Date: 09/05/2016

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No : CHE F211
Course Title: Chemical Process Calculations
Instructor-in-charge: Asma Ahmed

1. Objective and Learning Outcomes:

Chemical Process Calculations is one of the most fundamental courses of Chemical Engineering and serves as an introduction to the field. The course aims at inculcating systematic problem solving skills in students.

<u>At the end of the course, the student should be able to:</u>
- Draw a process flow diagram based on a given problem, identify unknowns and carry out a degrees of freedom analysis
- Solve material balance problems with and without chemical reactions in single and multiple subsystems
- Solve problems involving recycle and bypass
- Apply the laws of thermodynamics to solve basic energy balance problems
- Use tables, charts and equations to calculate values of enthalpy, humidity, etc.
- Analyze and solve problems involving both material and energy balances simultaneously

2. Text Book:

Himmelblau, D. M. "Basic principles & calculations in chemical Engg", PHI, 7th ed., 1997.

3. Reference Book:

Felder, R. M. & R. W. Rousseau, "Elementary Principles of Chemical Processes", John Wiley & Sons, Inc., 3rd ed., 2000.

4. Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Ref. (Text Book)
1	Introduction to Chemical Engineering	-	-
2	Units, Dimensions and their conversion, Dimensional consistency in equations	Units and Dimensions	1.1-1.4
3-4	Mole, density and concentration	Density, specific gravity, mole fraction and mass fraction, concentration	Ch 2

5	Choosing a basis	How to choose a basis	Ch 3
6	Different units of temperature, pressure	Temperature and Pressure	Ch 4, 5
7-10	Introduction to material balances	Concept of material balance, open and closed systems, steady state/unsteady state	Ch 6, 7
11-12	Solving material balance problems without chemical reactions	Material balances without chemical reactions	Ch 8
13-14	Stoichiometry	Chemical reaction equations and stoichiometry	Ch 9
15-17	Solving material balances with chemical reactions	Material balances with chemical reactions	Ch 10
18-19	Material balances involving multiple subsystems	Solving material balance problems involving multiple subsystems	Ch 11
20-23	Material balances with recycle and bypass	Recycle bypass and purge calculations	Ch 12
24-25	Calculation procedures for ideal gas systems	Ideal gas law calculations, ideal gas mixtures and partial pressure	Ch 13
26-27	Two phase systems	Vapor pressure, saturation, phase diagrams	16.1, 17.1, 17.3, 19.1
28-30	General energy balances for open and closed systems without chemical reactions	The General energy balance	Ch 21, 22
31-32	Calculation of enthalpy changes using heat capacity equations and enthalpy tables	Calculation of enthalpy changes	23.1-23.3, Ch 24
33-35	Enthalpy balances with chemical reaction	Energy balances that account for chemical reactions	Ch 25
36-37	Calculation of heat of mixing and heat of solution	Heats of solution and mixing	Ch 28
38-39	Humidity chart and its use in determining the properties of moist air	Humidity charts and their use	Ch 29
40-42	Solving simultaneous material and energy balances	Miscellaneous Examples	-

5. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Remarks
Test I	1 hr	20		CB
Test II	1 hr	20		OB
Surprise Tests	Variable	20		CB
Comprehensive Exam.	3 hrs	40		CB + OB

6. **Chamber Consultation Hour:** Will be announced in the class (Chamber: D-222)

7. **Notices:** Notices concerning the course will be displayed on the CMS website

8. **Make-up Policy:** Make-up will be granted only for genuine cases with valid justification and only with prior permission of Instructor-in-charge.

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Instructor-in-charge
CHE F211

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