

## Wallingford Public Schools - HIGH SCHOOL COURSE OUTLINE

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| <b>Course Title:</b> Agricultural Mechanics / Turf Management 1   | <b>Course Number:</b> 8753  |
| <b>Department:</b> Agriculture Education  | <b>Grade(s):</b> 9  |
| <b>Level(s):</b> Academic   | <b>Credit:</b> 1  |
| <b>Course Description</b><br>Freshman course work introduces students to tractor driving, soils and turf management, plumbing, welding and cold metal work, wood working, and athletic field layout. Students will be introduced to and participate in the Lyman Hall Chapter of the national organization, FFA. Students will start to develop a portfolio and skills to prepare for future careers in agricultural mechanics and turf management. |   |
| <b>Required Instructional Materials</b><br>Sufficient Hands-on Materials  | <b>Completion/Revision Date</b><br>Approved by Board of Education<br>October 15, 2007 |

### Mission Statement of the Curriculum Management Team

The mission of the Career and Technical Education Curriculum Management Team is to ensure 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 life long 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.
- Safe operation of tractors 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.
- Many variables influence successful starting, growing and maintenance of plants
- Soil properties dictate the success of plant growth and can be remediated to improve the outcome.
- Skilled and safe use of materials and equipment will result in quality construction and a satisfied client.
- Career planning and preparation requires self assessment and involves informed responsible decision making during high school and beyond.
- Recreational field dimensions and turf coverage vary based on the individual sport, space available and other variables.
- Proper design and maintenance of sports fields helps to foster safe and fair competition.

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

**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

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

**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
- Title page
- Table of contents
- Summer summary
- SAE hours

**INSTRUCTIONAL SUPPORT MATERIALS**

- FFA manual
- [www.ffa.org](http://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:
  - 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

- SAE planning forms
- Agricultural inventory

- Writing sample about the FFA Code of Ethics

**LEARNING STRAND**

3.0 Tractor Driving

- Approximately 4 weeks

**ENDURING UNDERSTANDING(S)**

- Safe operation of tractors 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:

- 3.1 Evaluate surroundings and determine acceptable speeds for conditions and skill level required.
- 3.2 Demonstrate proper procedure for starting a tractor.
- 3.3 Select proper gear range for attached load.
- 3.4 Identify parts and function of the tractor important for safe operation.
- 3.5 Demonstrate backing up a tractor into a designated space with and without an implement.
- 3.6 Demonstrate hitching up equipment safely to a tractor.
- 3.7 Demonstrate driving through an obstacle course with an attached implement.
- 3.8 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

**LEARNING STRAND**

4.0 Soils

- Approximately 4 weeks

**ENDURING UNDERSTANDING(S)**

- Many variables influence successful starting, growing and maintenance of plants.
- Soil properties dictate the success of plant growth and can be remediated to improve the outcome.

**ESSENTIAL QUESTION(S)**

- What is soil?
- What effect will nutrient corrections have on plant growth?
- What is required for successful plant growth?
- What are characteristics of a healthy soil?
- What safety precautions should be observed when using chemicals in the soil?

**LEARNING OBJECTIVES** The students will:

- 4.1 State functions of soil properties such as: pH, nitrogen, phosphorus and potassium.
- 4.2 Demonstrate the correct method for soil sample collection.
- 4.3 Test and evaluate soil samples for pH, nitrogen, phosphorus and potassium.
- 4.4 Investigate the effect of adding lime and aluminum sulfate on the pH of soil.
- 4.5 Explore appropriate soil requirements for plants.
- 4.6 Classify soils based upon the percentage of sand, silt and clay (soil texture)
- 4.7 Determine safety precautions of fertilizer based on MSDS sheets.
- 4.8 Interpret a fertilizer bag label
- 4.9 Interpret a soil survey map.
- 4.10 Investigate water holding capability and analyze results.

**INSTRUCTIONAL SUPPORT MATERIALS**

- Soil texture triangle
- Soil test kits
- MSDS sheets
- Fertilizer, lime and aluminum sulfate
- Sample soil survey maps
- Assorted labels from different kinds of fertilizers

**SUGGESTED INSTRUCTIONAL STRATEGIES**

- Classify soils using soil using soil texture triangle
- Perform soil tests
- Explain information found on MSDS sheet
- Model how to correctly collect soil samples for testing
- Experiment on the effect of lime and aluminum sulfate
- Discuss compaction and aeration

**SUGGESTED ASSESSMENT METHODS**

- Analysis and conclusion of soil testing
- Quizzes and tests
- Evaluation of class exercises
- Portfolio products may include:
  - Lab report on soil analysis
  - Photo and description of class activity related to soils



## **LEARNING STRAND**

### 5.0 Plumbing

- Approximately 4 weeks

#### **ENDURING UNDERSTANDING(S)**

- Skilled and safe use of materials and equipment will result in quality construction and a satisfied client.

#### **ESSENTIAL QUESTION(S)**

- What safety precautions must be used in a shop setting?
- How are different pipe materials attached?
- Why are different pipes attached differently?
- Why are different types of pipe materials used?

#### **LEARNING OBJECTIVES** – The students will:

- 5.1 Identify different types of pipe (copper, galvanized, & pvc) used in plumbing and different types of plumbing fittings (unions, bushings, valves, & adapters)
- 5.3 Accurately measure and correctly cut different lengths of pipe to predetermined dimensions using the appropriate tools.
- 5.4 Demonstrate how to prepare and solder a copper pipe resulting in a sealed fitting.
- 5.5 Use a thread cutter to create threads on a galvanized pipe.
- 5.6 Demonstrate how to prepare and cement a pvc pipe resulting in a sealed fitting.
- 5.7 Locate and repair improperly installed fittings.

#### **INSTRUCTIONAL SUPPORT MATERIALS**

- 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

#### **SUGGESTED INSTRUCTIONAL STRATEGIES**

- Teacher demonstrations/modeling
  - Accurate measurements
  - Cutting
  - Threading
  - Soldering
  - Cementing
  - Repairing leaks
- Demonstrate the appropriate and safe use of plumbing tools such as:
  - Tubing cutters
  - Torch and soldering material
  - Hack saw
  - Reamer
  - Thread cutter
- Writing assignment – write an advice column for a popular trade magazine answering questions posed by readers

#### **SUGGESTED ASSESSMENT METHODS**

- Project checklist
- Portfolio may include:
  - Skill sheet
  - Photo of student and completed project
  - Writing assignment

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| <b><u>LEARNING STRAND</u></b>  |  |
| 6.0 Career Exploration <ul style="list-style-type: none"> <li>Approximately 2 weeks</li> </ul>   |  |
| <b><u>ENDURING UNDERSTANDING(S)</u></b>  | <b><u>ESSENTIAL QUESTION(S)</u></b>  |
| <ul style="list-style-type: none"> <li>Career planning and preparation requires self assessment and involves informed responsible decision making during high school and beyond.</li> </ul>  | <ul style="list-style-type: none"> <li>What job / career are best for me?</li> <li>What is needed for a job / career?</li> <li>How can I prepare for a job / career?</li> <li>How I become a life long learner?</li> </ul>   |
| <b><u>LEARNING OBJECTIVES</u></b> The students will:   | <b><u>INSTRUCTIONAL SUPPORT MATERIALS</u></b>  |
| 6.1 Identify the differences between a career and a job.<br>6.2 Compare and contrast various career clusters.<br>6.3 Interpret results from self assessment to choose a career.<br>6.4 Develop a career plan (road map).<br>6.5 Research a career.<br>6.6 Present career information in a career fair format.<br>6.7 Explore agriculture careers during career fair presentations in a format where all agricultural careers clusters are represented. | <ul style="list-style-type: none"> <li><i>Career Exploration Inventory</i> published by JIST Works, John J. Liptak</li> <li>Choices program</li> <li>Career planning notebook</li> <li>Poster board, computer</li> <li>Research materials</li> </ul>   |
|  | <b><u>SUGGESTED INSTRUCTIONAL STRATEGIES</u></b>   |
|  | <ul style="list-style-type: none"> <li>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</li> <li>Define vocabulary related to careers</li> <li>Facilitate students with developing a personal roadmap</li> <li>Guest speakers related to career clusters</li> <li>Integrate LHHS guidance / use roadmap as component to LHHS scheduling</li> <li>Create a web of self</li> <li>List career characteristics – Such as: <ul style="list-style-type: none"> <li>What does the job entail (specific tasks)</li> <li>Salary / Benefits</li> <li>Hours / time requirement</li> <li>Education, training, apprenticeships, etc.</li> <li>Travel</li> <li>Level of difficulty (How hard is the</li> </ul> </li> </ul> |

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|  | <p>work)</p> <ul style="list-style-type: none"><li>○ Working conditions</li><li>○ Professionalism – advancements, certificates, licenses, organizations</li><li>○ Life style</li></ul> <ul style="list-style-type: none"><li>• Career Fair – freshman research and prepare visual to share at career fair</li><li>• Complete self reflection of career choices</li><li>• Conduct an informational interview</li></ul> <p><b><u>SUGGESTED ASSESSMENT METHODS</u></b></p> <ul style="list-style-type: none"><li>• Career exploration portfolio</li><li>• Display board for career fair</li><li>• Road map</li><li>• Interview summary</li><li>• Self reflection</li></ul> |
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**LEARNING STRAND**

7.0 Cold Metal/Welding

- Approximately 5 weeks

**ENDURING UNDERSTANDING(S)**

- Skilled and safe use of materials and equipment will result in quality construction and a satisfied client.
- Learned skills and safety procedures will transfer to allow students to confidently operate many different types of equipment.

**ESSENTIAL QUESTION(S)**

- What safety precautions must be used in a shop setting?
- How are different tools used to cut and shape metal?
- What different types of welders can be used to weld mild steel?

**LEARNING OBJECTIVES** – The students will:

7.1 Demonstrate the appropriate and safe use of metal/welding tools such as:

- Bench grinder
- Horizontal bandsaw
- Oxy-acetylene torch
- Plasma cutter
- Arc welder
- MIG welder
- Angle grinder
- Tap set

7.2 Demonstrate how to effectively and safely cut mild steel.

- Properly set up and light a oxy-acetylene torch
- Adjust the cutting flame

7.3 Demonstrate effective and safe welding techniques.

- Select the proper welding rod
- Properly set up an electric arc welder
- Strike the arc
- Maintain the welding arc and form a bead

7.4 Weld two pieces of mild steel together using the following welds:

- Lap
- Butt
- T
- Corner
- Edge

**INSTRUCTIONAL SUPPORT MATERIALS**

- Appropriate equipment and materials including: bench grinder, horizontal bandsaw, oxy-acetylene torch, plasma cutter, arc welder, MIG welder, angle grinder, and tap set.
- Appropriate safety equipment and attire including goggles, welding helmet, gloves, leggings, and aprons
- Sample welded materials

**SUGGESTED INSTRUCTIONAL STRATEGIES**

- Teacher demonstrations/modeling:
  - Accurate measurements
  - Use of bench grinder and angle grinder
  - Torch set up and use
  - Arc welder set up and use
  - MIG welder set up and use
  - Tap use
- Writing assignment-write an advice column for a popular trade magazine answering questions posed by readers

**SUGGESTED ASSESSMENT METHODS**

- Project checklists
- Peer assessments
- Teacher observation of techniques
- Portfolio may include:
  - Skill sheet
  - Photo of student and completed project
  - Writing assignment

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| <b><u>LEARNING STRAND</u></b>  |   |
| 8.0 Woodworking <ul style="list-style-type: none"> <li>• Approximately 5 weeks</li> </ul>  |   |
| <b><u>ENDURING UNDERSTANDING(S)</u></b>  | <b><u>ESSENTIAL QUESTION(S)</u></b>   |
| <ul style="list-style-type: none"> <li>• Skilled and safe use of materials and equipment will result in quality construction and a satisfied client.</li> </ul>  | <ul style="list-style-type: none"> <li>• What does a quality wood project look like?</li> <li>• What safety precautions must be used in a shop setting?</li> <li>• How are different tools used to cut and finish wood?</li> </ul>  |
| <b><u>LEARNING OBJECTIVES</u></b> – The students will:   | <b><u>INSTRUCTIONAL SUPPORT MATERIALS</u></b>   |
| 8.1 Demonstrate the appropriate and safe use of woodworking tools such as: <ul style="list-style-type: none"> <li>• Hand saws</li> <li>• Drills and appropriate bits</li> <li>• Portable sanders</li> <li>• Jointer</li> <li>• Planer</li> <li>• Band saw</li> <li>• Table saw</li> </ul> 8.2 Select appropriate lumber for a project based on the properties of the lumber and the cost. 8.3 Read a ruler to within 1/16” to accurately measure and cut. 8.4 Perform mathematical computations (board footage and cost of materials) 8.5 Interpret working drawing to construct a simple project utilizing skills: <ul style="list-style-type: none"> <li>• Read a woodworking bill of materials</li> <li>• Measure and cut boards to specifications</li> <li>• Assemble a project with adhesive and fasteners</li> <li>• Prepare a wood project to apply a finish</li> <li>• Apply a finish</li> </ul> | <ul style="list-style-type: none"> <li>• Band saw, table saw, sliding compound miter saw, jointer, sanders, surface planer, router table, fasteners, glue, measuring tapes, etc.</li> <li>• Project lumber</li> <li>• Appropriate safety equipment and attire including goggles</li> <li>• Assorted simple wood project plans</li> </ul><br><b><u>SUGGESTED INSTRUCTIONAL STRATEGIES</u></b> <ul style="list-style-type: none"> <li>• Review and post safety rules</li> <li>• Model safe and appropriate technique of tools</li> <li>• Practice use of tools and techniques on scrap lumber</li> <li>• Model how to counter sink screws, pre-drill holes and avoid splitting the wood or stripping the screw</li> <li>• Discuss different lumber kinds, their properties and cost</li> <li>• Visit local lumber yard</li> <li>• Calculate the cost of a simple project, such as an engine stand, if it was made from different types of wood such as pine, oak, maple, etc.</li> <li>• Model how to cut lumber for project and practice on scarp lumber</li> <li>• Discuss poor techniques and how to correct the error, such as stripped screws, broken screws, split wood, etc.</li> <li>• Writing assignment – Procedural writing explaining how to construct a wood project correctly and to avoid common mistakes</li> </ul><br><b><u>SUGGESTED ASSESSMENT METHODS</u></b> <ul style="list-style-type: none"> <li>• Project checklists</li> <li>• Teacher observation of techniques</li> <li>• Sample wood projects</li> </ul> |

- Portfolio may include:
  - Skill sheet
  - Work sample picture and caption
  - Writing assignment

**LEARNING STRAND**

9.0 Athletic Field Layout

- Approximately 5 weeks

**ENDURING UNDERSTANDING(S)**

- Recreational field dimensions and turf coverage vary based on the individual sport, space available and other variables.
- Proper design and maintenance of sports fields helps to foster safe and fair competition.

**ESSENTIAL QUESTION(S)**

- How do you effectively use field grooming equipment?
- How do you ensure that a playing field is in the ultimate playing condition?
- What information can surveying equipment provide?
- How can I translate field notes into an accurate drawing?
- What/how maintenance must be performed on a machine to ensure peak performance?

**LEARNING OBJECTIVES** – The students will:

9.1 Demonstrate safe and efficient use of field maintenance equipment, including:

- Toro 5020 infield groomer
- Zero turn riding mower
- Walk-behind mower
- Athletic field marker
- Gas engine edger

9.2 Demonstrate efficient use of surveying equipment, including:

- Builder’s level
- Laser transit
- Surveying rod
- 200’ tape and chaining pins

9.3 Record accurate surveying field notes.

9.4 Construct scale drawing of athletic field based on field measurements.

9.5 Perform necessary equipment maintenance and repair including:

- oil changes
- lubricating
- sharpen blades

**INSTRUCTIONAL SUPPORT MATERIALS**

- Assorted athletic field grooming equipment
- Maintenance/repair tools and supplies
- Surveying equipment
- Availability of soccer, football, baseball and softball fields
- Drawing materials

**SUGGESTED INSTRUCTIONAL STRATEGIES**

- Demonstrate proper use of field grooming equipment
- Demonstrate proper use of surveying equipment
- Model how to take accurate surveying measurements and how to interpret this data
- Model how to construct scale drawings including mini lessons on triangulation, accurate measurements, ruler reading, drawing on graph paper, etc.
- Hands-on learning using the equipment to perform maintenance and repair work
- Visit and map football, baseball, softball and soccer fields

**SUGGESTED ASSESSMENT METHODS**

- Exercises on adding subtracting fractions
- Quiz on the correct terminology and function of the equipment parts
- Equipment operation checklists
- Athletic field drawing rubric
- Team final exam - properly groom and edge field without teacher guidance
- Portfolio items may include:
  - Skill sheet

- Work sample picture and caption
- Athletic field drawing