

Wallingford Public Schools - HIGH SCHOOL COURSE OUTLINE

Course Title: Plant Science 1	Course Number: 8323
Department: Agricultural Education	Grade(s): 9
Level(s): Academic	Credit: 1
Course Description Freshman course work introduces students to concepts related to plant science, house plants, soils, plumbing, and tractor driving. This class will assist with activities related to the annual Holiday Shop. Students will be introduced to and participate in the Lyman Hall Chapter of the national organization, FFA. An additional component includes the development of a portfolio and skills to prepare them for future careers in plant science.	
Required Instructional Materials Sufficient Hands-on materials	Completion/Revision Date Approved by Board of Education October 15, 2007

Mission Statement of the Curriculum Management Team

The mission of the Career and Technical Education Curriculum Management Team is to assure that students, as a result of their experiences in K-12, will demonstrate transferable skills, knowledge, and attributes for successful life management, employment, career development, post-secondary educational opportunities, and lifelong learning.

Enduring Understandings for the Course

- Self-reflection of learning experiences, in and out of school, fosters the development of a life long learner. Life long learners are able to apply and refine skills as they prepare for their post-high school endeavors.
- Leadership organizations, such as FFA, offer numerous opportunities for members such as; a sense of community, leadership activities, travel, scholarships, social activities, service, etc.
- Plants are essential to sustain life and all aspects of our lives can be linked to plants.
- Plants have many common characteristics, yet can differ in numerous ways including their parts, complexity, and appearance.
- A florist is a multifaceted business requiring creativity, time management, and business knowledge to manage successfully.
- Career planning and preparation requires self assessment and involves informed responsible decision making during high school and beyond.
- House plants are an integral part of interior settings and many related factors determine how these plants thrive in interior settings.
- Many variables influence successful starting, growing, and harvesting of plants for the home vegetable garden.
- Skilled and safe use of materials and equipment will result in quality construction and a satisfied client.

- | |
|--|
| <ul style="list-style-type: none">• Safe operation of tractor and equipment is essential to enhance driving skills and ensure safety. |
| <ul style="list-style-type: none">• Learned skills and safety procedures will transfer to allow students to confidently operate many different types of equipment. |

LEARNING STRAND

1.0 Transferable Skills

ENDURING UNDERSTANDING(S)

- Self-reflection of learning experiences, in and out of school, fosters the development of a life long learner. Life long learners are able to apply and refine skills as they prepare for their post-high school endeavors.

ESSENTIAL QUESTION(S)

- What is the importance of maintaining a portfolio?
- What are the qualities of an effective oral presentation?
- What safety precautions do I have to follow?
- What can I do differently next time?
- What does a cooperative group require to function successfully?
- How can I assess the situation and implement change?
- What are the characteristics of an organized person? What do I need to do to be more organized?
- How can I manage informational research, organize the information, and present it professionally?
- What is a leader?

LEARNING OBJECTIVES The students will:

- 1.1 Demonstrate public speaking skills using appropriate visuals and tailoring the presentation to specific audiences.
- 1.2 Communicate in writing about a topic using different formats applying relevant vocabulary, supporting evidence and clear logic.
- 1.3 Self-assess transferable skills and reflect on areas of strengths and improvement.
- 1.4 Identify and use the appropriate tools and equipment safely.
- 1.5 Work cooperatively with fellow peers, teachers, and employers to complete a task.
- 1.6 Apply problem solving skills to critically approach a situation and work through the steps to solve the problem.
- 1.7 Develop organizational skills that assist with data collection, data analysis and synthesis.
- 1.8 Apply research skills to collect information, summarize the findings and to cite the sources used.
- 1.9 Recognize leadership skills such as: motivating others, negotiating,

INSTRUCTIONAL SUPPORT MATERIALS

- See other learning strands for integration

SUGGESTED INSTRUCTIONAL STRATEGIES

- See other learning strands for integration

SUGGESTED ASSESSMENT METHODS

- See other learning strands for integration

participating in meetings, gaining confidence, and gaining self-awareness, etc.

- 1.10 Apply computer-based tools such as PowerPoint, Word, Excel, and Access, to organize and present information.
- 1.11 Demonstrate self expression and creativity through different projects.
- 1.12 Develop a positive attitude and become an independent learner in order to prepare for the future.
- 1.13 Organize and maintain a four year portfolio including a compilation of student products and reflections.
- 1.14 Document SAE (Supervised Agricultural Experience) monthly. This includes recording hours, expenses, income, tasks and applied skills.

LEARNING STRAND

2.0 FFA Leadership Organization - Greenhand Degree

- Approximately 5 weeks

ENDURING UNDERSTANDING(S)

- Leadership organizations, such as FFA, offer numerous opportunities for members such as: a sense of community, leadership activities, travel, scholarships, social activities, and service.

ESSENTIAL QUESTION(S)

- What are the member benefits of FFA?
- How are official meetings conducted?
- What is the rationale for conducting parliamentary correct meetings?
- What is required to achieve a Greenhand degree?
- What is the importance of maintaining a portfolio?

LEARNING OBJECTIVES – The students will:

2.1 Meet the criteria for the FFA Greenhand Degree. This includes:

- Recall important historical and current facts regarding the FFA
- State the aims and purposes of the FFA
- Write the FFA Motto and explain the meaning
- Write the FFA Creed and explain the meaning
- State the official FFA colors
- Describe the FFA Emblem and explain the meaning of each part
- Describe FFA official dress
- Describe the 4 types of active membership
- Describe the benefits of paying dues
- Describe local, state, national and international activities available to FFA members
- Describe the degrees of active FFA membership
- List the chapter officers, their symbols, and explain their duties
- Demonstrate basic parliamentary abilities
- Describe the contests and awards programs a member can participate in on the local, state and national levels

2.2 Recognize the importance and organization of the four year portfolio.

- Dividers

INSTRUCTIONAL SUPPORT MATERIALS

- FFA manual
- www.ffa.org
- Paraphernalia such as gavel, officer symbols, jacket, *Robert's Rules of Order*, etc.

SUGGESTED INSTRUCTIONAL STRATEGIES

- Complete application for the Greenhand Degree
- Construct a time-line of historical FFA events
- Recite the FFA Motto, Creed, membership response and salute
- Participate in a mock meeting
- Write a letter to the National FFA recommending a change in the official FFA dress
- Internet research on FFA organization and activities
- Illustrate and color a personal emblem
- Write about the FFA Code of Ethics and identify those codes that seem to be “old fashioned behavior” and those that seem to be “current”
- Attend first FFA monthly meeting

SUGGESTED ASSESSMENT METHODS

- Score 80% or higher on FFA unit test
- Meet criteria for Greenhand Degree and complete written application
- Portfolio products may include:

- Title page
- Table of contents
- Summer summary
- SAE hours
- SAE planning forms
- Agricultural inventory

- Skill sheet
- A time line of FFA history
- Create a personal FFA emblem
- Write a letter to the National FFA recommending a change in the official FFA dress
- Writing sample about the FFA Code of Ethics

LEARNING STRAND

3.0 Introduction to Botany

- Approximately 6 weeks

ENDURING UNDERSTANDING(S)

- Plants are essential to sustain life and all aspects of our lives can be linked to plants.
- Plants have many common characteristics, yet can differ in numerous ways including their parts, complexity, and appearance.

ESSENTIAL QUESTION(S)

- Why are plants necessary?
- What are plants used for?
- What is needed for plants to grow?
- How can plants reproduce?
- How do plants grow and change?
- Why are plants essential to sustain life?
- How are different processes in plants integrated?

LEARNING OBJECTIVES – The students will:

- 3.1 Distinguish between a vascular and a non-vascular plant
- 3.2 Collect and label examples of non-vascular plants.
- 3.3 Explain how plants have evolved over time.
- 3.4 Compare and contrast characteristics of a fern, gymnosperm, and angiosperm.
- 3.5 Identify the different plant parts and their functions:
 - root – primary, secondary, root hairs
 - trunk – external (outer bark), internal (phloem, xylem, cambium, heart wood)
 - stem – external (terminal bud, lateral bud, node, internode, lenticels) internal (pith, cambium)
 - leaf – external (vein, midrib, margin, apex, base, petiole) internal (epidermis, cutin, cuticle, guard cells, stomata, chloroplast)
 - flower – anther, ovary, petal, sepal, pistil
 - seed – seed coat, endosperm, embryo
- 3.6 Diagram and explain the process found in plants such as:
 - Osmosis
 - Translocation
 - Transpiration
 - Respiration
 - Photosynthesis
 - Germination
 - Pollination
 - Fertilization

INSTRUCTIONAL SUPPORT MATERIALS

- Assorted seeds, plants, flowers, leaves, potting materials, tools, etc.

SUGGESTED INSTRUCTIONAL STRATEGIES

- Graphic organizer to display the parts, function and process
- Discuss how plants are used for every day items such as medicines, food, clothing, make up, etc.
- Germinate different seeds and observe growth
- Propagate stem and leaf cuttings
- Dissect flower and sketch and label the parts
- Create a clay model or poster board depicting plant parts, functions, processes
- Create a children's book to teach plant vocabulary and processes
- Collect, dissect, and sketch seeds, flowers, roots, and stems
- Press collected plants and their parts
- Research and summarize the evolution of plants
- Vocabulary reinforcement activities

SUGGESTED ASSESSMENT METHODS

- Build a model / poster board depicting plant parts, function and processes
- Quizzes and test
- Portfolio may include:
 - Unit skill sheet
 - Photo of plant model

LEARNING STRAND

4.0 Holiday Shop

- Approximately 4 weeks – December

ENDURING UNDERSTANDING(S)

- A florist is a multifaceted business requiring creativity, time management, and business knowledge to manage successfully.

ESSENTIAL QUESTION(S)

- What are the components of a pleasing arrangement?
- What makes an arrangement saleable?
- What are personal attributes that are necessary for success in the floral business?
- What is the effect of seasonal sales on a business?
- What does a florist consider when managing seasonal sales?
- What is professional? (behavior, merchandise)

LEARNING OBJECTIVES – The students will:

4.1 Demonstrate basic flower arranging skills such as:

- Attach wire hangers on wreaths
- Determine the wreath sizes
- Attach a tag with size on each wreath
- Green and design boxwood arrangements
- Prepare plants for holiday sale
- Establish price and create sales tag for merchandise

4.2 Demonstrate basic customer service skills such as:

- Wrap plants for sale and transportation
- Assist customers with sales
- Complete order forms and locate merchandise
- Complete sale
- Assist with daily organization of wreath and plant orders

INSTRUCTIONAL SUPPORT MATERIALS

- Assorted wire, tags, wreath materials, bows, pots and potting materials, dried flowers, holiday embellishments
- Holiday plants and greenery
- Seasonal cut flowers and mixed seasonal greens

SUGGESTED INSTRUCTIONAL STRATEGIES

- Prepare and manage the Holiday Shop for the community
- Use pictures and materials to model different floral design principles such as focal point, rhythm, balance
- Demonstrate method for attaching wire hangers, wreath sizing and tag attaching
- Design and construct a wreath
- Model basic flower design skills – boxwood rings or arrangements
- Review and discuss student expectations during the Holiday Shop.
- Discuss how the Holiday Shop differs from other classes and is open to members of the community.

SUGGESTED ASSESSMENT METHODS

- Teacher observations
- Portfolio may include:
 - Unit skill sheet
 - Photo of products completed including price

	<p>and description</p> <ul style="list-style-type: none">• Daily log of daily activities• Holiday Shop written review – Personal assessment and critique of the Holiday Shop.
--	--

LEARNING STRAND	
5.0 Career Exploration <ul style="list-style-type: none"> Approximately 2 weeks 	
ENDURING UNDERSTANDING(S) <ul style="list-style-type: none"> Career planning and preparation requires self assessment and involves informed responsible decision making during high school and beyond. 	ESSENTIAL QUESTION(S) <ul style="list-style-type: none"> What job / career are best for me? What is needed for a job / career? How can I prepare for a job / career? How I become a life long learner?
LEARNING OBJECTIVES The students will: <ul style="list-style-type: none"> 5.1 Identify the differences between a career and a job. 5.2 Compare and contrast various career clusters. 5.3 Interpret results from self assessment to choose a career. 5.4 Develop a career plan (road map). 5.5 Research a career. 5.6 Present career information in a career fair format. 5.7 Explore agriculture careers during career fair presentations in a format where all agricultural careers clusters are represented. 	INSTRUCTIONAL SUPPORT MATERIALS <ul style="list-style-type: none"> <i>Career Exploration Inventory</i> published by JIST Works, John J. Liptak Choices program Career planning notebook Poster board, computer Research materials SUGGESTED INSTRUCTIONAL STRATEGIES <ul style="list-style-type: none"> Complete Career Exploration Inventory (CEI) Including the following 16 career clusters: Agriculture and Natural Resources; Architecture and Construction; Arts and Communication; Business and Administration; Education and Training; Finance and Insurance; Government and Public Administration; Health Science; Hospitality, Tourism, and Recreation; Human Service; Information Technology; Law and Public Safety; Manufacturing; Retail and Wholesale Sales and Service; Scientific Research, Engineering and Mathematics; Transportation and Distribution and Logistics Define vocabulary related to careers Facilitate students with developing a personal roadmap Guest speakers related to career clusters Integrate LHHS guidance / use roadmap as component to LHHS scheduling Create a web of self List career characteristics – Such as: <ul style="list-style-type: none"> What does the job entail (specific tasks) Salary / Benefits Hours / time requirement Education, training, apprenticeships, etc.

- Travel
- Level of difficulty (How hard is the work)
- Working conditions
- Professionalism – advancements, certificates, licenses, organizations
- Life style
- Career Fair – freshman research and prepare visual to share at career fair
- Complete self reflection of career choices
- Conduct an informational interview

SUGGESTED ASSESSMENT METHODS

- Career exploration portfolio
- Display board for career fair
- Road map
- Interview summary
- Self reflection

LEARNING STRAND

6.0 Houseplants

- Approximately 5 weeks

ENDURING UNDERSTANDING(S)

- House plants are an integral part of interior settings and many related factors determine how these plants thrive in interior settings.

ESSENTIAL QUESTION(S)

- What is necessary to keep houseplants healthy?
- What environmental factors are necessary to keep plants thriving in an interior setting?
- What are common causes of “unhealthy” plants?
- How are plants used in interior settings?
- How do you identify an unknown plant?
- How do you propagate and transplant?

LEARNING OBJECTIVES – The students will:

- 6.1 Use characteristics to identify common houseplants.
- 6.2 Compare and contrast cultural requirements necessary for the health of different houseplants:
 - water
 - light
 - humidity
 - soil
 - fertilizer
- 6.3 Demonstrate how to correctly transplant house plants.
- 6.4 Explain when, why, and how to transplant.
- 6.5 Demonstrate how to correctly propagate plants.
- 6.6 Explain when, why, and how to propagate plants.
- 6.7 Distinguish the decorative use and functionality of different plants in interior settings.
- 6.8 Distinguish cause(s) of “unhealthy” plants based on multiple observations and recommend treatment. (Insects, daily care, environment, disease, etc.)
- 6.9 Evaluate biological, mechanical, and chemical methods for insect control.
- 6.10 Evaluate the different types and methods of fertilizer. Including:
 - Organic vs inorganic
 - Ratio and function of nitrogen, phosphorus, and potassium
 - Application – water soluble, slow

INSTRUCTIONAL SUPPORT MATERIALS

- Assorted potting and planting materials, containers, greenhouse and supplies
- Assorted interior houseplants
- Assorted fertilizers

SUGGESTED INSTRUCTIONAL STRATEGIES

- Field trip to local greenhouse
- Discuss the scientific name of some common house plants
- Use plants and pictures to demonstrate how to identify different plants based on their characteristics such as: variegated leaf, leaf texture, leaf shape, stem, cane, flower (shape, color, etc.), habit (cascade, upright, etc.) height, seasonality, seed, etc.
- Discuss how plants are used to decorate in malls, businesses, and homes
- Discuss how plants serve different functions such as; reduce noise, traffic patterns, absorb odors, aesthetics, privacy, etc.
- Compare and contrast numerous commercially available fertilizers and discuss the N-P-K levels
- Vocabulary reinforcement activities
- Apply different fertilizers using different application methods
- Explore related careers
- Have students create a PowerPoint presentation on demonstrating the indigenous environment of a tropical plant group, their characteristics and how they are adapted to

<p>release, foliar feed, etc.</p> <ul style="list-style-type: none"> • Time of year • Plant requirements 	<p>their environment. How do you replicate this type of environment in an interior planting?</p> <ul style="list-style-type: none"> • Transplant and propagate plants • Plant Doctor – diagnosing the health of interior plants and make recommendations <ul style="list-style-type: none"> o Students design a flier/questionnaire with specific questions related to how the plant is currently being cared for o Teachers are asked to complete the questionnaire and submit a sample of the unhealthy plant to the students o Students diagnose problem and provide recommendations on how to improve the health of the plant. <p><u>SUGGESTED ASSESSMENT METHODS</u></p> <ul style="list-style-type: none"> • Contribute articles for a houseplant newsletter • Develop A Plant Doctor questionnaire • Answer to A Plant Doctor requests • Design an insect identification fan deck or troubleshooting guide for unhealthy plants • Portfolio may include: <ul style="list-style-type: none"> • Unit skill sheet • Plant Doctor questionnaire and response • Fan deck / trouble shooting guide
--	---

LEARNING STRAND

7.0 Soils and Vegetables

- Approximately 4 weeks

ENDURING UNDERSTANDING(S)

- Many variables influence successful starting, growing, and harvesting of plants for the home vegetable garden.

ESSENTIAL QUESTION(S)

- What is required for successful plant growth?
- What are characteristics of a healthy garden soil?
- What is involved in starting, growing and transplanting spring greenhouse crops?
- What is required for a successful home vegetable garden?
- What safety precautions should be observed when using chemicals in the home garden?

LEARNING OBJECTIVES – The students will:

- 7.1 State functions of soil properties such as: pH, nitrogen, phosphorus and potassium
- 7.2 Test and evaluate soil samples for pH, nitrogen, phosphorus, and potassium.
- 7.3 Investigate the effect of adding lime and aluminum sulfate on the pH of soil.
- 7.4 Explore appropriate soil requirements for different home vegetable crops.
- 7.5 Classify soils based up the percentage of sand, silt and clay (soil texture).
- 7.6 Investigate and predict the effect of temperature on seed germination.
- 7.7 Demonstrate correct planting procedures for vegetable seeds.
- 7.8 Demonstrate correct transplanting skills.
- 7.9 Summarize how to plant, grow and harvest a vegetable.
- 7.10 Identify ten unusual home garden vegetables.
- 7.11 Evaluate pesticide MSDS sheets.
- 7.12 Construct a home garden plan for planting vegetables planning for row size, yield, growing time, crop succession, etc.

INSTRUCTIONAL SUPPORT MATERIALS

- Soil texture triangle
- Soil test kits
- Seed catalogs
- MSDS sheets
- Greenhouse/growing materials/seeds
- Fertilizer, lime and aluminum sulfate

SUGGESTED INSTRUCTIONAL STRATEGIES

- Classify soils using soil texture triangle
- Perform soil tests
- Perform and analyze a seed germination experiment
- Plant vegetable seeds in greenhouse
- Use a seed catalog to select appropriate seeds for location and consumer use
- Purchase unusual vegetables to discuss, identify and sample vegetables found in the marketplace
- Explain information found on MSDS sheet
- Brainstorm vegetable types
- Model how to draw vegetable garden to scale

SUGGESTED ASSESSMENT METHODS

- Analysis and conclusion of soil testing
- Quizzes and tests
- Evaluation of class exercises
- Portfolio products may include:
 - Seed germination experiment
 - Home garden drawing and written explanation
 - Skill sheet

<u>LEARNING STRAND</u>	
8.0 Plumbing <ul style="list-style-type: none"> • Approximately 4 weeks 	
<u>ENDURING UNDERSTANDING(S)</u> <ul style="list-style-type: none"> • Skilled and safe use of materials and equipment will result in quality construction and a satisfied client. 	<u>ESSENTIAL QUESTION(S)</u> <ul style="list-style-type: none"> • What safety precautions must be used in a shop setting? • How are different pipe materials attached? • Why are different pipes attached differently?
<u>LEARNING OBJECTIVES</u> – The students will: <p>8.1 Demonstrate the appropriate and safe use of plumbing tools such as:</p> <ul style="list-style-type: none"> • Tubing cutters • Torch and soldering material • Hack saw • Reamer • Thread cutter <p>8.2 Identify different types of pipe (copper, galvanized, & pvc) used in plumbing and different types of plumbing fittings (unions, bushings, valves, & adapters)</p> <p>8.3 Accurately measure and cut different lengths of pipe to predetermined dimensions using the appropriate tools correctly.</p> <p>8.4 Demonstrate how to prepare and solder a copper pipe that results in a sealed fitting.</p> <p>8.5 Use a thread cutter correctly to create threads on a galvanized pipe.</p> <p>8.6 Demonstrate how to prepare and cement a PVC pipe resulting in a sealed fitting.</p> <p>8.7 Locate and repair leaky fittings.</p>	<u>INSTRUCTIONAL SUPPORT MATERIALS</u> <ul style="list-style-type: none"> • Appropriate equipment and materials including: tubing cutters, torch and soldering material, hack saw, reamer, thread cutter, vises, tape measures, etc. • Appropriate safety equipment and attire including goggles <u>SUGGESTED INSTRUCTIONAL STRATEGIES</u> <ul style="list-style-type: none"> • Teacher demonstrations/modeling <ul style="list-style-type: none"> • Accurate measurements • Cutting • Threading • Soldering • Cementing • Repairing leaks • Writing assignment – write an advice column for a popular trade magazine answering questions posed by readers <u>SUGGESTED ASSESSMENT METHODS</u> <ul style="list-style-type: none"> • Project checklist • Portfolio may include: <ul style="list-style-type: none"> • Skill sheet • Photo of student and completed project • Writing assignment

LEARNING STRAND

9.0 Tractor Driving

- Approximately 4 weeks

ENDURING UNDERSTANDING(S)

- Safe operation of tractor and equipment is essential to enhance driving skills and ensure safety.
- Learned skills and safety procedures will transfer to allow students to confidently operate many different types of equipment.

ESSENTIAL QUESTION(S)

- What is safe tractor operation?
- What precautions are necessary when driving a tractor?
- How does attaching an implement change driving a tractor?
- How does backing up a tractor differ from driving forward?

LEARNING OBJECTIVES – The students will:

- 9.1 Evaluate surroundings and determine acceptable speeds for conditions and skill level required.
- 9.2 Demonstrate proper procedure for starting a tractor.
- 9.3 Select proper gear range for attached load.
- 9.4 Identify parts and function of the tractor important for safe operation.
- 9.5 Demonstrate backing up a tractor into a designated space with and without an implement.
- 9.6 Demonstrate hitching up equipment safely to a tractor.
- 9.7 Demonstrate driving through an obstacle course with an attached implement.
- 9.8 Operate a backhoe safely and efficiently.

INSTRUCTIONAL SUPPORT MATERIALS

- Tractors
- Two wheel wagon
- Four wheel wagon
- Various three point hitch mounted implements
- Owner’s manuals
- Tools and supplies
- Obstacle course location and materials

SUGGESTED INSTRUCTIONAL STRATEGIES

- Review and model safety procedures and rules
- Set up driving course for students to practice driving forward and backing up tractor
- Demonstrate pre-trip checkup
- Peer- instruct others on the safe operation of a tractor
- Writing assignments:
 - Personal letter
 - Procedural writing
 - Safety precautions

SUGGESTED ASSESSMENT METHODS

- Teacher checklist:
 - Start up tractor
 - Back up a tractor into a parking spot
 - Back up tractor and implement into a parking space
 - Drive tractor and implement through an obstacle course
 - Back up tractor and hook up to an implement

- Peer-assessments using checklist
- Portfolio products may include:
 - Driving Rubric
 - Tractor safety assessment
 - Work sample picture and caption
 - Writing assignment