

ChE 203 - CHEMICAL PROCESS CALCULATIONS
Section 03
Fall 2014

Instructor & Assistant	Office	Phone	e-mail
Dr. Yusuf Uludağ	D - 112	4374	yuludag@metu.edu.tr
Mustafa Yasin Aslan	CZ - 12	4353	mustafay@metu.edu.tr

T 10.40 & 11.40 (Z-15A) **TR** 10.40 & 11.40 (Z-15A)

Catalog Description

Basic chemical engineering concepts and methods of analysis. Introduction to mass and energy balance calculations applied to solution of problems in systems of interest to chemical process industries.

Textbook

Felder, R.M. and Rousseau, R.R. "*Elementary Principles of Chemical Processes*", Wiley, 3rd ed, 2000.

Course Objectives

On completion of this course each student is expected to be able to

- define and describe the process stream variables such as flow rate, composition, pressure and temperature,
- convert stream variables from one unit to other accurately,
- draw and label process flow diagrams from process descriptions, analyze the problems by identifying systems and process units by applying degree of freedom analysis,
- select appropriate reference state and basis,
- apply laws of conservation of mass and energy around physical and chemical process units,
- analyze the physical state of process streams, apply conservation of mass and energy with complementary equation of state for multiphase systems.

Outline

- I. Introduction to Engineering Calculations (Ch 2)
 1. Units and Dimensions
 2. Conversion of Units
 3. System of Units
 4. Force and Weight

- II. Process and Process Variables (Ch 3)
 1. Mass, Volume and Density
 2. Flow Rate
 3. Chemical Composition
 4. Temperature

- III. Fundamentals of Material Balances (Ch 4)
 1. Process Classification
 2. Material Balance Calculations in Non-Reactive and Reactive Processes

- IV. Single Phase Systems (Ch 5)
 1. Single Phase Systems
 2. Ideal Gases

- V. Multiphase Systems (Ch 6)
 1. Single Component Phase Equilibrium
 2. Gibbs Phase Rule
 3. Gas-Liquid Systems
 4. Humidity
 5. Solutions of Solids in Liquids

- VI. Energy and Energy Balances (Ch 7)
 1. Energy and Energy Balances
 2. Tables of Thermodynamic Data

- VII. Energy Balances on Nonreactive Processes (Ch 8)
 1. Energy Balance Calculations for Non-Reactive Processes
 2. Sensible Enthalpy and Heat Capacities
 3. Phase Change Operations

- VIII. Energy Balances on Reactive Processes (Ch 9)
 1. Energy Balance Calculations for Reactive Processes
 2. Heat of Reaction
 3. Heats of Formation and Combustion
 4. Heating Value and Adiabatic Flame Temperature

Policies and Procedures

- A web page has been constructed for this course. All course materials (syllabus, homework assignments, exam solutions and grades, etc.) will be made available at

<http://www.metu.edu.tr/~yuludag/che203/>

Visit the site on a regular basis to get recent homework assignment and other relevant announcements.

- Attendance is mandatory. Below 70 % attendance will be considered as NA and waiving the final exam right regardless of other grades.
- During the lectures refrain from being late and using cellular phone.
- You must work in groups of three on the assigned homework sets. Hand in the homework during the class on due date - one solution set per group. Use A-4 size paper and one side of each page. Include a title page. 25 % deduction per day for late homework.

- Exams are scheduled as follows:

Midterm Exam # 1	Nov. 14, 2013, Thursday
Midterm Exam # 2	Dec. 24, 2013, Tuesday
Final Exam	TBA

- All tests will be open-book. It is your responsibility to understand the exam questions. If you have difficulty in English, you may use a dictionary during the exams.
- If you miss an exam with a certified medical excuse, you may take a makeup exam at a designated time near the end of the semester. Bear in mind that it will be **CHALLENGING!**
- A weighted average grade will be calculated as follows:

Midterm exams	55 % (MT1 25 % and MT2 30 %)
Homework	10 %
Final exam	35 %