when arranging flowers in any design. | Have students develop a list of the common reasons for floral deterioration. Have the students experiment with three identical cut flowers to determine the effect of water quality. Place the first flower in water with a preservative, the second in tap water with a sugar solution added and the third flower in pond water then observe for a week and report the results.<br><br>Discuss the treatments needed to give longevity to the flowers and greens.<br><br>Factors contributing to flower longevity must include quality of water and ethylene control. Some flowers produce more ethylene than other more sensitive flowers and will cause premature wilting and death of the sensitive flowers if both types are stored in close proximity. |
| 9.2 | To make informed decisions for the inspection and processing of florals upon delivery. (IL) | Have students closely examine flowers and foliage upon delivery, inspecting stems, leaves, petals, buds for quality or damage.<br><br>Have students find examples of mildew, rot, insect or mechanical damage caused by various common packaging or handling methods used in the floral industry.<br><br>Have students process flowers upon delivery.<br><br>Have students suggest why flowers are re-cut and leaves are removed when they are prepared for display. Experiment to see if there are differences in results between flower stems re-cut under water and flower stems re-cut in the open air.<br><br>Have the students describe how stem blockage occurs.<br><br>Preservatives are added to the water to counteract problems like pH reductions and bacterial actions. Have the students identify the elements in secondary preservative ingredients and the function of each element for plant preservation and development. |

| | Learning Objectives | Notes |
|---|---|---|
| 9.3 | To determine the proper type and style of the container to match the type and quantity of flowers. | Have the students collect a variety of sizes and styles of containers (vases, rose bowls, etc.). Sort the containers to determine the number of flowers or the design that would be suitable for each container. Points to have students discuss when selecting a container for a particular floral design presentation include:<br>• Texture of the container<br>• Sense of unity<br>• Colour schemes (of the arrangement, container and the display area).<br>• Light requirements<br><br>As a general rule the container should be as simple as possible in order not to detract from the flowers.<br><br>Have students produce arrangements using a single flower and greens and a small group of three or five blooms.<br><br>Have students identify the reasons why floral designers do not use metal containers. |
| 9.4 | To identify long term solutions for storage and bouquet arrangements. | Discuss with the students the steps involved in long term storage of flowers and foliage; these include:<br>• Change of solution frequently<br>• Using clean and sterile containers<br>• Re-cut stems before putting them in preservation solutions<br>• Soak form in water with preservative<br>• Water temperature<br>• Water quality<br>• Depth of solution<br>• Use of non metallic containers |

## Module 10: Introductory Floral Design (Optional)

**Suggested time:** 5-10 hours **Level:** Introductory
**Prerequisite:** Module 9

**Foundational Objectives**
- To instill in students an appreciation for the diverse roles that are part of floral design.
- To develop a knowledge and appreciation for floral design.

**Common Essential Learnings Foundational Objective(s)**
- To foster responsibility and self-confidence in students through the production of a floral design. (IL)

| | Learning Objectives | Notes |
|---|---|---|
| 10.1 | To identify the four flower and foliage classifications. (CCT) | Have the students distinguish between the following materials: line, form, mass and filler. Then determine the size and shape of the arrangement by using any combination of the four materials listed.<br><br>Give examples of the four classifications that would best suit a particular season. Enhance the aspects of the colour combinations by using the colour spectrum. |
| 10.2 | To establish three-dimensional arrangements and compositions. | In making a decision about the design that they will be developing have students discuss:<br>• aspects of height, width and depth.<br>• where the floral composition will be used<br>• the viewing distance of the arrangement.<br><br>Using all available resources, identify locations where floral compositions might be desirable and undesirable. |
| 10.3 | To understand and demonstrate the basic principles involved in floral design. | Explain the role and responsibility of balance, proportion, rhythm and dominance.<br><br>Develop styles of design that include symmetrical and asymmetrical balance.<br><br>Demonstrate symmetrical styles of design that include repetition of line.<br><br>Develop dominance by using an idea or theme, a special design or style, a sense of movement or a center of interest.<br><br>For more information on the elements and principles of design see the *Design Studies10, 20 Curriculum Guide* and the *Interior Design 30 Curriculum Guide*, available online in the Evergreen Curriculum at www.sasked.gov.sk.ca. |

## Module 11: Floral Aesthetics (Optional)

**Suggested time:** 10-15 hours **Level:** Intermediate
**Prerequisite:** Module 10

**Foundational Objectives**
- To instill in students an appreciation for the diverse roles that are part of floral design.
- To develop a knowledge and appreciation for floral design.

**Common Essential Learnings Foundational Objective(s)**
- To foster responsibility and self-confidence in students through the production of a floral design. (PSVS)

| | Learning Objectives | Notes |
|---|---|---|
| 11.1 | To determine the function and practicality of flowers and foliage by using bilateral, equi-dimensional and spiral symmetries. | Have students identify different varieties of "greens" (ferns, leather leaf, blade leaf, etc.) and determine which types are a best match or most effective with different styles of arrangements.<br><br>Have the students demonstrate the various symmetries, using a selection of foliage and flowers, to create the size and shape of the design.<br><br>Have students do a cost analysis for a desired floral design. Make them aware of the "hidden" costs that should be included in product pricing (labour costs, building expenses and secondary supplies).<br><br>Give the students a variety of foliage types and have them determine the amount of foliage required to meet the desired style. |
| 11.2 | To develop harmony that deals with intangibles (aesthetic qualities) rather than physical properties. (PSVS) | Conduct a demonstration to identify the need for open and free space in the arrangement to enhance the design as opposed to densely-packed, sharp contrasts between size, shapes, textures, and colours.<br><br>Demonstrate that lines in the arrangement should come from a central point. Do not cross stems or place them in a row.<br><br>Have students prepare a design that will show harmony with a specific theme e.g., Christmas, Valentine's Day or a birthday.<br><br>Photographs will help document the students' work and should be included in their portfolio. |

## Module 12: Floral Arrangement Design (Optional)

**Suggested time:** 15-20 hours **Level:** Advanced
**Prerequisite:** Module 11

**Foundational Objectives**
- To understand that the finished arrangement must compare with the principles of design evident in earlier modules.
- To develop knowledge and appreciation of detailed arrangements.

**Common Essential Learnings Foundational Objectives**
- To develop the students' abilities to meet their own learning needs. (IL)
- To foster responsibility and self-confidence in students through the production of a floral design. (PSVS)
- To select appropriate materials for a floral design. (TL)

| | Learning Objectives | Notes |
|---|---|---|
| 12.1 | To review the mechanical supplies needed to design a simple or complex floral arrangement. (TL) | Have students identify the factors that affect the physical stability and practicality of most arrangements.<br><br>Create a list of common mechanical mounting supplies and consider their suitability for different types of arrangements:<br>• fresh floral foam<br>• wire mesh netting<br>• silk foam<br>• dried foam<br>• styrofoam<br>• shredded styrofoam<br>• needlepoint holders (commonly called frogs) |
| 12.2 | To examine and match the type of arrangement for the occasion. (IL) | Have students create a check list that will include the appropriate flowers and materials needed to design the arrangement.<br>• Select the desired geometric form (shape).<br>• Sketch a line drawing of the arrangement.<br><br>Make certain the students plan the arrangement to include the principles of floral design:<br>• balance<br>• shape<br>• rhythm<br>• unity<br>• focal point<br>• harmony.<br><br>For more information on the elements and principles of design see the *Design Studies 10, 20 Curriculum Guide* and the *Interior Design 30 Curriculum Guide.*<br><br>Select an appropriate container and prepare it to receive the flowers and foliage by:<br>• cutting a piece of Styrofoam or floral block to fit the container opening.<br>• cutting the stems of the flowers to desired lengths with wire cutters taking care to plan lengths carefully to obtain the desired shape. |

| | Learning Objectives | Notes |
|---|---|---|
| 12.3 | To design a specific S-shaped (Hogarth) arrangement. | Have students plan the arrangement to exhibit the principles of floral design. Draw a single-line sketch of the arrangement.<br><br>Assemble at the work area flowers and foliage: cut, dried or artificial. Assemble tools and supplies at the work area.<br><br>Have the students construct the S-shaped Hogarth arrangement with artificial or live flowers using their single line sketch as a guide. |
| 12.4 | To design a vertically shaped arrangement. | Have students construct the Vertical Arrangement using their single-line sketch as a guide.<br><br>Pick out flowers and foliage that will correspond to the season and occasion desired. |
| 12.5 | To determine the impact of vase arrangements. | Discuss with the students and have them demonstrate how different vase floral and foliage arrangements may need to have their lower leaves removed to expose the stems.<br><br>Have the students discuss the benefits of using the natural foliage of the flowers in the arrangement whenever possible. |
| 12.6 | To discuss the various arrangements that can be designed from basic designs. | Have the students develop a seasonal plan noting when specific flowers are used for specific occasions and seasons. Some varieties of flowers are popular at all times of the year.<br><br>Create a list of flowers that are available from a local florist shop.<br><br>Have students prepare a list of the possible problems that can occur when inappropriate flowers and foliage are selected for a floral design. Discuss ways to avoid the problem. |

## Module 13: Interior Plantscapes (Optional)

**Suggested time:** 5-15 hours **Level:** Intermediate
**Prerequisite:** Module 3

**Foundational Objectives**
- To introduce students to intermediate fundamentals of horticulture.
- To expand students' knowledge of career opportunities within the horticultural industry.
- To instill an appreciation for the diverse roles of horticulture in our society.

**Common Essential Learnings Foundational Objectives**
- To foster an understanding and appreciation for the aesthetic usage of interior plants and develop skills required to maintain the plants used. (TL, CCT)
- To strengthen students' understanding, within horticulture, through applying knowledge of numbers and their interrelationships. (IL, NUM)
- To develop an understanding of how knowledge is created, evaluated, refined and changed within horticulture. (COM, IL)

| Learning Objectives | Notes |
|---|---|
| 13.1 To understand the role that light, temperature, water and nutrients have on indoor plants. (TL, NUM) | Discuss with students how the wavelength of light affects the growth of plants and determine the wavelength that is most suitable for indoor plant growth. (COM)<br><br>The students can set up an experiment to determine how the quantity and quality of light each affect the growth of plants in an interior setting.<br><br>Have students practise using a light meter to measure light intensity. Take measurements, at various locations on plants, the tops of leaves, underside of leaves, ground level and crown and compare intensities. (TL)<br><br>Further experiments may be conducted to measure an indoor plant's response to changes in air temperature (above and below optimal).<br><br>Have the students discuss the water requirements (quality, temperature and frequency of watering) of individual plants. Have the students develop and conduct an experiment to show the effects of cold water compared to room temperature water on plant uptake and growth.<br><br>Have the students describe and demonstrate various watering methods (water from bottom, from the top, and misting). Conduct a set of experiments to identify symptoms of excess and lack of water.<br><br>Identify the principal elements in fertilizer and the function of each element for plant development. The students can do a number of experiments to see the effects of proper over and under fertilization. |

| Learning Objectives | Notes |
|---|---|
| 13.2 To establish and understand the proper types of growing media. (TL, IL) | Have students collect evidence of the impact of salts in water used to irrigate interior plants and provide several solutions for the problem. (CCT)<br><br>Have the students test water samples for acidity or alkalinity. Then students can research and define "pH" in their own words.<br><br>Students could also perform a chemical analysis to determine the quality of water. If possible, have students conduct an experiment to determine the trace elemental composition of various water samples.<br><br>Students could demonstrate and define the terms aeration and compaction as they apply to various growing media. It is best to provide a medium that is neither acidic or alkaline for use in an interior plantscape.<br><br>Have the students conduct a soil test to assess the condition of the soil and make recommendations as to how it could be improved.<br><br>Students could research hydroponic growing operations to learn how such systems operate. A tour of a greenhouse that is using this growing method would be worthwhile.<br><br>A variety of growing experiments could also be developed to compare soil growth to hydroponic growth and product yield.<br><br>Discuss the soil requirements of various plants and have the students prepare soil samples that contain an appropriate selection of elements. |
| 13.3 To develop consistent plant maintenance routines and safe cultural practices. | Have students develop an effective fertilizer program for an interior plantscape. (CCT)<br><br>Have students demonstrate the following routine plant maintenance operations: trimming, pruning, staking, cleaning, installation, removal, and sanitation. (TL) |
| 13.4 To develop insect and disease control methods safe for public spaces and the environment. (TL, CCT) | Identify and suggest how to control: white-fly, aphids, scale, mealy bugs, and fungus gnats.<br><br>Have students research the movement of Dutch Elm disease across the prairie provinces, as well as efforts to control it. Suggest additional methods to control the spread of disease. |

## Module 14A, B: Landscape Design (Optional)

**Foundational Objectives**
- To afford students the opportunity to produce landscape plans including an accurate budget.
- To demonstrate skills with the tools, equipment and techniques used in the horticulture industry.
- To develop skills in horticulture that may lead to securing employment.

**Common Essential Learning Foundational Objectives**
- To create a working landscape design and defend the design attributes to colleagues. (COM, IL, CCT)
- To promote both intuitive, imaginative thought and the ability to evaluate ideas, processes, experiences and objects in meaningful contexts. (CCT)
- To develop a comfort level in presenting and defending design decisions. (COM)
- To prepare budgeting and tendering documents. (NUM)

## Module 14A: Landscape Design (Optional)

**Suggested time:** 5-15 hours **Level:** Intermediate
**Prerequisite:** Modules 2 and 3

| | Learning Objectives | Notes |
|---|---|---|
| 14.1 | To explore the benefits of a landscape plan. | Have students prepare a list of the benefits of developing a landscape plan. (CCT)<br><br>Have the students describe the relationship between the designer, the contractor, and the homeowner.<br><br>Find additional information on landscaping and surveying in the *Drafting and Computer Aided Design 10, 20, 30 Curriculum Guide.* |
| 14.2 | To understand the contrast between hard and soft landscape attributes. | Some examples of hard landscaping include crushed rock and stepping stones. Examples of soft landscaping include plants, shrubs, trees, and lawns.<br><br>Discuss rock gardens and ponds. Have the students determine which elements are examples of hard or soft landscapes.<br><br>Research and list examples of hardy herbaceous landscape plants that are suitable for sun, shade, dry, moist, acidic or alkaline conditions.<br><br>List examples of hardy deciduous and coniferous landscape plants suitable for the above conditions. (COM)<br><br>Have the students develop a simple draft landscape design of a typical city lot using hard landscape features.<br><br>Students could brainstorm a list of the anticipated maintenance requirements for the following: residential lot, shopping centre, school, public park, golf course, urban renewal project and a landfill reclamation project. (CCT, NUM) |

| | Learning Objectives | Notes |
|---|---|---|
| 14.3 | To analyze selected scenarios in relation to their potential design, installation and maintenance requirements. (NUM) | Have the students take a difficult landscape problem from a golf course, public park, school yard, or residence and resolve the situation through design. Prepare a report of the solution. (CCT, TL) |
| 14.4 | To interpret landscape construction details. | Provide the students with examples of landscape plans and ask that they interpret construction details for the following: deck, fences, shade structures, benches, walkways, paving, retaining walls, steps, water features, and lighting. |
| 14.5 | To create a plan for a landscape design. (TL, CCT) | Have the students create a landscape plan given specific criteria: size of lot, location, function, and desired affect.<br><br>Have the students prepare a sketch to act as a guide for a planting plan.<br><br>Prepare a planting plan. Be certain the students include all required elements in their plan including plant varieties, soil needs, location (full sun, partial sun or shade etc.). There are other considerations that could be researched by the students.<br><br>See Module 3 of the *Drafting and Computer-Aided Design 10, 20, 30 Curriculum Guide*. |
| 14.6 | To determine a project budget for the given plan. (NUM) | Have students research the prices of landscape plants that are suitable for their area and climate zone.<br><br>Have students devise a budget for their landscape project. |
| 14.7 | To become familiar with a sequential work schedule. (IL) | Using their plan and budget assignments students might develop a project schedule that would complete their design plan.<br><br>Students could research and develop a Gaant chart to schedule the construction sequence of the landscape project. Explore software for project management templates and Gaant charts. |
| 14.8 | To understand the role of material specifications, estimating, and bid documents. | Have students research, describe and discuss the importance of specification documents.<br><br>Prepare an assignment for students that requires them to develop a small tender for a project and submit it. Include all the documentation required to meet building code requirements. |

## Module 14B: Advanced Landscape Design (Optional)

**Suggested time:** 10-15 hours **Level:** Advanced
**Prerequisite:** Module 9A

| | Learning Objectives | Notes |
|---|---|---|
| 14.9 | To draft a landscape design. (TL, CCT, COM) | Review objectives in Module 14A.<br><br>Develop a residential landscape design for a lot size and location of their choice. The house and other buildings should be identified to include a number of each:<br>• hard landscape features<br>• herbaceous, deciduous and coniferous plants.<br><br>Have students prepare a finished sketch followed by a finished plan for a residential landscape design. Have the students include an itemized planting list for a wide variety of seasonal features. This would reflect plants whose colour would be a winter feature and blooms would be a summer or spring feature. |
| 14.10 | To draft a landscape project budget. (NUM) | Have students:<br>• develop a budget itemizing expenses for hard landscape supplies, plant materials and labour.<br>• develop an alternate project budget to address a situation where the actual budget is 20% less than projected. This would reflect a situation where a client wants to decrease his/her costs.<br><br>Have students prepare an extensive estimate and a formal tender for a large project like a municipal park. (NUM, TL) |
| 14.11 | To develop a construction schedule. | Have students interview a landscape contractor to learn about the intricacies of scheduling. Have the students list the details involved in construction and installation scheduling.<br><br>Develop a Gaant chart to schedule the construction sequence of the landscape project. (CCT) |
| 14.12 | To complete a project design. | Develop a scale model of the landscape project and present the design concept to peers, or using computer software develop a general plan view of a given property. Prepare and defend the installation schedule based on a three-year period. Render a finished planting plan and generate a model to express plant growth within a 5, 10 and 15-year period.<br><br>Refer to Module 31 in the *Drafting and Computer Aided Design 10, 20, 30 Curriculum Guide* for specifics on drafting a plan. (IL) |

## Module 15: Container Gardening (Optional)

**Suggested time:** 5-10 hours **Level:** Introductory
**Prerequisite:** Module 1

**Foundational Objectives**
- To demonstrate skills with the tools, equipment and techniques used in the horticulture industry.
- To use and understand horticulture terminology in context.
- To develop skills to appreciate the natural world through direct experience.

**Common Essential Learnings Foundational Objectives**
- To develop student abilities to access information. (IL)
- To touch, handle, or experiment with materials first-hand and to discuss observations from an experiential point of view. (CCT)

| | Learning Objectives | Notes |
|---|---|---|
| 15.1 | To examine advantages of using container gardens. (CCT) | Have students create a list of the factors to consider when making a container garden. These might include:<br>• Available space (apartment or condominium gardener).<br>• Type of plants desired and growing habits.<br>• Portability<br>▪ Transportable gardens (move to different yard locations).<br>▪ A herb selection to move indoors when autumn arrives. |
| 15.2 | To identify the different types of containers and the suitability for different situations and locations. | Have students plan and build or adapt different styles and types of containers, and list the possible uses and limitations of each type. Window boxes, wall planters and hanging baskets are popular planting containers.<br><br>The size of the plant and the size of the container used need to be considered when planting is done. If possible have students build and finish a wooden planter as part of their class assignment. Students could also adapt a variety of other suitable containers for small gardening projects. Check the Internet for ideas and plans. |
| 15.3 | To make informed decisions for the selection of soil mixture and maintenance of the container. | Have students prepare a variety of potting mixes and mulches for container plants. The watering and feeding requirements vary according to plant varieties and the exposure of the container to sunlight.<br><br>Have the students review the safety requirements for handling, mixing and applying fertilizers. |
| 15.4 | To make selections of annuals for containers. | Have the students research nursery catalogues and gardening books to prepare a list of annuals suitable for their climate zone growing conditions. Points to consider include:<br>• Size when mature<br>• Colour combinations<br>• Variety of upright or hanging plants<br>• Similarity of growing requirements (soil mix, fertilizer, etc.) for containers that have a mix of varieties in the same pot<br>• Light requirements of plants locating containers<br>• Placement of containers for lighting conditions. |

| | Learning Objectives | Notes |
|---|---|---|
| 15.5 | To make selections of perennials for container gardens. (CCT) | This provides opportunities to grow flowering shrubs or dwarf conifers that will not usually grow in Saskatchewan's climate zones. Potted trees can be moved outdoors in frost-free weather and returned indoors in the fall.<br><br>Different types and colours of grasses make good container plants. Students can collect varieties of wild native grasses that can be gathered from roadsides or open prairie.<br><br>Remember that wild prairie lilies should be left where they are found because the plants are very fragile. It is illegal to remove them from their habitat. With the same note of caution the prairie crocus does not survive transplanting in the majority of cases.<br><br>Some varieties of conifers can be trimmed to resemble Bonsai without the commitment of many years that true Bonsai requires.<br><br>Some fruit trees can be grown successfully as container plants. It should be noted that most of the seeds recovered from fruit do not produce exactly the same type of fruit due to pollination variables. Varieties grown as container plants may not be winter hardy in Saskatchewan. Imported fruit trees including citrus, apple, cherry, peach, and fig are fairly successful in pots. Domestic varieties of blueberry and cranberry are also candidates for containers. |
| 15.6 | To demonstrate practical skills involved in planning a container garden. (IL, TL) | Students can produce a sketch of a container garden with accompanying text including a plant list to describe the intended effect of the matured container garden. |
| 15.7 | To choose bulbs that are suitable for container gardens. | Different varieties of bulb-generated flowers bloom at different times throughout the year, so bulbs could be used for project work at any time. Research the origins of different:<br>• types of bulbs.<br>• seasons of growth.<br>• forcing bulbs for out of season blooming.<br>• propagation of bulbs. (IL)<br><br>Have students select a variety of bulbs that might be grown together for a floral display, then plant and care for the selection keeping a journal of the development. After bulbs have flowered and foliage has died back, the bulb can be salvaged and planted outside in the spring or kept until next year with proper storage conditions maintained. |
| 15.8 | To complete a project that involves the soil preparation, plant selection and growth of a container garden. (IL) | Have each student select an annual or a perennial plant as a project and complete a journal of the growth of the plant reflecting the plant development throughout the class. Photographs would be a way to document the growth. |

## Module 16: Water Gardens (Optional)

**Suggested time:** 5-10 hours **Level:** Advanced
**Prerequisite:** Modules 1, 9 and 10

**Foundational Objectives**
- To demonstrate skills with the tools, equipment and techniques used in the horticulture industry.
- To develop knowledge and appreciation for horticulture and its role in our society.

**Common Essential Learnings Foundational Objectives**
- To participate in activities and assignments that focus thinking on the purposes of components within a water garden. (CCT)
- To develop students' abilities to meet their own learning goals. (IL)

| | Learning Objectives | Notes |
|---|---|---|
| 16.1 | To examine the variety of water garden styles. (COM) | Have students identify a variety of water garden styles. Some to consider include:<br>• Tubs or half barrels (suitable for decks or balconies)<br>• Troughs (for a narrow space above ground)<br>• In ground types (where a larger space is available). |
| 16.2 | To examine the factors related to pond location in a landscaped area. | Create a list of factors to consider when selecting the style and size of a pond. These may include:<br>• Topography<br>• Existing landscaping<br>• Location of underground utilities<br>• Lot size and shape<br>• Intended function; aesthetics, horticulture, etc.<br>• Amount of sunlight required. |
| 16.3 | To design a water garden. (CCT) | Visit local park areas or backyard ponds to get ideas as to how pond size and location relate to one another.<br><br>Ponds that will contain plants and fish have different requirements of surface area and depth.<br><br>Water garden projects using portable containers are possible. |
| 16.4 | To build a portable water garden. (IL) | Have the students create a small water garden based on their plans. It may be possible to build a water garden for the community or to contract with an individual to build a pond.<br><br>It will be necessary to use a liner of some variety, preformed or made from sheet material to waterproof the container or prepared space for the water garden. Have the students collect all the material necessary before beginning their project.<br><br>If possible, have students build a small container pond in a wooden half barrel at the school or at a seniors' facility. |

| | Learning Objectives | Notes |
|---|---|---|
| 16.5 | To develop a plan for construction of an in-ground pond. | Have students prepare a work plan for the construction of the pond. Do not forget to include the final finishing of the pond apron and surrounding landscaping.<br><br>Prepare a list of materials that will be needed to build the pond. Calculate the cost of the selected pond design. (NUM)<br><br>Visit building centres, greenhouses and landscaping companies. As well, investigate the Internet for information on building techniques and material suppliers.<br><br>Careful calculation of the amount of liner material will be necessary to adequately cover the pond interior. The area that surrounds the pond will also be part of the overall plan, particularly if a stream or a waterfall is to be included.<br><br>If possible, have the students build a water garden at the school or perhaps for a seniors' complex in the community. |
| 16.6 | To discuss the management and maintenance procedures needed for a water garden. | Have the students develop a seasonal plan for the maintenance of a water garden. Create a list of products required for water garden maintenance.<br><br>Have students prepare a list of the possible problems that can occur with water gardens and suggest their solutions for dealing with the problems identified. (CCT) |
| 16.7 | To select suitable plants to put in a water garden. | Discuss the three groups of water plants: bog or marshy varieties, submerged plants, and shade producing plant types.<br><br>Examples might include:<br>• Bog or Marginal: Cattails, water iris or marsh grasses (planted in pots with the roots submerged near the surface).<br>• Submerged: Water lilies, Vallisneria, Sagittaria (roots are in soil at the bottom of the pond, the latter two providing oxygen to the water).<br>• Shade producing: Duck weed, water hyacinths and water lettuce (the roots are not in soil but hang in the water).<br><br>Determine what plants are suitable for our climate zones. |
| 16.8 | To understand the requirements for water plants. | Identify the soil mixes for submerged water plants.<br><br>Investigate water chemistry and its importance to the health of water plants. (IL)<br><br>Have students test the pH of a variety of water bodies to evaluate the safety of the water for plants.<br><br>Determine the optimum plant population for a given pond size. |

| | Learning Objectives | Notes |
|---|---|---|
| 16.9 | To discuss the pond and the creatures that may inhabit the pond. (COM) | Fish, amphibians and insects are popular additions to ponds. Have students identify the contributions of each one. Have students determine the number and types of fish that a given pond can support. Students should also investigate the predators that may visit the pond and suggest methods to prevent predation. |
| 16.10 | To investigate the relationships among the various natural elements in the pond. | Students can show how the pond becomes a self-sustaining environment through the symbiotic relationships of its elements. (IL)<br><br>Have the students discuss the pond and how it fits in an eco-system. |

## Module 17: Landscape Construction (Optional)

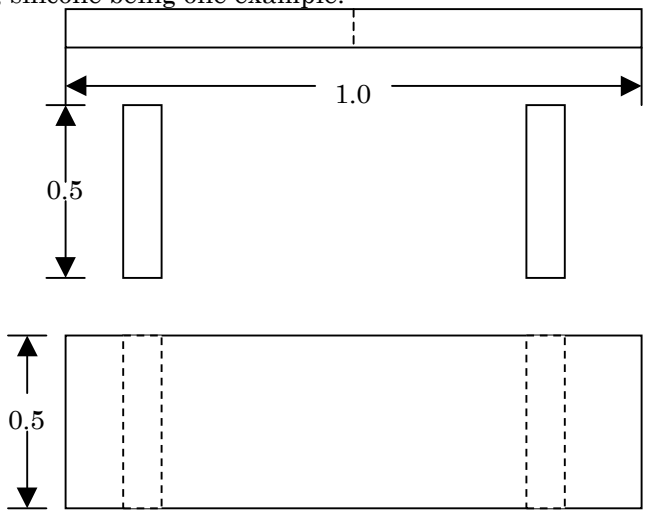
**Suggested time:** 5-15 hours **Level:** Intermediate
**Prerequisite:** Modules 9, 12, and 13

**Foundational Objectives**
- To introduce students to fundamentals of horticulture.
- To expand students' knowledge of career opportunities that may lead to securing employment in the horticultural industry.
- To develop knowledge and appreciation for horticulture and its role in our society.

**Common Essential Learnings Foundational Objectives**
- To provide the opportunity for students to use and become comfortable with the elements and materials of hard landscape. (TL, CCT)
- To create and carry out the construction of a landscape design. (IL)

| | Learning Objectives | Notes |
|---|---|---|
| 17.1 | To understand the basic construction of a timber retaining wall. (TL) | Have students collect samples of landscape wood materials and describe the difference between pressure treated landscape timbers and railroad ties.<br><br>Have the students determine and list the factors that will define the load stress of a wooden retaining wall. (NUM)<br><br>Have the students describe the design considerations for a vertical timber wall and a modular wall, and the need for tie back systems. |
| 17.2 | To create a practical timber planter design. (CCT) | Have students describe the following design factors for a timber planter: purpose, design style, estimated stress loads, and corner bracing.<br><br>A planter could be built in the school yard or in the yard of a volunteer. |
| 17.3 | To investigate the use of precast blocks for a planter or retaining wall design. (IL) | Have the students collect data about the variety of blocks available and define their uses. They could develop design ideas that show where each type of block would be best used. |
| 17.4 | To understand the uses and installation of precast paving stone. | Have students prepare a plan for the use of precast pavers including sub-grade preparation, materials estimation, and estimated wastage for the project. Demonstrate how a project is priced. (NUM)<br><br>Have students demonstrate how to stake out and estimate the requirements for pavers. Demonstrate the installation of paving stones and show variations in colour and design patterns.<br><br>Tour a new building subdivision to view the way paving materials are used. |

| Learning Objectives | Notes |
|---|---|
| 17.4 To prepare concrete forms and batch mix concrete by hand. | Forms can be created with dimensional lumber, if the finished shape has straight sides. To make curved forms, plywood can be used. It is best to hold the forms in place with wooden stakes that are driven below the top edge of the form so that the wet concrete can be screeded or leveled with a board.<br><br>Have the students research the types of concrete, their additives and application.<br><br>Review the fundamentals of making concrete. Discuss the ratios of materials. Discuss rebar, sealants, joints, curves, curing, strength, and aggregates.<br><br>Have students prepare small batches of concrete in a wheelbarrow or a simple box made from plywood and dimensional lumber. Ensure the materials are thoroughly mixed with a hoe or shovel.<br><br>Have students identify and demonstrate various ways in which concrete is finished: brooming, stamping, troweling, dyeing, and creating exposed aggregate surfaces.<br><br>Identify or be able to recognize concrete defects such as: scaling, dusting, blistering and discoloration. Have the students provide possible solutions to rectify these concrete defects.<br><br>Forms (that can be used several times), for a simple garden bench, can be created by the students. Concrete benches consisting of two square pillars and a top can be made with one form constructed of plywood with a centre divider, if each pillar is half the length of the top. The top and pillars can be glued together using a variety of sealants, silicone being one example. |




These benches have several advantages: they are heavy and not easily moved, do not blow over, weather well, are inexpensive and are difficult to damage.

| Learning Objectives | | Notes |
|---|---|---|
| 17.5 | To prepare plans for enclosing a residential property. (TL, NUM) | Have students design a number of different plans to enclose a yard. This is usually accomplished by constructing a fence and gates. There are many styles and materials available to consider when doing designs.<br><br>The students could research the cost of enclosing a residential lot, 15.2 x 30.5 M (50 feet x 100 feet), for example, using different styles and heights of fence. Have the students prepare a cost estimation for the entire job including materials, construction and finishing.<br><br>Hedges may be an alternative closure method for consideration. |

## Module 18: Pest and Disease Management (Optional)

**Suggested time:** 5-15 hours **Level:** Advanced
**Prerequisite:** Module 4

**Foundational Objectives**
- To introduce students to fundamentals of horticulture.
- To develop knowledge and appreciation for horticulture and its role in our society.
- To recognize health and safety hazards in the workplace so that the potential for personal injury and damage to equipment or the environment is minimized.

**Common Essential Learnings Foundational Objectives**
- To enable students to understand that positive plant culture requires comprehension of pathogens, insects, diseases and their control. (IL, CCT)
- To recognize health and safety hazards associated with handling and application of chemical controls in the workplace. (TL)

| | Learning Objectives | Notes |
|---|---|---|
| 18.1 | To understand a holistic approach to pest management. (CCT) | Have the students describe their interpretation of Integrated Pest Management (IPM).<br><br>Outline the history of IPM with the class.<br><br>Explain the concept of IPM using an example such as white fly control, aphid control or spidermite control.<br><br>Have the students list advantages and disadvantages of implementing an IPM program in a commercial or hobby greenhouse. |
| 18.2 | To understand the variation in life cycles of common insect pests. | Have the students identify three different types of insect life cycles.<br><br>Determine at which stage in the life cycle of these common insects the most damage to plants occurs.<br><br>Have the students diagram and describe an insect's life cycle as it relates to horticulture. (COM) |
| 18.3 | To determine which pest management methods are the most effective. (CCT) | Have the students research different methods of pest management including the following methods of insect control:<br>• cultural<br>• physical<br>• biological<br>• chemical.<br><br>Prepare and present a discussion paper wherein the control of a specific insect pest is attained using all four methodologies. (COM, CCT) |

| | Learning Objectives | Notes |
|---|---|---|
| 18.4 | To identify common insect pests and their damage. | Have students collect and identify insect pests. Those that are fairly common include the following: aphids, birch leaf miner, cankerworm, sod web worm, white fly, fungus gnat, potato beetle, and cabbage butterfly. |
| 18.5 | To identify and control common landscape diseases and how they are controlled. | Caution students about the health risks that can result from careless handling of fungi and their spores.<br><br>Have student collect and identify local fungi and compare their spread to bacterial diseases.<br><br>Students can conduct research and report on the most serious virus, bacterial or fungal problem in horticultural crops in their area.<br><br>Contact a chemical manufacturing company to determine its products that are useful for fungus control.<br><br>Determine cultural and physical controls for fungal and bacterial problems. |
| 18.6 | To describe methods of pest control using organic control methods. (IL) | Have students create experiments to determine the effectiveness of organic controls. Several methods are available for students to investigate. These methods may include companion planting, organic soil additives, and natural compounds (rhubarb leaf extract). |

## Module 19: Arboriculture (Optional)

**Suggested time:** 5-15 hours **Level:** Advanced
**Prerequisite:** None

**Foundational Objectives**
- To introduce students to the fundamentals of horticulture.
- To develop knowledge and appreciation for horticulture and its role in our society.
- To expand students' knowledge of career opportunities within the horticultural industry.

**Common Essential Learnings Foundational Objective(s)**
- To enable students to understand that positive plant culture coupled with consistent maintenance practices are essential to the health of an urban forest. (TL, PSSV)

| | Learning Objectives | Notes |
|---|---|---|
| 19.1 | To determine the scope of the arboriculture industry in the province. (TL, COM) | Have the students identify industry and professional arboriculture societies. Research the societies to determine their mission statement, purposes and membership benefits. (COM) |
| 19.2 | To understand tree biology. | Have the students prepare a cross-section of a tree to reveal the anatomy of a tree, to examine various internal structures and to understand the method of tree growth. Further information on this topic can be found in the *Construction and Carpentry 10, 20, 30 Curriculum Guide.*<br><br>Have students collect a variety of tree cross-sections to examine growth rings. Discuss the development of the life of the tree.<br><br>Have the students conduct research and collect data on the world's oldest trees, looking for global location, climate, local environment and possible commercial uses for the trees. |
| 19.3 | To compare deciduous and evergreen growth. | Have the students research the benefits that deciduous and evergreen types of trees provide to an urban landscape or a farm.<br><br>Students could prepare a sketch of a particular environment to illustrate how different trees might be situated for maximum benefit in their sketch.<br><br>Students could prepare a list of the growing requirements of each type of tree in terms of soil, water, fertilizer and general maintenance. |
| 19.4 | To determine tree - soil relations. | Have the students prepare a list that outlines the relationship of the following as it affects tree growth:<br><br>• soil conditions - soil type and quality.<br>• water - amount and quality.<br>• fertilizers - selection, timing and application. |

| | Learning Objectives | Notes |
|---|---|---|
| 19.5 | To understand the basics of tree pruning. | Have the students review the importance of pruning trees.<br><br>The students could tour a municipal park or residential area to see the need for and effect of tree or scrub pruning.<br><br>Have the students demonstrate the procedure for pruning a young shade tree. This activity could be conducted with the cooperation of a farmer or a municipality that has natural bluffs of aspen or poplar tree cover.<br><br>Have the students describe the method for pruning a mature street tree. The students could also list the additional equipment needed to prune large trees compared to smaller trees.<br><br>Have the students contact the local municipal or provincial department responsible for street tree maintenance. Determine the criteria and pruning cycle for the local area. |
| 19.6 | To understand the importance of proper pruning of elm trees to protect them from Dutch Elm disease. | The time of year to prune trees for disease control purposes varies depending on the life cycle of the disease or disease carrying insect that creates the problem. Have students investigate the proper time to prune elms. |
| 19.7 | To understand the procedures required for planting a tree. | The students can develop a checklist for evaluating a site for planting. They can also develop criteria for selection of tree species and methods of installation.<br><br>See if the students can create a list of ideal conditions for installing trees in a street site. List a selection of suitable street trees for the local area. Identify the factors that make a tree unsuitable for use as a street tree. |

| Learning Objectives | Notes |
|---|---|
| 19.7 To demonstrations skill and success as a tree planter. (CCT, COM, TL) | Have the students develop a list of the steps used to plant trees in the following installation situations:<br>• a bare root tree.<br>• a balled and burlap-wrapped tree.<br>• a mature tree utilizing a tree spade.<br><br>Contact local forestry department or provincial resource management to determine local codes or procedures.<br><br>It may be to possible to arrange for tours of tree nurseries in the province. The two largest are:<br>• Prairie Farm Rehabilitation Association (PFRA) Nursery at Indian Head that produce trees and shrubs for farmsteads, shelterbelts and municipalities.<br>• PRT-PA (Pacific Regeneration Technologies) at Prince Albert that produces coniferous trees for reforestation in clear-cut areas.<br><br>Have the students provide a practical demonstration by planting trees at the school or in the community. It may also be possible to develop a land reclamation, wildlife habitat or a beautification project that involves planting a number of tree varieties.<br><br>Many students are hired each summer to plant trees in areas of commercial harvest. Have the students search for a tree planting job or interview someone who has had this job.<br><br>For additional information, consult the *Forestry Studies 20, 30 Curriculum Guide*. |

## Module 20: Stock Handling and Sales (Optional)

**Suggested time:** 5-15 hours **Level:** Advanced
**Prerequisite:** None

**Foundational Objectives**
- To introduce students to the fundamentals of horticulture.
- To develop knowledge and appreciation for horticulture and its role in our society.
- To expand students' knowledge of career opportunities that may lead to employment in the horticultural industry.

**Common Essential Learnings Foundational Objective(s)**
- To enable students to understand that positive plant maintenance practices are essential to the health of plants. (TL).

| | Learning Objectives | Notes |
|---|---|---|
| 20.1 | To handle and care for plant material properly. | Have the students prepare experiments to test the effects of climate on indoor plants. The students might place similar plants in different environments to observe differences in growth.<br><br>Describe and demonstrate how to prepare a flowering plant for retail sale. This description could include pot selection, decoration, trimming and presentation.<br><br>Have students demonstrate different methods to clean large tropical plants.<br><br>Have the students prepare a theme display of small tropical plants as it could appear in a retail plant store.<br><br>Demonstrate the proper ways to water an indoor plant display.<br><br>Have students demonstrate how flowering plants (e.g., Chrysanthemums) are readied for shipping. Review the precautions that should be taken when a shipment is unpacked. Have the students describe how plants are wrapped for delivery in the winter.<br><br>Discuss the necessary cleaning and general maintenance of a floral cooler, floral bulk containers and floral arrangements. (CCT) |
| 20.2 | To explore the role of the retail horticulturist. | Have students list personal characteristics that would be beneficial as an employee in a retail business. The students could role play different sales techniques appropriate to a retail flower shop or garden centre.<br><br>Have students devise and deliver a product or service plan for a customer. This could reflect a service contract for a company or a corporation, to provide indoor plants for offices or mall kiosk displays. Have students create additional scenarios for this type of business.<br><br>Discuss customer expectations and determine appropriate sales strategies. Determine the need for a follow up service program. (PSVS) |

## Module 21: Herbs and Medicinal Plants (Optional)

**Suggested time:** 3-5 hours **Level:** Intermediate
**Prerequisite:** Modules 1 and 7

**Foundational Objectives**
- To instill an appreciation for the diverse roles of horticulture in our society.
- To develop knowledge and appreciation for horticulture.

**Common Essential Learnings Foundational Objectives**
- To touch, handle, manipulate, or experiment with materials first-hand in order to discuss observations from an experiential point of view. (CCT)
- To respect cultural perspectives that may differ from their own. (PSVS)

| | Learning Objectives | Notes |
|---|---|---|
| 21.1 | To identify ten native herbs that grow in Saskatchewan. | Have the students identify plants that have been grown in gardens as additives to foods.<br><br>Have students collect data on native species of plants that are used as herbs and as medicines. |
| 21.2 | To identify the varieties of non-native, imported or commercial herbs that are grown in Saskatchewan. (CCT) | Herbs are not only grown as a part of a vegetable or kitchen garden but also as part of the Saskatchewan agricultural industry as a value added crop. Have students list those herbs that are field cropped and those planted on a smaller land plots. Compare the two growing situations and the crops that each situation is used to produce.<br><br>See Module 24 for more information on garden care. |
| 21.3 | To demonstrate practical skills in selecting and growing a nursery or greenhouse crop. (IL) | Use this as an opportunity to have students prepare a seed bed, propagate, transplant, water, fertilize and cultivate a herb crop.<br><br>If the herbs are planted in foam egg cartons and cared for until they are ready for transplant from the egg carton, they can be used as a fundraiser for the school horticulture program. |
| 21.4 | To determine the medicinal properties and uses of herbs. (PSVS) | Students should also try to discover plants that are used for their medical properties. Aboriginal cultures are familiar with a wide variety of plants that are collected for their medicinal properties.<br><br>A visit to or from an elder who knows the traditional uses of plants would be valuable.<br><br>Caution is urged when herbs are selected for making herb tea. Be very certain about the ingredients that are included, as some plants resemble others and may be poisonous.<br><br>Have students interview grandparents or other elders in the community about the topical as well as internal herbal treatments that might be made from locally available plants.<br><br>Students can visit a health food store to investigate herbal treatments.<br><br>Invite a herbalist to address the class. |

## Module 22: Turf Management (Optional)

**Suggested time:** 5-10 hours **Level:** Introductory
**Prerequisite:** Modules 4A and 7

**Foundational Objectives**
- To foster responsibility and self-confidence through the production of a horticultural design.
- To develop knowledge and appreciation for horticulture and its role in our society.

**Common Essential Learnings Foundational Objectives**
- To enable students to understand and use the vocabulary related to horticulture. (COM)
- To develop students' abilities to access knowledge. (IL)
- To develop tool handling skills that may lead to employment. (PSVS)

| | Learning Objectives | Notes |
|---|---|---|
| 22.1 | To identify grass varieties suitable for use as turf in Saskatchewan. (COM) | Have students identify different varieties of grasses and their applications, growing requirements, general characteristics, and management techniques required to grow them.<br><br>There are also a number of ornamental grasses that are available. These are covered in Module 25.4. |
| 22.2 | To describe the tools and equipment used in turf maintenance. (COM) | Students should be tested to determine their knowledge regarding the safe use of all equipment. Hand and power tool equipment skills should include mowing and trimming, cultivating and aerating, planting, transplanting and irrigating. Include other tools as necessary. Begin with the common hand tools that are familiar to the students and introduce other types as required.<br><br>Refer to Saskatchewan Labour's safety supplement, *Recognizing Hazards in Horticulture* for more information regarding safety. |
| 22.3 | To perform the practical skills used to prepare soil for planting grass or laying sod. (IL) | Locate a spot on the school property that can be used as a demonstration site so students can work on a plot. Plant a number of seed blends or varieties and evaluate which grows the best in a particular soil mix. Different grass varieties will require different blends of sand, loam and clay.<br><br>If possible, arrange a tour to a sod farm or a golf course with a greenskeeper.<br><br>Contact a landscape contractor and arrange for students to observe or help with a sod-laying job at a work site. |
| 22.4 | To demonstrate the practical skills using proper tools to maintain turf grass. (PSVS) | The students can do the maintenance on grassed areas surrounding the school or on playing fields in the community.<br><br>Students must wear required protective equipment and observe necessary safety precautions when using power tools. |
| 22.5 | To identify methods of weed control. | Have students prepare a comparison of the advantages and disadvantages of chemical application to control weeds.<br><br>The students could investigate the trend toward the reduced use of chemicals on golf courses and parks and the increased use of more natural types of groundcovers that result. |

## Module 23: Flower Gardens (Optional)

**Suggested time:** 15-20 hours **Level:** Intermediate
**Prerequisite:** Modules 7 and 8

**Foundational Objectives**
- To produce landscape plans, budgets and tender documents.
- To develop a knowledge and appreciation for horticulture and its role in our society.

**Common Essential Learnings Foundational Objectives**
- To discover challenges and solutions through actively participating in prairie garden planting. (IL)
- To touch, handle, manipulate, or experiment with materials first-hand in order to discuss observations from an experiential point of view. (CCT)

| | Learning Objectives | Notes |
|---|---|---|
| 23.1 | To create a landscape plan that lays out the flowerbed locations and planting details for a residential property. (NUM) | Have students create a series of sketches before preparing a scale diagram of their residential location on grid paper. The diagram should contain a legend to map the planting details. (NUM)<br><br>See Module 14A, for landscape planning assistance. |
| 23.2 | To identify suitable plant varieties for Saskatchewan's climate, for both annual and perennial flowering plants. (CCT) | If possible, plan a visit to a nursery or greenhouse to examine popular flower varieties that are suitable for Saskatchewan's climate.<br><br>Have students create a list of annual and perennial flowers and the time during the growing season that they produce blooms.<br><br>Have the students list propagation methods for perennials. Some are bulbs or corms, cuttings, root division, seeds, or transplants. List examples of plants propagated by these methods.<br><br>Have the students investigate cloning as a propagation method. If possible, conduct experiments to propagate plants by cloning.<br><br>Other considerations regarding plant location might include amount of sunlight, soil type, watering requirements, heat or shade tolerance, expected size, and rate of growth for the selected variety.<br><br>Have students review the benefits and necessity for seasonal pruning and "dead-heading" throughout the growing season. |

| | Learning Objectives | Notes |
|---|---|---|
| 23.3 | To list the advantages of annual versus perennial flowers gardens. | Factors to consider may include blooming time (early or late season), length of blooming season, water and fertilizer needs, hardiness, and care and maintenance, etc. |
| 23.4 | To examine the advantages of xeriscaping. | Have students prepare a list of the types of plants that do well in a xeriscape environment.<br><br>Ornamental grasses are becoming more popular and are used as a flower display in a garden. Students can research the different varieties available that are both native and imported, by visiting a greenhouse or nursery.<br><br>List the methods of cultivation that are used in xeriscaping and the reasons for using these methods.<br><br>Many native prairie plants work well in a low maintenance environment. Prepare a list of those plants locally available that could be transplanted into a xeriscape plan.<br><br>Plan a field trip in the community to locate examples of xeriscaping. |
| 23.5 | To prepare a plan and a scale model of a xeriscape location. | Students can create a contoured scale model that is designed to use xeriscaping principles and practices. A variety of materials can be used including gravel, sand, small dried plants, landscape fabric scraps, pine cones, twigs, etc. The entire structure can be contained in a cardboard box measured to scale dimensions, to represent a municipal park or a residential lot. (IL) |
| 23.6 | To identify flowering bulbs suitable for Saskatchewan. (CCT) | Have students create a list of different types of root-propagated plants.<br><br>Prepare a chart for various "bulbs" to illustrate planting depths.<br><br>Prepare lists of bulbs for fall planting that are winter hardy and will survive outdoors and those that must removed from the garden and stored indoors.<br><br>Students can plant and force bulbs for indoor winter flowering, if the project is started before the end of October. |

## Module 24: Vegetable Gardens (Optional)

**Suggested time:** 15-20 hours **Level:** Introductory
**Prerequisite:** Module 1 and 7

**Foundational Objectives**
- To examine relationships between plant species and humans and how populations are affected by local plant growth.
- To demonstrate skills with the tools, equipment and techniques used in the horticulture industry.
- To develop knowledge and appreciation for horticulture and its role in our society.

**Common Essential Learnings Foundational Objectives**
- To touch, handle, manipulate, or experiment with materials first-hand in order to discuss observations from an experiential point of view. (CCT)
- To participate in activities which focus on real world situations involving quantitative information in vegetable gardening.

| | Learning Objectives | Notes |
|---|---|---|
| 24.1 | To explore the possible locations for a vegetable garden. | Have students list the spaces that are used as gardens. These might include rooftops, balconies, patios, decks, backyard plots and community gardens.<br><br>Have the students describe community garden plots and their benefits. Investigate which segment of the population uses these plots and what the criteria are for accessing these garden areas. |
| 24.2 | To select a site for a vegetable garden on a landscaped property. (CCT) | Have students prepare a scale diagram of a residential property and determine the best site for the garden, in relation to the rest of the landscaping. (NUM)<br><br>Considerations regarding the location of the garden including the amount of sunlight and shade, soil condition, size of plot. (CCT) |
| 24.3 | To choose different vegetables and plant varieties suitable for a vegetable garden. | Create a scaled garden plan and locate the varieties and planting location on the plan. (NUM)<br><br>Both crop types, above and below the soil, i.e., leaf and root crops, should be included in the selection.<br><br>Have students look through seed catalogues and investigate different varieties of vegetables. Note the climatic requirements, yield and growth period for each.<br><br>Have students research the practice of companion planting and demonstrate the technique in their experiments with a control plot, to see if there is a noticeable benefit to crop yield.<br><br>The students could keep a journal or log book of the yield produced by their plots.<br><br>Explore a partnership with an English language arts teacher where students would do technical or creative writing about their garden for an English class. |

| | Learning Objectives | Notes |
|---|---|---|
| 24.4 | To investigate the benefits of traditional garden plots compared to raised bed gardens. | Review advantages of different styles of gardens, for example, traditional or raised beds.<br><br>The students can research the locations that favor one style or the other to see the benefits each one provides. (COM) |
| 24.5 | To experiment with different methods for improving the productivity of the soil to increase the yield. | The students can construct compost bins and conduct a composting project. Plans are available on the Internet. (IL)<br><br>Refer to *Construction and Carpentry 10, 20, 30 Curriculum Guide*, for information on the safe use of tools.<br><br>Research the fertilizer requirements for different types of vegetables, i.e., leaf crops or root crops. |

## Module 25: Fruit Production (Optional)

**Suggested time:** 5-10 hours **Level:** Intermediate
**Prerequisite:** Module 7

**Foundational Objectives**
- To develop skills in horticulture that may lead to employment.
- To demonstrate skills with the tools, equipment and techniques used in the horticulture industry.
- To use and understand horticulture terminology in context.

**Common Essential Learnings Foundational Objectives**
- To participate in activities and assignments that focus thinking on the purposes of the components in fruit production. (CCT)
- To enable students to understand and use the vocabulary related to horticulture. (COM)

| | Learning Objectives | Notes |
|---|---|---|
| 25.1 | To identify the climate zones within Saskatchewan. | Have students draw the provincial map with the zone areas labeled on it. |
| 25.2 | To identify the small fruit varieties that are suitable for commercial production in Saskatchewan. (COM) | Arrange a tour to a u-pick farm or a market garden to investigate this type of commercial horticulture.<br><br>Students can research the variety of ways that provincially grown fruit is marketed in Saskatchewan. |
| 25.3 | To list the fruit bearing trees and shrubs suitable for Saskatchewan. (COM) | The students can list different tree varieties of apple, crabapple, plum, cherry, pear, and apricot that are able to survive the prairie winter climate.<br><br>The fruit bearing shrubs that are common in Saskatchewan may include: saskatoon, currant, high bush cranberry and gooseberry.<br><br>Arrange a trip to a nursery to examine the varieties of fruit trees suitable for this province. |
| 25.4 | To identify the varieties of fruit bearing trees and perennials that are native to Saskatchewan. | Take a field trip to the surrounding country or a near-by provincial park to locate native fruit bearing plants. If the trip is taken in the spring, the flowers will help to identify the plant; during an early fall trip the fruit will help identify the variety.<br><br>Plants in this category include: chokecherry, blueberry, pincherry, cranberry, saskatoon, wild raspberry and strawberry. |
| 25.5 | To demonstrate the practical skills required to maintain a fruit orchard. (CCT) | The skills can include grafting, pruning, watering and fertilizing, harvesting and pest control.<br><br>To improve winter hardiness, desirable characteristics from imported varieties are grafted to domestic root stock. Students could do grafting, using cutting or budding procedures, as an assignment to learn propagation methods used for fruit trees. |

## Module 26: Floral Arrangements for Weddings (Optional)

**Suggested time:** 15-20 hours **Level:** Advanced
**Prerequisite:** Module 7

**Foundational Objectives**
- To develop skills in horticulture that may lead to securing employment.
- To demonstrate skills with the tools, equipment and techniques used in the horticulture industry.
- To use and understand horticulture terminology in context.

**Common Essential Learnings Foundational Objectives**
- To participate in activities and assignments that focus thinking on the purposes of floral arrangements. (CCT)
- To enable students to understand and use the vocabulary related to floral design. (COM)
- To execute floral designs for bridal parties. (IL)

| | Learning Objectives | Notes |
|---|---|---|
| 26.1 | To develop skills required to design a traditional bridal bouquet. (IL) | Have students collect a variety of design illustrations of floral arrangements for all members in the bridal party. This will include the bride, her attendants, groom, his attendants and the parents/guardians and special guests of the bride and groom. Class members could role play different people for the floral arranger.<br><br>Have the students design and create a bridal bouquet that reflects a traditional style and flower selection. Points to consider in the design process include:<br>• The elements and principles of design must be followed. Additional information can be found in the *Design Studies 10, 20 Curriculum Guide.*<br>• The style of the bride's dress.<br>• The cascade of the bouquet should be proportional to the height of the person carrying it.<br>• Flowers should be the classic white with accents to reflect bridal party colours.<br>• The stature and physique of the bride.<br>• The bouquet should have movement that complements the shape of the bouquet whether it is a circular, crescent, cascade, or presentation style of arrangement.<br>• The bouquet should be well balanced and light weight. This is accomplished by using as little wire and tape in the bouquet construction as possible while still maintaining design shape.<br><br>Have the students research other formal and less formal styles of bouquet arrangements that might be suitable. |

| | Learning Objectives | Notes |
|---|---|---|
| 26.2 | To develop hair accessories to compliment the bridal bouquet. (IL) | This design is usually part of the bride's attendants' ensemble, as the bride traditionally wears a veil.<br><br>Have the students decide the type of flowers and the presentation that would give the best appearance. Advise the students that subtle decoration would be best complementing the rest of the floral arrangements.<br><br>There may be additional materials required for a hair floral arrangement such as combs, clips or a tulle bridal pouf. |
| 26.3 | To create a bride's throw bouquet. | Have the students design and build a functional, inexpensive keepsake bouquet. This bouquet might be a copy of the bride's floral bouquet created from artificial flowers. The focal flower in this design is often a carnation. |
| 26.4 | To prepare small floral arrangements intended to be worn. | This type of floral arrangement would include boutonnieres and corsages.<br><br>Have the students design and create a corsage or boutonniere. It is important to remember that the colour of the clothes that will be worn with the floral is important to the design, flower selection, correct foliage and ribbon. |

## Module 27A, B, C: Work Study Preparation and Follow-up Activities (Optional)

This module is used to prepare students for work study placement. Foundational Objectives include pre-placement information, preparation for interviews, and expectations for the workplace experience.

**Suggested time:** 5-10 hours **Level:** Introductory/Intermediate/Advanced
**Prerequisite:** None

**Foundational Objectives**
- To be aware of the careers and opportunities in the field of horticulture that exist in Saskatchewan and other provinces.
- To integrate classroom learning with work-related learning.
- To increase awareness of employability skills as they relate to the work environment.

**Common Essential Learnings Foundational Objectives**
- To foster an effective use of communication skills in the workplace. (COM)
- To engage in a work study experience and develop entry level workplace skills that may lead to sustainable employment. (PSVS)
- To expand career research beyond the classroom setting. (IL)

| | Learning Objective | Notes |
|---|---|---|
| 27.1 | To become aware of the expectations of each of the partners in the work study component. (PSVS) | In order to establish a successful working relationship with all of the partners involved in the workplace, it is important to define the expectations of each partner.<br><br>Refer to Guidelines for Work Study, a section of *the Practical and Applied Arts Handbook* (2002) for the expectations of business, student, teacher monitor, and school. |
| 27.2 | To determine factors that would affect the student contribution in the workplace. (CCT) | The students may formulate a list of what they can bring to the workplace and how each item may impact on potential jobs. Items could be included such as:<br>• school subjects<br>• past experiences<br>• self-concept and personality<br>• needs, values and interests<br>• knowledge, skills and attitudes<br>• career goals and plan.<br><br>Ask students to do a self-assessment of skills using the influences in the above list as a guide. Students should identify strengths they can offer community partners. Try to incorporate the value of communication and teamwork in the discussion. |
| 27.3 | To foster an awareness of building good communication in the workplace. (COM) | Discuss verbal and non-verbal communication. List some ways in which negative, non-verbal communication may be displayed. Encourage students to role play ways of demonstrating effective techniques of verbal communication on the job when giving or receiving instructions and resolving conflict. With the use of case studies, divide the students into groups and role play to show how effective use of communication can resolve conflict on the job. |

| | Learning Objectives | Notes |
|---|---|---|
| 27.4 | To develop a resumé that may be forwarded to a potential employer. | The student will develop a résumé using the correct format. (IL)<br><br>The résumé may be used to introduce the student to the employer of a workplace site prior to an interview. Teachers are encouraged to work with other staff members to ensure résumé preparation is taught. Résumé writing is suggested in *English Language Arts 20 and A30, Information Processing 10, 20, 30*, and *Career and Work Exploration 10, 20, A30, B30.*<br><br>Students should save the résumé on a computer disk and update it, as changes need to be made and references are added. |
| 27.5 | To determine student guidelines in preparation for an interview. (COM) | Through class or small group discussions, students may list guidelines for an interview. The instructor may add missing items to the list.<br><br>Outline and describe the three stages of an interview. Point out to the students at what stage of the interview each of the guidelines previously discussed will be used.<br><br>The **greeting** involves an introduction between the student and employer. Discuss or demonstrate how this should be done.<br><br>The **exchange** is the longest part of the interview where the employer asks a series of questions and engages in a dialogue with the student about information on the résumé and other matters relating to the job.<br><br>The **parting** provides closure to the interview and may be just as important as the greeting. Explain how this may be done.<br><br>Provide the students with a list of questions frequently asked by employers or ask students to make a list. Students may role play the stages of the interview. |
| 27.6 | To discuss the post-interview. | After the student has completed the interview with the employer, do a follow-up activity. Review the interview with the student using the three stages above as points for discussion. |
| 27.7 | To develop a procedural guide for the work site. | Discuss the following work site items with students:<br>• transportation<br>• hours of work<br>• absence and tardiness<br>• procedures for conflict resolution<br>• role of the student, teacher, and work place supervisor<br>• dress code<br>• job description<br>• school and employer expectations. |

| Learning Objectives | | Notes |
|---|---|---|
| 27.8 | To relate feedback from the work placement. | Students provide feedback about work placement including: where they were placed, type of business, duties, most rewarding experience, most difficult situation and how they handled it.<br><br>Note: It is recommended that each student send a thank you note or card to the employer upon the completion of each work placement. If more than one placement has been made in the course, follow-up activities must be completed after each placement.<br><br>Ensure that students understand these guidelines by asking students to describe each of these items.<br><br>Note: Look for opportunities to introduce and reinforce ideas about Labour Standards, Occupational Health and Safety, and WHMIS. Use the *Career and Work Exploration 10, 20, A30, B30 Curriculum Guide*, the *Practical and Applied Arts Handbook,* the Saskatchewan Labour website (http://www.readyforwork.sk.ca), and other recommended resources. |

## Module 28A, B, C: Work Study (Optional)

**Suggested time:** 25-50 hours **Level:** Introductory/Intermediate/Advanced
**Prerequisite:** None

**Foundational Objectives**
- To be aware of the careers and opportunities in the field of horticulture that exist in Saskatchewan and other provinces.
- To integrate classroom learning with work-related learning.
- To increase awareness of employability skills as they relate to the work environment.

**Common Essential Learnings Foundational Objectives**
- To engage in a work study experience and develop entry level workplace skills that may lead to sustainable employment. (PSVS)
- To expand career research beyond the classroom setting. (IL)

For more information about implementing work study in schools see the Work Study Guidelines for the Practical and Applied Arts included in the *Practical and Applied Arts Handbook* (Draft 2002). Teachers need to use or design appropriate learning objectives for this module; for instance, to demonstrate ability to follow a "Training Plan".

Note: Consult the *Career and Work Exploration 10, 20, A30, B30 Curriculum Guide* and the Department of Labour for content about Labour Standards, Occupational Health and Safety, and WHMIS. If several work studies are offered during grade 11 or 12 in a course series, add more depth to each successive experience.

## Module 88: Apprenticeship in Horticulture (Optional)

**Suggested time**: 2-5 hours **Level:** Introductory
**Prerequisite**: None

**Module Overview**
Students will be introduced to the apprenticeship and trade certification process and the role of the Saskatchewan Apprenticeship and Trade Certification Commission. Students will also explore a variety of opportunities that apprenticeship offers, and the relationship between secondary level and apprenticeship training.

**Foundational Objectives**
- To create an awareness of apprenticeship programs and opportunities in Saskatchewan.

**Common Essential Learnings Foundational Objectives**
- To broaden students understanding of the apprenticeship program and the role it plays in the trade industries. (CCT)
- To examine particular trade opportunities that are appropriate for themselves. (IL, PSVS)

| | Learning Objectives | Notes |
|---|---|---|
| 88.1 | To understand and describe the process and benefits of apprenticeship. | Students should recognize that apprenticeship is a process of training and certifying workers in specific trades.<br><br>Students could perform research to determine which trades are designated in Saskatchewan and how those compare to those in other provinces.<br><br>Students should brainstorm reasons why a person would become an apprentice. Alternatively, they could interview journeypersons or apprentices to find out what they feel the advantages of the apprenticeship program were for them.<br><br>Students should be able to describe the difference between a provincial certification and the Interprovincial Standards "Red Seal" program. |
| 88.2 | To understand and use the appropriate terminology related to apprenticeship. | Students should be able to use a wide variety of terms appropriately, including but not limited to the following:<br><br>• Journeyperson<br>• Indenture<br>• Joint training committee<br>• Pre-employment training<br>• Designated trade and sub-trade<br>• Advanced standing |

| | Learning Objectives | Notes |
|---|---|---|
| 88.3 | To determine the steps involved in becoming an apprentice. | Students need to be aware that the applicant must be working in the trade, must sign a formal contract with the employer and the Saskatchewan Apprenticeship and Trade Certification Commision, and must be prepared to attend technical training, typically once per year.<br><br>Students should create a list of institutions that provide training for horticulture apprentices.<br><br>Students could interview a journeyperson or an apprentice to learn about his or her experience. |
| 88.4 | To determine the relationship between the ATCC and the various trade boards. | Students should be aware of how a trade board becomes established, and how a trade becomes designated in Saskatchewan.<br><br>Students could contact horticulture trade board and explore the board's role in the apprenticeship process. They should also determine the relationship between the trade board and the ATCC. Students could share and compare their finding with other students in the class. |
| 88.5 | To develop an understanding of the programs available to help make the transition from secondary level to apprenticeship. | Students should be aware that the time spent in a work placement under the supervision of a journeyperson may be used toward apprenticeship. Students should be aware of existing Articulation Agreements regarding apprenticeable trades courses at the secondary level. These tri-party agreements (K-12 education, SIAST, ATCC) ensure that secondary students receive full credit for coursework completed and eligible trade hours. Students should also be aware of the opportunity for challenging the Level I examination in a given trade, providing certain conditions are met. |
| 88.6 | To determine the specific requirements for an apprenticeship in horticulture. | Students should explore the requirements of the horticulture apprenticeship program including years and hours required, location of annual training, and the duration of annual training. Students could also explore employability and expected wages for those trades. They could share their findings with the rest of the class. |
| 88.7 | To explore the qualities of a successful horticulture apprentice. | Students could interview employers to determine personal characteristics that will help make an apprentice successful. They could also brainstorm a list of qualities and discuss them. With these qualities in mind, the students could perform a peer or self-assessment to guage their own suitability for a career in horticulture. |

## Module 99A, B, C: Extended Study (Optional)

**Note:** The extended study module may be used only once in each 100 hour course. It is important to record the title of the extended study module on the recordkeeping chart. Record 99A for the first extended study module offered in the course series, 99B for the second and 99C for the third.

**Suggested time:** 5-20 hours **Level:** Introductory/Intermediate/Advanced
**Prerequisite:** None

**Module Overview**
Evolving societal and personal needs, advances in technology, and demands to solve current problems require a flexible curriculum that can accommodate new ways and means to support learning in the future. The extended study module is designed to provide schools with an opportunity to meet current and future demands that are not provided for in current modules in the renewed PAA curriculum.

The flexibility of this module allows a school/school division to design **one new module per credit to complement or extend the study of pure, core and optional modules** configured to meet the specific needs of students or the community. The extended study module is designed to extend the content of the pure courses and to offer survey course modules beyond the scope of the available selection of PAA modules.

The list of possibilities for topics of study or projects for the extended study module approach is as varied as the imagination of those involved in using the module. These optional extended study module guidelines should be used to strengthen the knowledge, skills, and processes advocated in the PAA curriculum.

For more information on the guidelines for the Extended Study module see the *Practical and Applied Arts Handbook*.

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# Appendix A: Recordkeeping Charts

## Horticulture 10: Sample Module Recordkeeping Chart

Student Name: _____

Student Number: _____

| Module Code | Modules | Hours | Date | Teacher Initial |
|---|---|---|---|---|
| | **Horticulture 10** | | | |
| HORT01A | Module 1A: Botany C | | | |
| HORT02A | Module 2A: Soils Characteristics C | | | |
| HORT03A | Module 3A: Indoor and Outdoor Plant Identification C | | | |
| HORT04A | Module 4A: Safety – Recognizing Hazards C | | | |
| HORT05 | Module 5: Exploring Careers C | | | |
| HORT06A | Module 6A: Business Management O | | | |
| HORT07 | Module 7: Plant Production C | | | |
| HORT08 | Module 8: Artificial Flower Floral Design O | | | |
| HORT09 | Module 9: Floral Care and Handling O | | | |
| HORT13 | Module 13: Interior Plantscapes O | | | |
| HORT15 | Module 15: Container Gardening O | | | |
| HORT22 | Module 22: Turf Management O | | | |
| HORT24 | Module 24: Vegetable Gardens O | | | |
| HORT27A | Module 27A: Work Study Preparation and Follow-up Activities O | | | |
| HORT28A | Module 28A: Work Study O | | | |
| HORT99 | Module 99: Extended Study O | | | |

C = Core Modules
O = Optional Modules

**Note:** When the Extended Study, Work Study Preparation and Follow-up Activities and Work Study modules are studied for the first time, record the module number and the letter A (Extended Study Module 99A). If the module is used at another level, the module is recorded using the letter B (Extended Study Module 99B).

**All recordkeeping charts should be copied to school letterhead.**

## Horticulture 20: Sample Module Recordkeeping Chart

Student Name: _____

Student Number: _____

| Module Code | Modules | Hours | Date | Teacher Initial |
|---|---|---|---|---|
| | **Horticulture 20** | | | |
| HORT01B | Module 1B: Botany C | | | |
| HORT02B | Module 2B: Soils Characteristics C | | | |
| HORT03B | Module 3B: Indoor and Outdoor Plant Identification C | | | |
| HORT04B | Module 4B: Safety – Risk Control C | | | |
| HORT06B | Module 6B: Intermediate Business Management O | | | |
| HORT10 | Module 10: Introductory Floral Design O | | | |
| HORT11 | Module 11: Floral Aesthetics O | | | |
| HORT14A | Module 14A: Landscape Design O | | | |
| HORT15 | Module 15: Container Gardening O | | | |
| HORT20 | Module 20: Stock Handling and Sales O | | | |
| HORT21 | Module 21: Herbs and Medicinal Plants O | | | |
| HORT23 | Module 23: Flower Gardens O | | | |
| HORT27B | Module 27B: Work Study Preparation and Follow-up Activities O | | | |
| HORT28B | Module 28B: Work Study O | | | |
| HORT99 | Module 99: Extended Study O | | | |

C = Core Modules
O = Optional Modules

**Note:** When the Extended Study, Work Study Preparation and Follow-up Activities and Work Study modules are studied for the first time, record the module number and the letter A (Extended Study Module 99A). If the module is used at another level, the module is recorded using the letter B (Extended Study Module 99B).

**All recordkeeping charts should be copied to school letterhead.**

## Horticulture 30: Sample Module Recordkeeping Chart

Student Name: _____

Student Number: _____

| Module Code | Modules | Hours | Date | Teacher Initial |
|---|---|---|---|---|
| | **Horticulture 30** | | | |
| HORT01C | Module 1C: Botany C | | | |
| HORT02C | Module 2C: Soils Characteristics C | | | |
| HORT03C | Module 3C: Indoor and Outdoor Plant Identification C | | | |
| HORT04C | Module 4C: Safety – WHMIS C | | | |
| HORT06C | Module 6C: Advanced Business Management O | | | |
| HORT14B | Module 14B: Advanced Landscape Design O | | | |
| HORT16 | Module 16: Water Gardens O | | | |
| HORT17 | Module 17: Landscape Construction O | | | |
| HORT18 | Module 18: Pest and Disease Management O | | | |
| HORT19 | Module 19: Arboriculture O | | | |
| HORT25 | Module 25: Fruit Production O | | | |
| HORT26 | Module 26: Floral Arrangements for Weddings O | | | |
| HORT27C | Module 27C: Work Study Preparation and Follow-up Activities O | | | |
| HORT28C | Module 28C: Work Study O | | | |
| HORT88 | Module 88: Apprenticeship in Horticulture O | | | |
| HORT99 | Module 99: Extended Study O | | | |

C = Core Modules
O = Optional Modules

**Note:** When the Extended Study, Work Study Preparation and Follow-up Activities and Work Study modules are studied for the first time, record the module number and the letter A (Extended Study Module 99A). If the module is used at another level, the module is recorded using the letter B (Extended Study Module 99B).

**All recordkeeping charts should be copied to school letterhead.**

# Appendix B: Career Research Interview Questions

Adapted from *Business Education: A Curriculum Guide for the Secondary Level Accounting 10, 20, 30* (Saskatchewan Education 1992).

Interview someone who currently works in this career.

The assignment may be completed independently, in pairs, in small groups, or by whichever method is chosen by the student(s) and teacher. The teacher should encourage students to use a variety of resources to gather information about the career that they are researching. The student may use letters, the Internet, phone or a personal interview to gather information.

After the students have discussed different career paths, students may prepare a short journal writing explaining why they are interested in the career area they are about to investigate.

Students may proceed to develop a list of questions to collect the information they require, to help them understand more about the career area they have chosen.

The following list of questions may be included in the students' interview project.

1. What is the title of your job?
2. What are your normal duties on the job?
3. What are some of the things that you enjoy about your job?
4. Are there any things about your job that you dislike? What are those things?
5. Does your company have a dress code for employees? What is considered suitable?
6. How often is working overtime required in your job?
7. Do you have to work nights or weekends?
8. What aptitudes and abilities are needed to succeed in your career?
9. What are the post-secondary education and training requirements to enter and advance in your career?
10. Can you give an approximate starting salary for someone just starting out in your occupation? How much does the average person earn after five years? After ten years? What types of employee benefits, such as sick leave or dental plans, do workers in your career usually receive?
11. Do you think the demand for workers in your career will increase or decrease over the next five years? Why?
12. What changes have you seen over the past 5 to 10 years in this career?
13. What are the advantages and disadvantages of entering and being in your career?
14. Is there any advice you would give to a young person just making a career choice?

After the interview session, students may summarize the information they received and draw a conclusion as to whether they would like to learn more about this career. They may also determine whether they would like to join that organization based on their experience.

Students may brainstorm different ways to present their career research to the class. Presentation ideas may include:

- Oral presentation
- PowerPoint presentation
- Written report
- Creating a website with links to career information
- Role playing a student interviewing a career professional
- Role playing a professional promoting his/her career at a career fair.