



ME451 HVAC Systems (Required Course)

Code and Name: ME451 HVAC Systems

Credit Hours: 3 (Lecture: 3, Tutorial: 0)

Textbook:

- Heating, Ventilating, and Air Conditioning: Analysis and Design, F. C. McQuiston, J. D. Parker and J. D. Spitler, 6th Edition, Wiley, 2000.

Other References:

- ASHRAE Handbook of Fundamentals, 2003 Edition, Atlanta, GA

- Refrigeration and Air Conditioning, W. F. Stoecker, and J. W. Jones, 2nd Edition, McGraw-Hill, 1982.

- Thermal Environmental Engineering, T. H. Kuehn, J. W. Ramsey, and J. L. Threlkeld, 3rd Edition, Prentice Hall, 1998.

Course Description:

Qualitative and quantitative study in concepts of basic air-conditioning with focus on buildings including building envelope, moist air thermodynamics, human comfort. Thermal load calculations, thermal behavior of buildings, HVAC systems/equipment, and design of space air-conditioning and its relationship to architectural design.

Pre-requisites: ME324 Heat Transfer

Co-requisites: None

Course Learning Outcomes:

With relation to ABET Student Outcomes (SOs: 1-7)

1. Recognize the basic HVAC components and describe the various system types. (1)
2. Perform heat and mass balance and do psychrometric calculations. (1, 2)
3. Perform heating and cooling load calculations. (1, 2)
4. Define and analyze comfortability with respect to the surrounding environment. (4)
5. Analyze the surrounding environment with respect to human health. (4)
6. Develop the ability to use the design standards for HVAC system design. (1, 2)
7. Develop ability to use the software tools for heating and cooling load calculations. (1, 2, 6, 7)

Topics to be covered:

- Introduction (Historical Notes; Common HVAC Units and Dimensions, Fundamental Physical Concepts).
- Moist Air Properties and Conditioning Processes (Moist Air and the Standard Atmosphere; Fundamental Parameters; Adiabatic Saturation; Wet Bulb Temperature and the Psychrometric Chart; Classic Moist Air Processes; Space Air Conditioning—Design Conditions).
- Comfort and Health—Indoor Environmental Quality (Comfort—Physiological Considerations; Environmental Comfort Indices; Comfort Conditions; The Basic Concerns of IAQ; Common Contaminants; Methods to Control Humidity; Methods to Control Contaminants).
- Heat Transmission in Building Structures (Basic Heat-Transfer Modes; Tabulated Overall Heat-Transfer Coefficients; Moisture Transmission).

Grading Policy:

The grading for the course are 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, homework, and projects for the remaining 20% that is modified by the course instructor.

