

## ME 419: Air Conditioning

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

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| <i>Course description:</i>                 | Principles of heat and moisture transfer, air motion and purity in buildings; design of systems.  |
| <i>Number of credits:</i>                  | 3   |
| <i>Course Coordinator:</i>                 | Robert F. Richards  |
| <i>Prerequisites by course:</i>            | ME 404  |
| <i>Prerequisites by topic:</i>             | <ol style="list-style-type: none"><li>1. An understanding of engineering fluid mechanics</li><li>2. An understanding of engineering thermodynamics</li><li>3. An understanding of heat transfer applied to mechanical engineering problems</li></ol>  |
| <i>Postrequisites:</i>                     | None  |
| <i>Textbooks/other required materials:</i> | <ol style="list-style-type: none"><li>1. McQuiston, Parker and Spitler. <i>Heating, Ventilating and Air Conditioning Analysis and Design</i>. Wiley, 2005, 6/e.</li></ol>   |
| <i>Course objectives:</i>                  | <ol style="list-style-type: none"><li>1. Understanding the fundamentals of heating, ventilation and air conditioning.</li><li>2. Using application software for heating and cooling of building load analysis.</li><li>3. Becoming familiar with the codes and standards from ASHRAE handbooks.</li><li>4. Understanding efficiency improvement options.</li><li>5. Understanding to relate HVAC to other disciplines such as heat transfer, fluids, thermodynamics, control and economics.</li></ol>   |
| <i>Topics covered:</i>                     | <ol style="list-style-type: none"><li>1. Air conditioning systems</li><li>2. Properties of moist air</li><li>3. Moist air processes</li><li>4. Space air conditioning</li><li>5. Indoor air quality--comfort and health</li><li>6. Heat transfer from human body</li><li>7. Heat transfer in building envelopes</li><li>8. Infiltration heat load and weatherizing</li><li>9. Computation of the heating load</li><li>10. Heat gain by solar radiation</li><li>11. Computation of the cooling load</li><li>12. Energy requirements for HVAC systems; building energy audit</li><li>13. Fans--performance, selection, and installation</li><li>14. Air flow in ducts and fittings</li><li>15. Design of duct systems</li><li>16. Codes &amp; standards for building energy systems</li><li>17. Annual energy consumption</li></ol> |
| <i>Expected student outcomes:</i>          | <ol style="list-style-type: none"><li>1. Produce single-line diagrams for common HVAC system configurations from verbal specification or visual inspection of installed systems</li><li>2. Identify and explain the operation of common HVAC system components</li><li>3. Use both a psychrometric chart and computer-based tools to perform moist air process calculations</li><li>4. Demonstrate understanding of the equipment and design processes needed to assure comfort and health for common HVAC systems</li><li>5. Compute heating and cooling loads for buildings using conventional methods</li><li>6. Perform basic energy audit and building system cost analyses</li></ol>  |

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 program objectives:* Meets:

1. School of MME ME educational objectives: 1
2. School of MME ME program outcomes: 1, 2, 4, 6, 7
3. ABET EC2019, Criterion 3 program outcomes: 1, 2, 4, 6, 7

*Prepared by:* Andrea Butcherite and R. Richards

*Date:* May 30, 2018

## **POLICIES**

**A. Reasonable Accommodation** (the nature of the particular course determines which one applies):

- **Pullman Campus.** Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.
- **WSU Online Course.** Reasonable accommodations are available in online classes for students with a documented disability. All accommodations must be approved through your WSU Disability Services office. If you have a disability and need accommodations, we recommend you begin the process as soon as possible. For more information contact a Disability Specialist on your home campus: Pullman or WSU Online (<http://accesscenter.wsu.edu>), Spokane (<http://spokane.wsu.edu/students/current/studentaffairs/disability/>), Tri-Cities (<http://www.tricity.wsu.edu/disability>), Vancouver (<http://studentaffairs.vancouver.wsu.edu/student-resource-center/disability-services>).

## **B. Academic Integrity**

WSU expects all students to behave in a manner consistent with its high standards of scholarship and conduct. Students are expected to uphold these standards both on and off campus and acknowledge the university's authority to take disciplinary action. The Standards of Conduct for Students can be found at <http://conduct.wsu.edu>.

## **C. WSU Safety**

WSU is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, <http://safetyplan.wsu.edu>. It is highly recommended that you visit this web site as well as the University emergency management web site at <http://oem.wsu.edu/> to become familiar with the information provided.