

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: ENGY 240 Department: Energy Systems Technology

Course Title: Principles of Refrigeration Semester: Spring Year: 1997

Objectives/Competencies

Course Objective	Competencies
1. Theory of heat.	<ol style="list-style-type: none">1. Define temperature.2. Define the British Thermal Unit.3. Describe heat flow between substances of different temperatures.4. Explain the transfer of heat by conduction, convection, and radiation.5. Discuss sensible heat, latent heat, specific heat.
2. Theory of pressure.	<ol style="list-style-type: none">1. Define pressure.2. Describe deferent methods of measuring pressures.3. Describe the pressure/temperature relationship.
3. Matter and Energy.	<ol style="list-style-type: none">1. Define matter.2. Explain the three states in which matter is commonly found.3. Explain how energy can be converted from one form to another.

Course Objective	Competencies
4. Refrigeration Cycle.	<ol style="list-style-type: none"> 1. Describe the basic refrigeration cycle. 2. Explain the function of the Compressor, Evaporator, Condenser, and the Metering device.
5. Refrigerants.	<ol style="list-style-type: none"> 1. Define commonly used refrigerants. 2. List the designated colors for refrigerants cylinders for the various types of refrigerants. 3. Describe the characteristics of refrigerants.
6. General Safety Practices.	<ol style="list-style-type: none"> 1. Describe proper procedures for working with pressurized vessels, electrical energy, cold, rotating machinery, and chemicals. 2. Work safely, avoiding safety hazards.
7. Tools and Equipment.	<ol style="list-style-type: none"> 1. Describe specialized tools used in the HVAC industry. 2. Describe equipment used to install and service refrigeration systems. 3. Use specialized tools and equipment.
8. Tubing and Piping.	<ol style="list-style-type: none"> 1. Describe the different types of tubing used for refrigeration systems. 2. Explain the different ways of bending tubing. 3. Explain the different ways of flaring tubing. 4. Explain the different ways of swaging tubing. 5. Explain the methods for brazing and soldering tubing. 6. Explain the proper way of leak checking.
9. Systems Evacuation.	<ol style="list-style-type: none"> 1. Explain the proper evacuation practices.

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<p>10. Refrigerant Management.</p>	<ol style="list-style-type: none"> 2. Describe the triple evacuation. 3. Explain proper use of the compound gauge. 1. Define the terms Recovery, Recycling, Reclaiming. 2. Discuss the EPA regulations. 3. Differentiate between CFCs, HCFSs, and HFCs. 4. Discuss how CFSs deplete the earth's Ozone Layer.
<p>11. Systems Charging.</p>	<ol style="list-style-type: none"> 1. Describe how refrigerant is charged into systems in the vapor and the liquid states. 2. Describe system charging using two different weighing methods. 3. Describe the use of alternate charging methods.
<p>12. Basic Electricity.</p>	<ol style="list-style-type: none"> 1. Explain Ohm's law. 2. Calculate resistance, current, and voltage of simple electrical circuits. 3. Explain series, parallel and series parallel circuits.
<p>13. Automatic controls.</p>	<ol style="list-style-type: none"> 1. Define Bimetal. 2. Describe fluid filled, partial liquid, and partial vapor filled controls. 3. Differentiate between the bellows, diaphragm, and Bourdon tube.
<p>14. Control Applications.</p>	<ol style="list-style-type: none"> 1. Describe the difference between low and high voltage controls.

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<p>15. Electric Motors.</p>	<ol style="list-style-type: none"> 2. Describe the uses of high pressure, low pressure, and overload controls. 3. Describe the functions of electrical, mechanical, and electromechanical controls. 4. Troubleshooting basic refrigeration controls. <ol style="list-style-type: none"> 1. Describe the different types of motors used in the refrigeration industry. 2. Describe a motor's use in the refrigeration system. 3. Draw schematics for basic electric motor. 4. Describe the use of capacitors with electric motors.
<p>16. Evaporators.</p>	<ol style="list-style-type: none"> 1. Define high, medium, and low temp refrigeration. 2. Identify different types of evaporators. 3. Describe multiple and single circuit evaporators. 4. Describe the different methods of defrost.
<p>17. Condensers.</p>	<ol style="list-style-type: none"> 1. Describe the differences in operating characteristics between water and air cooled condensers. 2. Describe the cooling tower. 3. Explain the relationship between the condensing refrigerant and the condensing medium.
<p>18. Compressors.</p>	<ol style="list-style-type: none"> 1. Discuss compression ratio. 2. Describe four different methods of compression. 3. State the specific conditions under which a compressor is expected to operate.

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19. Metering Devices.	<ol style="list-style-type: none">1. Describe the six most common types of metering devices.
20. Special refrigeration components.	<ol style="list-style-type: none">2. Describe how each of the metering devices respond to load changes.
21. Application of refrigeration equipment.	<ol style="list-style-type: none">3. Explain superheat relating to the metering device.
22. Troubleshooting.	<ol style="list-style-type: none">1. Explain the difference between controls and accessories.2. Describe how the various refrigeration accessories may be used to increase operating efficiency and or serviceability.
	<ol style="list-style-type: none">1. Describe various types of refrigeration equipment.2. Describe display equipment.3. Describe walk-in equipment.4. Describe ice making equipment.5. Describe commercial equipment.
	<ol style="list-style-type: none">1. Diagnose an inefficient evaporator, condenser, and compressor.2. Evaluate a system with a low charge.3. Evaluate a system with a refrigeration restriction.