

**M.E. Rinker, Sr.School of Building Construction  
University of Florida**

**BCN 4510 Mechanical Systems II – HVAC**

4 Credits

Prerequisites: PHY 2005, PHY 2005L, BCN 3521

Description: Principles and practices of year-round air conditioning for the building contractor will be explored. Basic design principles and problems will be presented with emphasis on considerations of concern to the general contractor.

Keywords: Mechanical Systems, Heating and Cooling Calculations, Air Distribution Systems

Method: 4 lecture hours and 1 laboratory hour per week

Objective: This course includes heating and cooling load analysis; psychrometrics; fan and system curves; equipment sizing, selection and location; reading mechanical drawings; air handling systems; refrigeration system fundamentals; and system cost estimating.

Student Learning Outcomes:

1. Identify conditions that constitute a comfortable environment, (PL 1, ACCE SLO 10).
2. Demonstrate knowledge of residential and commercial plumbing systems, (PL 1, ACCE SLO 10).
3. Explain the components and operation of direct expansion and chilled water equipment (PL 1, ACCE SLO 10).
4. Locate the properties of air with a psychrometric chart , (PL 1, ACCE SLO 10).
5. Understand the operation of air distribution systems and be able to interpret and extract information from codes and standards. (PL 1, ACCE SLO 10).
6. Operate testing and balance and system commissioning equipment (PL 1, ACCE SLO 10).
7. Interpret mechanical specifications, drawings and submittals (PL 1, ACCE SLO 10).
8. Discuss energy efficiency measures to reduce a building's heating and cooling load (PL 1, ACCE SLO 11).

Texts: Heating and Air Conditioning Notes for BCN 4510 - Target Copy  
HVAC by S. Don Swenson (*Not Required*)

Suggested

References: Environmental Systems Technology, by W. David Bevirt, National Environmental Balancing Bureau, 1991.

Grading System

5 tests @ 18 points each (lowest grade is dropped)	= 72 points
Final 18 points	= 18 points
Class Attendance	= 5 points
Lab attendance	= 5 points

Grades will be computed according to the following scale: A=93-100; A- =90-92.9; B+ =87-89.9; B=83-86.9; B- =80-82.9; C+ = 77-79.9; C=73-76.9; C- =70-72.9; D+ =67-69.9; D=63-66.9; D- =60-62.9; E<60.

ASSESSMENT METHODS

Assessment	SLO 1	SLO 2	SLO 3	SLO 4	SLO 5	SLO 6	SLO 7	SLO 8
Test 1	X							
Test 2			X					
Test 3				X				
Test 4					X			
Test 5								X
Piping lab		X						
Dry fit lab		X						
Refrigeration lab			X					
Psychrometrics lab				X				
T&B instrument lab								
Submittal Lab		X					X	
Schedule Lab				X			X	

Assessment	Target
Tests	At least 80% receive a grade of B- or better
Labs	Successful completion of 90% of lab questions
Practical labs	Demonstration of the mechanical skill set

<b>Topic</b>	<b>Description</b>	<b>Swenson Text</b>
1	<b>Introduction to course</b> - aims and method of presenting material, course outline, grading, homework, quiz and attendance policies.	
2	<b>Introduction to Comfort</b>	1-8
3	<b>Basic Air Conditioning Definitions and Terms</b>	9-23
4	<b>Introduction to Air-side</b> - Residential and Commercial Equipment. Types of forced air systems including single, multi-zone, variable volume and dual duct.	64-72 171-185
5	<b>Refrigeration Systems</b> - arrangement of components, the p-h diagram, the refrigeration cycle, survey of equipment used to condition buildings.	99-169 187-199
6	<b>Principles of heat gain/loss in buildings</b> - modes of heat transfer, use of tables to determine the resistance of materials to heat flow, load calculations, and the Florida Energy Code.	215-240
7	<b>Psychrometrics</b> - properties of air, air conditioning processes, supply air quantity and sensible heat ratio.	37-50
8	<b>Measuring Air Flow and Air Pressure</b> - velocity and cfm, velocity transverse, velocity pressure and static pressure, and instruments to measure velocity and pressure.	285-296
9	<b>Air Distribution</b> - fan and system curves, fan types and the fan laws, sizing ductwork, duct fittings, duct construction, aspect ratio, reading mechanical drawings, duct symbols.	241-272
10	<b>Equipment Location and Installation</b>	
11	<b>System Cost Estimating</b>	