Typical daily assignment for CBE 201. This translates into a "Module" in Canvas

Assignments to be completed before class on Friday 10/25:

Homework on content covered in previous class:

Homework
- HW 12 **(Due by 5:00 am on Fri 10/25)**

Material to be completed before we cover the content in class:

zyBooks Reading:		
Topic	**Section**	**Participation & Challenge Activities**
Solids, Liquids, and Gases		
Vapor pressure and Antoine Eqn	4.7	All
Compressor	4.8	All
Multiphase Systems		
Raoult's Law	5.1	All
Bubble and dew point	5.2	All

The e-book. Participation and challenge activities are embedded animations they view or questions they have to answer within the reading. E-book tracks their completion, which contributes a small part (~5%) to their course grade. Most of them do it on time.

FRB Reading:		(✓=
Topic	**Section**	
Multicomponent Gas-Liquid Systems	6.4	

The classic, hard cover text that only a few of them read.

Assigned screencasts. They like these.

Videos
youtube.com/learncheme >> Mass and Energy Balances >>

1. Raoult's Law – Water as Condensable Component (4:20)
   https://www.youtube.com/watch?v=G6WZjpVwMaE&list=PLD4476BAFA5A65111&index=58

2. Relative and Absolute Humidity (3:51)
   http://www.youtube.com/watch?v=8EoxIUaFB3w&list=PLD4476BAFA5A65111&index=59

3. Single Condensable Species Balance (Raoult's Law) (8:53)
   http://www.youtube.com/watch?v=5gwnJr2-IV8&list=PLD4476BAFA5A65111&index=64

Key points:

1. $p*$ for water can be **looked up** in FRB Table B.3
2. $p*$ for water and other substances can be **calculated** using the Antoine equation: $\log_{10} p* = A - B/(T+C)$
3. The Antoine equation constants, A, B, and C, can be found in FRB Table B.4
4. Raoult's law says that **if A is the only component that can condense (*i.e., exist as a liquid*) in a vapor-liquid system,** then:
   - at equilibrium the partial pressure of A equals the vapor pressure of A, i.e.,: $p_A = p_A*$
   - By definition $p_A = y_A P$, where y_A = vapor mole fraction of A and P = total system pressure, so $y_A P = p_A*$
5. Relative saturation is ratio of the **actual** partial pressure of a substance to its vapor pressure times 100%, i.e., $s_r = (p_i/p_i*) \times 100\%$
6. If the substance is water, 'relative saturation (s_r)' is called 'relative humidity (h_r)'

Conceptual clicker questions. They have often have more difficulty with these than solving a problem with equations and numbers because the answers to these tend to be counterintuitive.
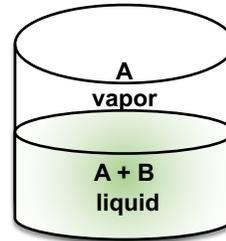
RUTGERS — Bubble-point concept

A tank contains a 50/50 mixture of A and B in vapor-liquid equilibrium. The vapor is 60 mol% A. As the vapor is removed and the liquid boils away, the mole fraction of A in the liquid phase _____.

A. increases

B. decreases

C. remains the same

A
vapor

A + B
liquid

RUTGERS — Mass and Volumetric Flowrate

Water at a constant density flows through the cone-shaped pipe below. The volumetric flow rate of water at the outlet is _____ the volumetric flow rate at the inlet.

A. equal to

B. greater than

C. less than

RUTGERS — Chemical & Biochemical Engineering

If air flows at steady state and constant pressure through a cone that is heated by a furnace, which of the following is correct? (V = volumetric flow rate)

A. The volumetric flow rate is higher at the outlet
B. The pressure is higher at the outlet
C. The quantity PV is higher at the outlet
D. The mass flow rate is higher at the outlet
E. Both A and C

RUTGERS — Ideal Gas Law

A constant-volume tank contains CO_2 at 2 bar. Nitrogen is injected into the tank. The CO_2 partial pressure _____. Assume ideal gases and an isothermal system.

A. decreases
B. increases
C. stays the same