

Plant Science/Horticulture

Grade Levels: 10,11,12

Course Mission:

To introduce agriculture students to the four major divisions of the horticulture industry: 1) Pomology (Fruit Industry), 2) Olericulture (Vegetable Industry), 3) Floriculture (Flower Industry), 4) Landscape and Nursery Industry. This course also introduces students to the FFA organization and the opportunities for agriculture leadership.

Major Units of Study:

- 1 quarter (9 weeks) = Plant Science and Plant Propagation
- 1 quarter (9 weeks) = Greenhouse Management and Floriculture
- 1 quarter (9 weeks) = Landscape Design & Construction
- 1 quarter (9 weeks) = Vegetable, Fruit and Bedding Plant Production

State Academic Standards addressed in this course:

A.12.1	C.12.2	E.12.2
A.12.2	C.12.3	E.12.3
A.12.3	C.12.4	E.12.4
A.9-12.1	C.9-12.1	E.12.5
A.9-12.2	C.9-12.2	E.12.6
A.9-12.3	C.9-12.3	E.9-12.1
A.9-12.4	C.9-12.4	E.9-12.2
B.12.1	D.12.1	E.9-12.3
B.12.2	D.12.2	E.9-12.4
B.12.3	D.12.3	F.12.1
B.12.4	D.12.4	F.12.2
B.12.5	D.12.6	F.12.3
B.12.6	D.9-12.1	F.12.4
B.9-12.1	D.9-12.2	F.9-12.1
B.9-12.2	D.9-12.3	F.9-12.2
B.9-12.3	D.9-12.4	F.9-12.3
B.9-12.4	E.12.1	F.9-12.4

Concepts & Skills by Unit (concepts/skills in bold mastery essential for all students)

Unit: **Plant Science and Plant Propagation:** (9 weeks)

Section #1: **Introduction to Horticulture:** (1 week)

- Exploring the Horticulture Field

Essential Understandings / Concepts Covered / "What students should know":

* Career

- Current & future employment needs.
- Job descriptions.
- Working conditions.

- Opportunities for advancement.
- Other factors

Process Skills / “What students should be able to do”:

- Define Plant Science.
- Define Horticulture.
- Identify the size & scope of the industry.
- Identify job descriptions and related working conditions.

- Plant Taxonomy: How Plants Are Named

Essential Understandings / Concepts Covered / “What students should know”:

- * Classifications of plants:
 - Need for classification.
 - Development of the present classification system.
 - Common & scientific names.
 - Important families of agricultural plants.
 - Agricultural crops belonging to the Gramineae family.

Process Skills / “What students should be able to do”:

- Explain the binomial classification system.
- Name the founding father of the classification system.
- List 10 common and scientific plant names.

Section #2: **Plant Science: (4 weeks)**

- Parts of the Plant and Their Function

Essential Understandings / Concepts Covered / “What students should know”:

- * Seed:
 - Main parts.
 - Function of each part.

Process Skills / “What students should be able to do”:

- Dissect and label the main parts of a monocot seed.
- Dissect and label the main parts of a dicot seed.
- Describe the functional difference between mono and dicot seeds.

Essential Understandings / Concepts Covered / “What students should know”:

- * Plant composition.
 - Makeup of cells.
 - Purpose of plant roots.
 - Types of plant roots.
 - Purpose of plant stems.
 - Difference between herbaceous and woody stem.
 - Purpose of plant leaves.
 - Type of leaves.
 - Three main leaf arrangements,

- Purpose of the xylem and the phloem.

Process Skills / “What students should be able to do”:

- Label the main parts to a tap and non-tap root.
- Describe the functional difference between tap and non-tap roots.
- Label the main parts to herbaceous and woody stems.
- Describe the functional difference between herbaceous and woody stems.
- Dissect and label the main parts of a leaf.
- Describe the functional difference the xylem and the phloem.
- Create a leaf collection of specified leaf types, arrangements and margins.

- Environmental Requirements for Good Plant Growth

Essential Understandings / Concepts Covered / “What students should know”:

* Water

- Its functions in the life of a plant.
- Meaning of the term “water requirement.”
- Amount required by different species.
- The process of transpiration.
- Factors affecting the water requirement of plants.

Process Skills / “What students should be able to do”:

- Water a plant from top down.
- Water a plant from bottom up.
- Explain the concept of transpiration.

Essential Understandings / Concepts Covered / “What students should know”:

* Soil

- Its functions in the life of a plant.
- Soil formation.
- Soil composition.
- Soil profiles.
- Soil evaluation.
- Soil testing.
- Types of water movement through soil.
- Relationship between nutrients and soil types.

Process Skills / “What students should be able to do”:

- Identify soil textures.
- Identify soil sizes.
- Label a soil profile.
- Collect a soil sample and perform a soil test for N. P. K.
- Demonstrate the three means of water movement through soil.

Essential Understandings / Concepts Covered / “What students should know”:

* Light

- Its functions in the life of a plant.
- Sources and quality for plant usage.

Process Skills / “What students should be able to do”:

- Select the proper place to grow a plant, based on lighting requirements.
- Explain the difference between “day long” and “day short” plants.

- Longevity of plants.

Essential Understandings / Concepts Covered / “What students should know”:

- * Growth characteristics of annuals, biennials & perennials.

Process Skills / “What students should be able to do”:

- Identify ten annuals.
- Identify ten perennials.
- Identify five biennials.
- Explain the difference between annual, perennial and biennial plants.

- Growth Stimulants, Retardants, and Rooting Hormones.

Essential Understandings / Concepts Covered / “What students should know”:

- * How plants manufacture their food.
 - Define photosynthesis.
 - Conditions necessary for the process of photosynthesis to take place.
 - Types of chlorophyll.
 - Raw materials.
 - Manufactured product.
 - By-product of the process.
 - Stages of photosynthesis.

Process Skills / “What students should be able to do”:

- Write out the chemical equation for photosynthesis.
- Explain the process of photosynthesis.
- Describe the conditions that affect the process of photosynthesis.
- Apply rooting hormones to plants during the “cutting” stage of

propagation

Essential Understandings / Concepts Covered / “What students should know”:

- * Plant nutrients.
 - Defining plant nutrients.
 - Elements necessary for normal growth.
 - The process of diffusion.
 - The process of osmosis.
 - Movement of nutrients within the plant.

Process Skills / “What students should be able to do”:

- Demonstrate fluid movement through a celery stalk.
- List the macro plant nutrients & describe their function.

Essential Understandings / Concepts Covered / “What students should know”:

- * Respiration.
 - Chemical reactions involved in the process.
 - Respiration in higher forms of plant life.

- Surplus foods.

Process Skills / “What students should be able to do”:

- Explain the process of plant respiration.
- Describe conditions that affect plant respiration.

Section #3: Plant Propagation: (4 weeks)

- Asexual propagation.

Essential Understandings / Concepts Covered / “What students should know”:

* Principles and practices of :

- Separation
- Division
- Cutting
- Grafting
- Layering

Process Skills / “What students should be able to do”:

- Asexually propagate two different plants by means of:
 - Separation
 - Division
 - Layering
- Asexually propagate four different plants by means of:
 - Cutting
 - * root cutting
 - * stem cutting
- Explain the process of grafting.
- Describe two examples of effective plant grafting.

- Sexual propagation.

Essential Understandings / Concepts Covered / “What students should know”:

- Components of a flower.
- Complete and incomplete types.
- Characteristics and functions of the flower components.
- The similarities and differences of flowers.
- The production of pollen and its function.
- The process of pollination, self-pollination, and cross-pollination.
- Steps or stages that take place from the time of pollination to fertilization.
- Principles of fertilization.

Process Skills / “What students should be able to do”:

- Label the main parts to a complete flower.
- Label the main parts to an incomplete flower.
- Dissect a complete flower and label the main parts.
- Describe the process of pollination.
- Explain the difference between self and cross-pollination.
- Appropriately apply fertilizer to a plant.

- Germination.

Essential Understandings / Concepts Covered / “What students should know”:

- Conditions needed for germination to happen.
- Steps or changes that take place during germination.
- Location of the root, hypocotyls, and epicotyl.
- Define node and internode.
- Location of the food supply in seeds.
- Crops having an active hypocotyl.
- Crops having an inactive hypocotyl.

Process Skills / “What students should be able to do”:

- Test seed for germination viability.
- Manipulate germination rates on vegetable seeds.
- Locate and label the root, hypocotyls and epicotyls of a plant.
- Identify the node and internode of a plant.
- Describe the difference between active and inactive hypocotyls.

- Plant diseases and causes.

Essential Understandings / Concepts Covered / “What students should know”:

- Types of microorganisms that causes plant diseases.
- Conditions favorable for diseases.
- Control of diseases.

Process Skills / “What students should be able to do”:

- Identify three main diseases associated with houseplants in

Wisconsin.

- List the most favorable conditions for a prescribed houseplant

disease.

- Explain how to effective control a prescribed houseplant disease.

Unit: Landscaping: (9 weeks)

Section #1: Landscape Design (6 weeks)

Essential Understandings / Concepts Covered / “What students should know”:

- Introduction to Landscape Design Principles and Practices.
- Lettering, Drawing, Graphic Materials and Techniques.
- Basic principles of drawing.
- Working with the Customer and the Landscape Process.
 - * The 8-Step process
- Basic principles of Landscape Design.
- Selecting Plants for the Design.
- Pricing the Plan and Understanding Contracts/Contractors.
- Computer-Aided Designing.

Process Skills / “What students should be able to do”:

- Identify lettering materials/tools.
- Apply lettering principle to a landscape design.
- Draw three coniferous and three deciduous trees
- Hand draw a landscape design on, using all eight steps.
- Create a landscape design on the computer.
- Identify twenty landscape plants, common to southern WI.
- Create a planting list for a landscape plan.
- Price out a landscape plan.

Section #2: Landscape Construction (3 weeks)

- Hardscaping.

Essential Understandings / Concepts Covered / “What students should know”:

- Contacting the utility companies before digging.
- Fundamentals of patio paving installation.
- Fundamentals of working with stone.
- Steps to installing a split-rail fence.

Process Skills / “What students should be able to do”:

- Install a 10 X 12 foot paved patio, with three types of pavers.
- Install a section of split-rail fence.
- Utilize a tape measure.
- Utilize a level.

- Principles of Landscape Surveying.

Essential Understandings / Concepts Covered / “What students should know”:

- Principles of grade elevations.
- Principles of slope.
- Tools of the trade.
- Engineer vs Mechanical measurements.

Process Skills / “What students should be able to do”:

- Plot out an area to paper, while keeping it to scale.
- Read a set of blue prints.
- Set a grade stake.
- Interpret a set grade stake.
- Set up and utilize a transit (level).

Unit: Greenhouse Management and Floriculture: (9 weeks)

Section #1: Greenhouse Management and Crops: (3 weeks)

- Plant production and sales.

Essential Understandings / Concepts Covered / “What students should know”:

- Poinsettias production and marketing.
- Chrysanthemums production and marketing.

Process Skills / “What students should be able to do”:

- Label the parts of a Poinsettia plant.
- Label the parts of a Chrysanthemum plant.
- Finish raising and market a Poinsettia cutting.
- Market a Chrysanthemum plant.

- Understanding & controlling environmental growth factors.
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Essential Understandings / Concepts Covered / “What students should know”:

- Controlling lighting, humidity and temperature in a greenhouse.

Process Skills / “What students should be able to do”:

- “Stretch” a plant.
- “Stunt” a plant.
- Kill a flat of seedlings through “damp off.”

Section #2: Pesticide Management, Use, & Safety: (3 weeks)

Essential Understandings / Concepts Covered / “What students should know”:

- Sustainable agriculture.
- Integrated Pest Management.
- Pesticide safety.

Process Skills / “What students should be able to do”:

- Explain the concept of “Sustainable Agriculture”
- Provide an example of effective, sustainable agriculture.
- Demonstrate an example IPM with a plant.
- Accurately read and interpret a chemical label.
- Utilize a “Materials Safety Data Sheet” binder.
- React to a chemical spill.

Section #3: Container-Grown Plants (2 weeks)

Essential Understandings / Concepts Covered / “What students should know”:

- Terrariums and Dish Containers
- The Art of Bonsai
- Culinary Herbs

Process Skills / “What students should be able to do”:

- Make a clay plant container.
- Create and maintain a terrarium.
- Create and maintain a dish container.
- Create and maintain a containerized herb garden.

Section #4: Holiday Crafts and Floral Designs: (1 week)

Essential Understandings / Concepts Covered / “What students should know”:

- Holiday Wreath making

- Creating Centerpieces
- Creating Bows for Floral Designs

Process Skills / “What students should be able to do”:

- Make a holiday wreath.
- Create a centerpiece floral arrangement.
- Make two bows for a floral arrangement.

Unit: Vegetable, Fruit and Bedding Plant Production: (9 weeks)

Section #1: The Vegetable Garden (2 weeks)

Essential Understandings / Concepts Covered / “What students should know”:

- Planning and preparing the garden site.
- Planting the vegetable garden.
- Caring for the vegetable garden.
- Favorite vegetables and herbs.

Process Skills / “What students should be able to do”:

- Order seeds from a catalog.
- Create a plant compatibility chart.
- Create a planting chart.
- Identify ten vegetables common to southern Wisconsin.
- Identify five herbs common to southern Wisconsin.

Section #2: The Small Fruit Garden and Orchard Operations (1 week)

Essential Understandings / Concepts Covered / “What students should know”:

- Strawberry production
- Blueberry production.
- Bramble fruit production.
- Grape production.
- Orchard production.

Process Skills / “What students should be able to do”:

- Apply mulch to plants.
- Prune plants.
- Identify common plant diseases.
- Identify ten wild fruit plants in southern Wisconsin.
- Make grape juice.
- Preserve fruits.

Section #3: Bedding Plant Production (6 weeks)

Essential Understandings / Concepts Covered / “What students should know”:

- Direct vs indirect seeding.
- Annuals vs perennials.
- Starting from seed.
- Using plugs.

- Working with cuttings.
- Designing and caring for basket arrangements.
- Creating and caring for bag arrangements.
- Creating and caring for dish arrangements.
- Principles of transplanting.
- “Hardening off” plants.
- Marketing your product.

Process Skills / “What students should be able to do”:

- Read and understand a plant tag.
- Raise plants from seed, plugs and cuttings to finish.
- Create and care for hanging baskets, bags and dish arrangements.
- Transplant seedlings from plugs to cell packs.
- Sell their product for a profit.