



# Systems Fundamentals

## 1. Introduction to HVAC Systems <6-hours>

- a. Dissecting HVAC Systems
  - i. Comfort Requirements
  - ii. The Five Systems Loops (Airside, Chilled Water, Refrigeration, Heat Rejection & Controls)
- b. Direct Expansion (DX) Versus Chilled Water Systems
- c. Common HVAC Systems Types
- d. Factors That Affect Selection of the HVAC System

## 2. Improving Dehumidification in HVAC Systems <6-hours>

- a. Full Load vs. Part Load Dehumidification Performance
  - i. Dehumidification vs. Compressor Run Time
- b. Ways to Improve Dehumidification in:
  - i. Chilled-Water Terminal Systems
  - ii. Single-Zone Unitary (DX) Systems
  - iii. Central Air-Handling Systems
- c. Various Strategies Covered
  - i. Automatic Fan-Speed Adjustment
  - ii. Face-and-Bypass Dampers (& Ideal Return Air Bypass)
  - iii. Supply-Air Tempering (Reheat)
  - iv. Dedicated Conditioning of Outdoor Air
  - v. Total-Energy Recovery
  - vi. Single-Zone VAV
  - vii. Dual-Path Air Handler
  - viii. CDQ
  - ix. Colder Supply Air

## 3. Air to Air Energy Recovery <3-hours>

- a. Applications
- b. Technologies
- c. Integrating into Systems

## 4. Waterside Heat Recovery <3-hours>

- a. Historical Perspective
- b. Reasons to Use
- c. Feasibility
- d. Analysis Tools
- e. Common Uses
- f. Comparison of Options
- g. Control Methods

## 5. Ice Storage Systems <3-hours>

- a. Benefits of Ice Storage
- b. System Components
- c. Design Process
- d. System Layout
- e. System Control

## 6. Commercial Building Pressurization <3-hours>

- a. Why Control Building Pressure
- b. System Configurations
- c. Application Considerations