

Stage 1 – Desired Results

ESTABLISHED GOALS	<i>Transfer</i>	
	<i>Students will be able to independently use their learning to...</i>	
	...relate the scientific foundations of plant science to the selection, planting, maintenance, cultivation, and harvesting of plants within sustainably built greenhouses, situated in urban settings and requiring minimal energy consumption. They will also understand the nutritional and economic value of these plants and communicate their benefits to the community,	
	<i>Meaning</i>	
	UNDERSTANDINGS	ESSENTIAL QUESTIONS
	<p>Using principles taught in this course, students will understand:</p> <ul style="list-style-type: none"> • Cytology – the structure, function, and biological systems of plant cells. • Ecology – the relationships between plants and the ecosystem, both natural and man-made. • Genetics – How plants reproduce and pass along their heredity and variation. 	<ul style="list-style-type: none"> • how climate change affects the populations of natural and cultivated plant life, and the factors that can improve the overall climate for plants and animals. • the role of sustainable ecosystems on fruit and vegetable production, and how these can be managed to the benefit of society. • the characteristics of “food deserts”, where fresh fruits and vegetables are largely unavailable, and the social and economic impact on these communities • the importance of community action to develop small, sustainable greenhouses to approach food equity matters in an incremental and sustainable manner.
	<i>Acquisition</i>	
	<i>Students will know...</i>	<i>Students will be skilled at...</i>
	<ul style="list-style-type: none"> • The structure and function of various plant types • The structure and function of plant components, including cells and their composition • The structure and function of leaves, stems, and roots. • Describing the functions of photosynthesis, respiration, and transpiration, and the role of the environment in the efficacy of these functions 	<ul style="list-style-type: none"> • Identification of different types of plants. • Identification of leaves, roots, and stems. • Description of flowering plants, their structure, and the function of each part. • Selection of plants for greenhouse cultivation under various constraints including greenhouse design, temperature, and availability of sunlight and water. • Applying sustainable practices to plant cultivation, including water conservation, alternative energy use, and recycled matter.

Stage 2 – Evidence and Assessment

Evaluative Criteria	Assessment Evidence
Students will have formative and summative assessments as well as evaluations of lab/observation activities.	<p>PERFORMANCE TASK(S):</p> <ul style="list-style-type: none"> • Each lesson will contain a formative assessment of knowledge gained during that lesson. • Each lesson will include a lab/observation activity to demonstrate understanding of principles covered during that lesson. • A summative assessment at the end of the course will evaluate each student’s retention of knowledge and demonstrate their understanding of the concepts involved in plant science.
	OTHER EVIDENCE:

- Students will maintain a journal for reflective learning
- Students will evaluate their peers for mutual understanding of subject matter.

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction (20 hours)

The learning plan is comprised of seven lessons. Each lesson is delivered in a sequential order, as each lesson builds upon the knowledge gained in previous lessons.

Lesson 1: Introduction to Plant Science (2 hours lecture)

- Define plant science
- Classify different types of plants
- Identify the uses of plants

Lesson 2: Plant Cell Structure (3 hours lecture/lab)

- Define key vocabulary terms relating to plant cell structure
- Accurately draw and label the parts of a plant cell
- Identify the function of plant cell parts

Lesson 3: Leaves, Roots and Stems (3 hours lecture/lab)

- Identify the function of leaves, roots and stems
- Identify the internal parts of a leaf, root and stem from a cross-section diagram
- Accurately label the external parts of a leaf, root or stem and the function of each

Lesson 4: Flowering Plants (3 hours lecture/lab)

- Define what a flowering plant is
- Accurately identify the parts of a flower
- Dissect a real flower and identify the parts
- Understand key vocabulary terms relating to flowering plants and their definitions

Lesson 4: Plant Identification Features (3 hours lecture/lab)

- Accurately identify nine different leaf venations
- Describe and recognize 40 common leaf shapes
- Accurately identify 12 different leaf margins
- Understand how plant identification features can be used together to identify plants

Lesson 6: Photosynthesis, Respiration and Transpiration (4 hours lecture/lab)

- Explain the process of photosynthesis
- Define photosynthesis, respiration and transpiration
- Articulate how photosynthesis, respiration and transpiration functions in plant growth and development
- Describe the reactants and products of photosynthesis and the source of reactions from the environment

Lesson 7: Sustainable Practices in Botany and Plant Science (2 hour lecture)

- Identify several ways that botany and plant science fields contribute to sustainable practices
- Consider how these lessons apply to greenhouse construction and maintenance