

## **ME 419: Air Conditioning**

*This is a cooperative course taught jointly by WSU and the University of Idaho.*

- Course description:* Principles of heat and moisture transfer, air motion and purity in buildings; design of systems.
- Number of credits:* 3
- Course Coordinator:* Robert F. Richards
- Prerequisites by course:* ME 304
- Prerequisites by topic:*
1. An understanding of engineering fluid mechanics
  2. An understanding of engineering thermodynamics
  3. An understanding of heat transfer applied to mechanical engineering problems
- Postrequisites:* None
- Textbooks/other required materials:* McQuiston, Parker and Spitler. *Heating, Ventilating and Air Conditioning Analysis and Design*. Wiley, 2005, 6/e.
- Course objectives:*
1. Understanding the fundamentals of heating, ventilation and air conditioning.
  2. Using application software for heating and cooling of building load analysis.
  3. Becoming familiar with the codes and standards from ASHRAE handbooks.
  4. Understanding efficiency improvement options.
  5. Understanding to relate HVAC to other disciplines such as heat transfer, fluids, thermodynamics, control and economics.
- Topics covered:*
1. Air conditioning systems
  2. Properties of moist air
  3. Moist air processes
  4. Space air conditioning
  5. Indoor air quality--comfort and health
  6. Heat transfer from human body
  7. Heat transfer in building envelopes
  8. Infiltration heat load and weatherizing
  9. Computation of the heating load
  10. Heat gain by solar radiation
  11. Computation of the cooling load
  12. Energy requirements for HVAC systems; building energy audit
  13. Fans--performance, selection, and installation
  14. Air flow in ducts and fittings

- 15. Design of duct systems
- 16. Codes & standards for building energy systems
- 17. Annual energy consumption

*Expected learning outcomes:*

- 1. Produce single-line diagrams for common HVAC system configurations from verbal specification or visual inspection of installed systems
- 2. Identify and explain the operation of common HVAC system components
- 3. Use both a psychrometric chart and computer-based tools to perform moist air process calculations
- 4. Demonstrate understanding of the equipment and design processes needed to assure comfort and health for common HVAC systems
- 5. Compute heating and cooling loads for buildings using conventional methods
- 6. Perform basic energy audit and building system cost analyses
- 7. Demonstrate familiarity with codes and standards related to building energy systems
- 8. Specify component performance requirements to meet HVAC system needs
- 9. Specify a complete air distribution system including fan, ductwork, and installation requirements for a typical HVAC system

*Class schedule:*

*Laboratory schedule:* None.

*Contribution to meeting the professional component:* Engineering Topics

*Relationship of course to student outcomes:*  
3 strongly supported; 2 supported; 1 minimally supported

Student Outcomes Pre-Fall 2018  
(ABET EC2000)

a	b	c	d	e	f	g	h	i	j	k
		2		3						

Student Outcomes Fall 2018 forward  
(ABET EC2019)

1	2	3	4	5	6	7
3	2					

*Prepared by:* Andrea Butcherite and R. Richards

*Date:* May 30, 2018