ChE 273
Review for Exam 1

Chapter 2

Conversion of Units/Systems of Units (lb-moles vs g-moles, pressure, etc.)
Force Units (lb_m vs. lb_f, g_c, etc.)
Density, specific gravity

Chapter 3

Mass vs. Mole Fractions
Average Molecular Weight
Fluid Pressure and Hydrostatic Head
Manometers, Barometers
Atmospheric (i.e., ambient) Pressure, Absolute Pressure, and Gauge Pressure

Chapter 4

The General Balance Equation (accum = in – out + …)
Transient Material Balances (m, m_i, n, n_i)
Steady-State Material Balance Calculations for **Non-reacting Flows**

a. Flow diagrams, Scaling, and Using a Basis
b. Balancing a Process - Degrees of Freedom
c. Outline of a Procedure for Material Balance Calculations
d. Multiple-Unit Processes/Recycle and Purge (non-reacting flows)

Material Balances with Reaction

a. Species balances with generation/consumption (not used much)
b. Species balances with extent of reaction (ξ)
c. Element balances
d. DOF analysis on reacting systems
    i. Additional unknown for each reaction (extent of reaction)
    ii. Elemental balances
    iii. Use reacting DOF for "block" with reacting systems
e. Definitions
    i. Stoichiometry, stoichiometric conditions
    ii. Limiting reactant
    iii. Percent excess
    iv. Yield
    v. Single-Pass Conversion
    vi. Overall conversion
    vii. Selectivity
f. Combustion Reactions
    i. Should be able to write and balance these reactions for complete combustion, etc.
    ii. $C \rightarrow CO_2$, $H \rightarrow H_2O$, $S \rightarrow SO_2$, $N \rightarrow N_2$
    iii. Theoretical and excess air
    iv. Dry basis for compositions, use of n_{dry}

How to Study

Please study hard before the exam; there is not time to study during the exam!

- Look at the competencies
  - Do I know how to do that stuff?
  - What kind of problems could be on the exam for each competency?
- Skim (not read) the text
  - work through the examples in the text (from scratch!)
- Review the homework problems, check answer key – (Did I understand everything?)
- Review Dr. Fletcher's lecture notes posted on the web and my class notes
- Study the practice exam (available on learning suite)
  - The TA's have the answer key (caution: study before taking the practice exam!)
- Select problems from the end of chapters and work them
- Pose sample exam problems to other students in the class (What do I think is important?)

Exam Tips

1. Read all questions first
2. Work simple problems quickly (look at point distribution)
3. Set up longer problems (but no numbers)
4. Finish working problems you can (remember partial credit helps a lot)

Competencies Covered Before Exam 1

Level	Usage	Competency Expectation
3	M	Students will be able to use basic engineering units in both SI and AES systems in solving problems, and be able to convert between unit systems by hand
3	M	Students will be able to solve steady-state, overall material balances for systems which include one or more of the following: recycle, multiple units.
2	M	Students will be able to set up and solve simple transient material balances.
2	M	Students will be able to use a degree-of-freedom approach to assist in the solution of material balances.
2	M	Students will be able to solve simple fluid statics problems (e.g., manometers, fluid head, etc.)
3	M	Students will be able to use a problem solving strategy to define and solve engineering problems.
2	M	Students will learn about chemical processes, units, and corresponding equipment
2	M	Students will be introduced to process variables (e.g., P, T, flow rate, conc.) and their measurement.