

Discipline: Agriculture	Sub-discipline: Mechanized Agriculture
General Course Title: <b>Power Equipment Air Conditioning</b>	Min. Units: <b>2 Semester</b>
Proposed Suffix: <b>L</b>	
<p>Course Description:  Power equipment air conditioning fundamentals designed to give the student knowledge and competencies in modern power equipment HVAC systems. Current EPA regulations that govern retrofit as well as the use of refrigerant installation, diagnostic, and recycling equipment are also covered. Environmental impacts by various protection procedures are emphasized. Laboratory required.</p>	
Required Prerequisites or Co-Requisites <sup>1</sup>	
Advisories/Recommended Preparation <sup>2</sup>	
<p>Course Objectives: <i>At the conclusion of this course, the student should be able to:</i></p> <ul style="list-style-type: none"> <li>• Explain the basics of air conditioning components</li> <li>• Demonstrate an understanding of refrigerants and oils</li> <li>• Explain air conditioning system theory</li> <li>• Develop competency in the use of service equipment</li> <li>• Develop competency in inspecting and diagnosing air conditioning systems</li> <li>• Practice testing and servicing the air conditioning system</li> <li>• Learn the effect of refrigerant (R12 and R134a) chemicals and their effect on our environment</li> <li>• Develop skills in communication with a customer to aid in diagnosing an air conditioning problem</li> <li>• Write up an explanation of the repairs needed to restore an air conditioning system to working order and the cost involved</li> <li>• Apply safety practices involved in the use of air conditioning diagnostic, recovery and installation equipment</li> <li>• Apply safety practices involved in handling refrigerant containers</li> <li>• Demonstrate ability to communicate and work cooperatively with others</li> </ul>	
<p>Course Content:</p> <ol style="list-style-type: none"> <li>1. Basics of air conditioning <ol style="list-style-type: none"> <li>a. Basic principles of refrigeration</li> <li>b. States of matter</li> <li>c. Heat and matter</li> <li>d. Heat movement</li> <li>e. Pressure and heat</li> <li>f. Refrigerant</li> <li>g. Basic refrigeration cycle</li> </ol> </li> <li>2. Refrigerants and oil <ol style="list-style-type: none"> <li>a. Refrigerants <ol style="list-style-type: none"> <li>(1) R 12</li> <li>(2) R 134a</li> </ol> </li> <li>b. Pressure temperature relationship</li> <li>c. Handling refrigerants</li> <li>d. Safety</li> <li>e. Moisture in system</li> <li>f. Refrigeration oil</li> </ol> </li> </ol> <p><b>Power Equipment Air Conditioning (Content continued)</b></p>	

<sup>1</sup> Prerequisite or co-requisite course need to be validated at the CCC level in accordance with Title 5 regulations; co-requisites for CCCs are the linked courses that must be taken at the same time as the primary or target course.

<sup>2</sup> Advisories or recommended preparation will not require validation but are recommendations to be considered by the student prior to enrolling.

3. Basic air conditioning system theory
  - a. Compressor
  - b. Condenser
  - c. Expansion valve
  - d. Evaporator
  - e. Receiver-drier (dehydrator)
  - f. Thermostat and magnetic clutch
  - g. Bypass systems
  - h. Suction throttling regulators
  - i. Lines and connections
4. Service equipment
  - a. Gauge and manifold set
  - b. Charge station
  - c. Refrigerant recovery-recycling station
  - d. Leak detectors
  - e. Service valves
  - f. Volt-Amp-ohm meter
5. Inspecting the system
  - a. Visual inspection
  - b. Operating inspection
6. Diagnosing the system
  - a. Troubleshooting customer complaints
  - b. Flow charts for diagnosing the system
  - c. Diagnostic chart
7. Testing and adjusting the system
  - a. Installing gauges to check
  - b. Adding refrigerant
  - c. Volumetric test of compressor
  - d. Adding oil to compressors
  - e. Bench testing expansion valve
  - f. Adjusting thermostat
  - g. Checking clutch oil
  - h. Leak testing system
8. Servicing the system
  - a. Refrigerant recovery
  - b. Evacuating system using vacuum pump
  - c. Evacuating system using charging station
  - d. Charging system using 15 ounce containers
  - e. Charging system using charging station
  - f. Isolating compressor from system

Laboratory Activities: Individual Laboratory Activities are designed to support course objectives.

Methods of Evaluation: Lecture  
 Comprehensive Quizzes and Exams  
 Written Critical Thinking Scenarios  
 Problem Analysis and Solution  
 Research and Term Papers

Methods of Evaluation: Laboratory  
 Laboratory Skill Validation by Observation  
 Laboratory Reports  
 Diagnostics and Problem Solving  
 Laboratory Skill Practicum

	Certification Exams
Typical Textbooks, Manuals, or Other Support Materials <u>Air Conditioning, John Deere</u>	
<b>Statewide Articulation: Transfers as lower division elective</b>	
FDRG Lead Signature:	Date:
Mark E. Bender, PhD CSU Stanislaus	
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