

Correlation of
Modern Refrigeration and Air Conditioning, by Althouse, Turnquist, Bracciano
(Goodheart-Willcox Publisher ©2021)
to
AHRI Curriculum Guide: II. Principles of Thermodynamics and Heat Transfer

The following chart correlates the *Modern Refrigeration and Air Conditioning* textbook (©2021) to a section of the Curriculum Guide developed by Air-Conditioning, Heating, and Refrigeration Institute (AHRI) and used for PAHRA accreditation.

The chart lists the Curriculum Guide’s knowledge and task competency objectives and the corresponding chapter numbers from *Modern Refrigeration and Air Conditioning*.

For more information on the Partnership for Air-Conditioning, Heating, Refrigeration Accreditation (PAHRA) and related accreditation, please visit: www.pahrahvacr.org



II.A. Matter and Heat Behavior	
Knowledge	Textbook Chapter(s)
1. Define <i>matter</i> and <i>heat</i> .	Chapter 4
2. Explain the direction and rate of heat flow.	Chapter 4
3. Describe the three methods of heat transfer.	Chapter 4
4. Identify the reference points of temperature:	
a. boiling point	Chapter 4
b. freezing point	Chapter 4
c. critical temperature	Chapter 4
d. absolute zero	Chapter 4
5. Explain the difference between heat and temperature.	Chapter 4
6. Explain the difference between latent and sensible heat.	Chapter 4
7. Explain the change of state of matter.	Chapter 4
8. Explain heat/cool storage.	Chapters 4, 44

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II.A. Matter and Heat Behavior (continued)	
Knowledge	Textbook Chapter(s)
9. Define <i>specific heat</i> .	Chapter 4
10. Define <i>sensible heat</i> .	Chapter 4
11. Define <i>latent heat of fusion</i> .	Chapters 4, 6
12. Define <i>latent heat of vaporization</i> .	Chapters 4, 6
13. Define <i>enthalpy</i> .	Chapters 4, 6, 9
14. Define <i>saturation temperature</i> (dew point temperature).	Chapters 4, 27, 35, 47
15. Define <i>water vapor pressure</i> .	Chapter 35
16. Explain the direction and rate of moisture transfer.	Chapters 4, 35
Task	Textbook Chapter(s)
1. Calculate total heat (in BTUs) a pound of any substance contains.	Chapter 4
II.B. Fluids and Pressures	
Knowledge	Textbook Chapter(s)
1. Explain the relationship of pressures and fluids at saturation temperatures.	Chapter 5
2. Explain the relationship between temperature and pressure using the P/T chart.	Chapters 5, 9, 53
3. Define <i>pressure</i> .	Chapter 5
4. Explain atmospheric pressure.	Chapters 5, 10
5. Explain compound gauges.	Chapter 10
6. Explain bourdon tubes.	Chapter 10
7. Explain barometric pressure.	Chapter 10
8. Explain absolute pressure.	Chapters 5, 10
9. Explain gauge pressure.	Chapter 10
10. Explain inches of mercury absolute.	Chapters 5, 10
11. Explain micron.	Chapter 10
Tasks	Textbook Chapter(s)
1. Calculate absolute and gauge pressures.	Chapter 10
2. Measure absolute and gauge pressures.	Chapter 10
3. Relate temperature and pressure using the P/T chart.	Chapters 9, 10, 53
4. Measure a vacuum using a micron gauge.	Chapter 10

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II.C. Refrigeration Cycle/Diagrams	
Knowledge	Textbook Chapter(s)
1. Identify the four major components of the vapor compression refrigeration system.	Chapters 6, 19, 21, 22
2. Describe the state and conditions of the refrigerant during a cycle.	Chapter 6
3. Explain the effects of:	
a. superheating the suction gases	Chapters 6, 9
b. increasing the condensing pressure	Chapters 6, 9
c. subcooling the liquid	Chapters 6, 9
4. Explain the importance of superheat and subcooling.	Chapter 6, 9
5. Define <i>refrigeration</i> .	Chapters 6, 47
6. Explain the functions of the four major components of a refrigeration system:	
a. compressor	Chapters 6, 19
b. condenser	Chapters 6, 22
c. metering device	Chapters 6, 21
d. evaporator	Chapters 6, 22
7. List the components that separate the high side from the low side of the system.	Chapters 6, 19, 21, 23
8. Describe the temperature/enthalpy (T-H) diagram.	Chapter 9
Tasks	Textbook Chapter(s)
1. Draw a refrigeration cycle on a pressure-enthalpy chart:	
a. diagram a simple refrigeration cycle	Chapters 6, 9, 35
b. state the unit of measurement for heat (BTU/h)	Chapters 4, 6
c. define <i>enthalpy</i> and <i>entropy</i>	Chapters 4, 6
d. show arrows for direction of cycle flow	Chapters 6, 32, 33, 49, 53, 54
e. place accumulator, receiver, and oil separator correctly on refrigeration cycle	Chapters 6, 20, 22, 23
2. Draw a simple refrigerant cycle diagram and label each of the basic components as well as the refrigerant lines. Place arrows on the diagram to show the direction of refrigerant flow.	Chapter 6
3. Calculate problems using temperature/enthalpy (T-H) diagram.	Chapter 9
4. Calculate problems using pressure/enthalpy (P-H) diagram.	Chapter 9

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II.C. Refrigeration Cycle/Diagrams (continued)	
Tasks	Textbook Chapter(s)
5. Label the line that represents each of the four basic components on a pressure/enthalpy (P-H) diagram.	Chapter 9
II.D. Measurement Systems	
Knowledge	Textbook Chapter(s)
1. Identify the four major components of the vapor compression refrigeration system.	Chapters 6, 19, 21, 22
2. Identify US and SI units.	Chapters 4, 5
Tasks	Textbook Chapter(s)
1. Convert from US to metric units for the following:	
a. length	Chapter 4, Appendix
b. area	Chapter 4, Appendix
c. volume	Chapters 4, 5, Appendix
d. mass	Chapter 4, Appendix
e. force	Chapter 4, Appendix
f. velocity	Chapter 4, Appendix
g. density	Chapters 4, 5, Appendix
h. pressure	Chapter 5, Appendix
i. temperature	Chapter 4, Appendix
j. energy	Chapter 4, Appendix
k. power	Chapter 4, Appendix
l. specific heat	Chapter 4, Appendix
m. volume flow rate	Chapter 4, Appendix
n. capacity	Chapters 4, 5, Appendix
2. Convert pounds to ounces.	Chapter 4, Appendix
3. Convert cooling capacity from tons of refrigeration to kW and Btu/h to kW.	Chapters 4, 43, Appendix