

## Course Title: Power Equipment Technology

<b>Unit 1:</b>	<b>Careers</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Identify career opportunities in power equipment technology.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Understand the vast scope of careers in the power equipment field.</li> <li>2. Identify career opportunities in the power equipment field.</li> <li>3. Discuss educational requirements.</li> <li>4. Discuss working conditions.</li> <li>5. Fill out job applications and write résumés.</li> <li>6. Discuss the history of the power equipment industry.</li> <li>7. Determine how power equipment knowledge may be used to earn a living.</li> <li>8. Identify mechanical skills that can be used in equipment repair.</li> <li>9. Describe the relationship between mechanical applications and success in agricultural occupations.</li> </ol>
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<b>Essential Question(s):</b>	What are some of the jobs in the power equipment industry besides engine mechanics?
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Content Knowledge	Suggested Instructional Activities Rigor & Relevance Framework (Quadrant)	Suggested Materials, Equipment and Technology Resources
<ol style="list-style-type: none"> <li>I. Mechanical knowledge requirements</li> <li>II. Work place skills</li> <li>III. Business management skills</li> <li>IV. Applications and resumes</li> <li>V. Tool knowledge</li> </ol>	<p>Lecture Worksheets Textbook examples Demonstrations Student research Student practice</p>	<p>Textbooks Handouts PowerPoint Computer/projector Guest speaker</p>

<b>Unit Assessment:</b>	Presentation of careers to class
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<b>Unit/Course CTSO Activity:</b>	FFA Small Engines Career Development Event (CDE), FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency (SAE)
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<b>Unit/Course Culminating Product:</b>	Students will gain insight into career opportunities in power equipment through the development of a career class presentation.
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<b>Course/Program Credential(s):</b> <input type="checkbox"/> Credential <input type="checkbox"/> Certificate <input checked="" type="checkbox"/> Postsecondary Degree <input type="checkbox"/> University Degree <input type="checkbox"/> Other:
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**Course Title: Power Equipment Technology**

<b>Unit 2:</b>	<b>Safety</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>2. Explain safety procedures for working with power equipment systems.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Explain the meaning of safety.</li> <li>2. Identify high hazard areas.</li> <li>3. Explain and demonstrate the use of appropriate personal protective equipment.</li> <li>4. Demonstrate and explain general hand- and power-tool safety.</li> <li>5. Recall general shop rules to be followed while in the shop.</li> <li>6. Explain shop safety color-coding system.</li> <li>7. Demonstrate knowledge of fire prevention and control methods.</li> </ol>
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<b>Essential Question(s):</b>	What are the legal and social reasons for learning to prevent shop accidents?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
<ol style="list-style-type: none"> <li>I. Meaning/Importance of shop safety</li> <li>II. High hazard areas</li> <li>III. PPE</li> <li>IV. Hand and Power Tool Safety</li> <li>V. Shop Rules</li> <li>VI. Safety Colors</li> <li>VII. Fire Safety</li> <li>VIII. Equipment operation and safety</li> </ol>	<p>Lecture/demonstration Worksheets Laboratory/shop safety tour Hazard identification tour Safe tool operation demonstration Pretest/Posttest</p>	<p>Guest speaker PowerPoint/ Projector Textbooks Quizzes Web sites Handouts Hand and power tools Videos MSDS PPE Safety Posters</p>

<b>Unit Assessment:</b>	Participation in class discussion, participation in shop hazard identification, and shop safety test (100% mastery)
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<b>Unit/Course CTSO Activity:</b>	Incorporate safety practices into student's SAE project, FFA Small Engines CDE, FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency.
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<b>Unit/Course Culminating Product:</b>	Students will master shop safety by identifying mock safety hazards in the shop and by passing the safety portion of the lesson with a 100 on the shop safety test.
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<b>Course/Program Credential(s):</b> <input type="checkbox"/> Credential <input type="checkbox"/> Certificate <input checked="" type="checkbox"/> Postsecondary Degree <input type="checkbox"/> University Degree <input type="checkbox"/> Other:
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**Course Title: Power Equipment Technology**

<b>Unit 3:</b>	<b>Tools</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>Differentiate among common tools used with hydraulic and pneumatic systems. Examples: mechanical tools, hose crimpers</li> <li>Identify common test equipment used with hydraulic and pneumatic systems. Examples: gauges, flow meters</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>Properly identify tools used in hydraulic and pneumatic applications.</li> <li>Properly identify testing equipment for hydraulic and pneumatic systems.</li> <li>Demonstrate proper use of hydraulic and pneumatic testing equipment.</li> </ol>
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<b>Essential Question(s):</b>	What machines do you see on your way to and from school that use hydraulics and pneumatics?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
<ol style="list-style-type: none"> <li>I. Hydraulic tool identification</li> <li>II. Hydraulic test equipment identification</li> <li>III. Pneumatic tool identification</li> <li>IV. Pneumatic testing equipment identification</li> <li>V. Hydraulic and pneumatic testing readings and calculations</li> </ol>	<p>Lecture                      Demonstration                      Handout/worksheet                      Hands on use by students                      Group activities</p>	<p>Examples of hydraulic tools                      Examples of pneumatic tools                      Example of hydraulic and pneumatic testing equipment                      Textbooks                      PowerPoint                      Computer/projector                      Handouts</p>

<b>Unit Assessment:</b>	Master tool identification and calculations of testing equipment on hydraulic and pneumatic tool systems
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**Unit/Course  
CTSO Activity:**

FFA Small Engines CDE, FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency

**Unit/Course  
Culminating  
Product:**

Students will demonstrate the use of common tools and test equipment used with hydraulic and pneumatic systems.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree

Other:

**Course Title: Power Equipment Technology**

<b>Unit 4:</b>	<b>Hydraulics</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>4. Identify systems in power equipment that utilize hydraulics.</li> <li>5. Distinguish between single-acting and double-acting hydraulic cylinders.</li> <li>6. Describe components of a hydraulic system.</li> <li>7. Explain how a hydraulic system works.             <ul style="list-style-type: none"> <li>• Diagnose problems with a hydraulic system</li> <li>• Solving problems found in a hydraulic system</li> </ul> </li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Compare hydraulic systems.</li> <li>2. Identify basic theories applying to fluid dynamics.</li> <li>3. Describe fluid power principles.</li> <li>4. Discuss fluid characteristics.</li> <li>5. Identify major components of a fluid system.</li> <li>6. Use and maintain fluid power equipment.</li> <li>7. Understand basic hydraulic system terminology.</li> </ol>
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<b>Essential Question(s):</b>	List and describe hydraulic systems that affect our everyday lives?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
<ol style="list-style-type: none"> <li>I. Parts of the hydraulic system</li> <li>II. Hydraulic system terminology</li> <li>III. Nature of hydraulic fluids</li> <li>IV. Pascal's law</li> <li>V. Bernoulli's theorem</li> <li>VI. Measuring pressure</li> <li>VII. Fluid additives</li> <li>VIII. Fluid ratings</li> <li>IX. Hydraulic pumps</li> <li>X. Fluid Couplings</li> <li>XI. Hydraulic hoses</li> <li>XII. Valves</li> </ol>	<p>Lecture Worksheets Textbook examples Demonstrations Student research Student practice</p>	<p>Textbooks Handouts PowerPoint Computer/projector Examples of hydraulic components Hydraulic system displays</p>

XIII. Filtering Systems XIV. Cylinders XV. Hydraulic motors XVI. System maintenance		
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<b>Unit Assessment:</b>	Calculate hydraulic pressures, demonstrate Pascal's law, service hydraulic systems
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<b>Unit/Course CTSO Activity:</b>	FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency
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<b>Unit/Course Culminating Product:</b>	Students will develop a presentation of how a hydraulic system works.
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<b>Course/Program Credential(s):</b> <input type="checkbox"/> Credential <input type="checkbox"/> Certificate <input checked="" type="checkbox"/> Postsecondary Degree <input type="checkbox"/> University Degree <input type="checkbox"/> Other:
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**Course Title: Power Equipment Technology**

<b>Unit 5:</b>	<b>Pneumatics</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>9. Identify parts of a pneumatic system.</li> <li>10. Explain how a pneumatic system works.             <ul style="list-style-type: none"> <li>• Diagnosing problems with a pneumatic system</li> <li>• Solving problems found in a pneumatic system</li> </ul> </li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Understand nature of pneumatics.</li> <li>2. Understand Boyles law.</li> <li>3. Explain how a pneumatic system works.</li> <li>4. Diagnose and correct problems with pneumatic systems.</li> </ol>
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<b>Essential Question(s):</b>	How does a pneumatic system differ from a hydraulic system?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
I. Operation of pneumatic systems II. Boyle's law III. Pneumatic system problems	Lecture Student practice Worksheets Demonstration Group practice	PowerPoint Computer/projector Textbooks Worksheets Examples of pneumatic systems

<b>Unit Assessment:</b>	Calculate pressures and problems using Boyle's Law, diagnose and repair pneumatic system problems.
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**Unit/Course  
CTSO Activity:**

FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency (SAE)

**Unit/Course  
Culminating  
Product:**

Students will repair a pneumatic control system.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree

Other:

**Course Title: Power Equipment Technology**

<b>Unit 6:</b>	<b>Drive Trains</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>11. Identify power equipment drive train components and the functions of each.</li> <li>12. Diagnose power equipment clutch and transmission problems.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Explain the meaning and components of a drive train.</li> <li>2. Describe how to maintain a transmission and drive train.</li> <li>3. Differentiate types of transmission fluid.</li> <li>4. Describe how to service the drive train.</li> </ol>
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<b>Essential Question(s):</b>	Why are drive trains so important to machines?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
<ol style="list-style-type: none"> <li>I. Drive train terminology.</li> <li>II. Clutches</li> <li>III. Transmissions</li> <li>IV. Differential</li> <li>V. Final Drive</li> <li>VI. Drive Wheels</li> <li>VII. Power Take Off (PTO)</li> <li>VIII. Maintaining Drive Trains</li> <li>IX. Transmission fluids</li> <li>X. Servicing transmissions, differentials, and final drives</li> </ol>	<p>Lecture            Teacher demonstration            Chapter activities            Student projects            Group work            Research Project</p>	<p>PowerPoint            Computer/projector            Textbook            Shop/Service Manuals            Examples of clutches, transmissions, differentials, final drives, PTOs, Transmission fluids</p>

<b>Unit Assessment:</b>	Identify drive train components, service transmissions, and select proper fluids for drive trains.
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**Unit/Course  
CTSO Activity:**

FFA Agricultural Mechanics CDE, FFA Small Engines CDE, Agricultural Mechanics Proficiency (SAE)

**Unit/Course  
Culminating  
Product:**

Students will troubleshoot power equipment clutch and transmission problems.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree  
 Other:

**Course Title: Power Equipment Technology**

<b>Unit 7:</b>	<b>Control Systems</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <p>13. Identify controls used in hydraulic and pneumatic systems.</p> <ul style="list-style-type: none"> <li>• Examples: electronic, digital, robotic, manual</li> </ul> <p>14. Describe the use of compliance controls on power equipment.</p> <ul style="list-style-type: none"> <li>• Examples: engine kill switch, inertia brake control</li> </ul>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Identify parts of hydraulic and pneumatic control systems.</li> <li>2. Identify parts and components of controls.</li> </ol>
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<b>Essential Question(s):</b>	What machines in our everyday lives utilize hydraulic and pneumatic systems?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
<ol style="list-style-type: none"> <li>I. Parts of hydraulic systems</li> <li>II. Parts of pneumatic systems</li> <li>III. Operation of compliance controls</li> </ol>	<p>Lecture</p> <p>Student practice</p> <p>Worksheets</p> <p>Demonstration</p> <p>Group practice</p> <p>Examples</p>	<p>PowerPoint</p> <p>Computer/projector</p> <p>Textbooks</p> <p>Worksheets</p> <p>Examples of pneumatic systems</p>

<b>Unit Assessment:</b>	Written test and parts/system identification
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**Unit/Course  
CTSO Activity:**

FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency (SAE)

**Unit/Course  
Culminating  
Product:**

Students will develop a presentation on the use of various controls in hydraulic and pneumatic systems.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree

Other:

**Course Title: Power Equipment Technology**

<b>Unit 8:</b>	<b>Starters</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <p>15. Demonstrate the procedure for manual starter overhaul.</p> <ul style="list-style-type: none"> <li>• Diagnosing manual starter problems</li> </ul> <p>16. Demonstrate the procedure for repairing electric starters.</p> <ul style="list-style-type: none"> <li>• Diagnosing electric starter problems</li> </ul>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Perform starter system tests.</li> <li>2. Rewind manual starters.</li> <li>3. Repair electric starters.</li> </ol>
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<b>Essential Question(s):</b>	Why do some engines only have pull, or manual starters, and others have electric starters?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
<p>I. Manual starter rewind/repair</p> <p>II. Electric starter repair</p>	<p>Lecture</p> <p>Demonstration</p> <p>Student practice</p> <p>Handouts</p> <p>Project assignments</p>	<p>Voltage testers</p> <p>Engine repair manuals</p> <p>Examples of starters</p> <p>Small engine tools</p> <p>Textbooks</p> <p>PowerPoint</p> <p>Computer/projector</p> <p>Handouts</p>

<b>Unit Assessment:</b>	Successfully rewind a manual pull starter, and repair an electric starter
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**Unit/Course  
CTSO Activity:**

FFA Small Engines CDE, FFA Agricultural Mechanics CDE, Agricultural Mechanics Proficiency

**Unit/Course  
Culminating  
Product:**

Students will successfully rewind a manual pull starter and troubleshoot an electric starter.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree  
 Other:

**Course Title: Power Equipment Technology**

<b>Unit 9:</b>	<b>Preventive Maintenance</b>
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <p>17. Identify preventive maintenance procedures used in checking and servicing hydraulic and pneumatic systems.                  Examples: changing fluids, changing filters, checking fluid levels, checking hoses</p>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Demonstrate techniques for changing operating fluids.</li> <li>2. Demonstrate techniques for changing filters.</li> <li>3. Explain and demonstrate how to check fluid levels.</li> <li>4. Demonstrate how to check and repair hoses.</li> </ol>
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<b>Essential Question(s):</b>	What problems can arise from not performing preventative maintenance procedures on engines and equipment?
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<b>Content Knowledge</b>	<b>Suggested Instructional Activities Rigor &amp; Relevance Framework (Quadrant)</b>	<b>Suggested Materials, Equipment and Technology Resources</b>
I. Changing Fluids A. hydraulic fluids B. pneumatic compressor oil II. Changing Filters A. hydraulic B. air III. Checking Fluids A. hydraulic B. pneumatic compressor oil IV. Hose Repair	Lecture Teacher led demonstration Worksheets Chapter activities Individual student practice Student group practice	Fluid examples PowerPoint Computer/projector Shop/service manuals Textbooks Worksheets

<b>Unit Assessment:</b>	Perform routine maintenance procedures for engines and equipment
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**Unit/Course  
CTSO Activity:**

FFA Agricultural Mechanics CDE, FFA Small Engines CDE, Agricultural Mechanics Proficiency (SAE)

**Unit/Course  
Culminating  
Product:**

Students will successfully perform routine preventative maintenance on hydraulic and pneumatic systems.

**Course/Program Credential(s):**  Credential  Certificate  Postsecondary Degree  University Degree

Other: