

## ChE 302 Computer-aided Material and Energy Balances

Date: 28/2/2006

**Instructor:** Kamil M. Wagialla & A. E. Abasaheed

**Total credits:** 2

Lecture Cr: 2

Lab Cr: 0

Recitation Cr: 0

**Pre Req(s):** CHE 202, GE 209

**Co Req(s):**

**Contribution to professional component:**

Math and Basic science Cr:

Engineering Cr: 2

General Education Cr: 0

### Catalog Data:

Application of computer software in solution of material and energy problems. Usage of equation solving software (such as EZ Solve), spreadsheets (such as Microsoft EXCEL), and simulation packages (such as SuperPro Designer or ChemCad). Determination of degree of freedom for multi-unit flowsheets.

### Textbook:

G.V. Reklaitis, "Introduction to Material and Energy Problems", Wiley, 1983.

### Topics covered

1. Classification of computer software (2 classes).
2. Material and energy balances involving chemical reactions (3 classes).
3. Material and energy balances involving phase change (3 classes).
- 4 .Degree of freedom analysis (3 classes).
5. Determination of number of independent unknown variables in a process flowsheet (2 classes).
6. Selection of independent unknown variables in a process flowsheet (2 classes).
7. Usage of equation solving software in material and energy balance problems (4 classes).
8. Usage of spreadsheets (e.g. EXCEL) in material and energy balance problems (4 classes).
9. Usage of simulation software package in material and energy balance problems (4 classes).

### Objectives

|                                                                                                           | a | b | c | d | e | f | g | h | i | j | k | L | M |
|-----------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.Understand the types of computer software available for solving material and energy problems            |   |   | 3 |   |   |   |   |   | 1 |   |   |   |   |
| 2.Determination of susceptibility of an engineering problem for solution using degree of freedom analysis |   |   | 3 |   | 3 |   | 1 |   |   |   | 3 |   |   |
| 3.Correct setting up of an engineering problem for solution                                               | 3 |   | 3 |   | 3 |   |   |   |   |   |   |   |   |
| 4.Training in efficient application of computer software in engineering problem solution.                 |   |   | 3 |   |   |   |   |   |   |   | 3 |   |   |

- a. Ability to apply knowledge of math, engineering, and science.
- b. Ability to design and construct experiments.
- c. Ability to design a system, component, or process.
- d. Ability to function on multi-disciplinary teams.
- e. Ability to identify, formulate, and solve engineering problems.
- f. Understanding of professional and ethical responsibility.
- g. Ability to communicate effectively.
- h. ...broad education ... to understand the impact of eng. solutions in a global and societal context.
- i. Recognition of the need for and ability to engage in life-long learning.
- j. Knowledge of contemporary issues.
- k. Ability to use techniques, skills, and modern engineering tools necessary for engineering practice.
- L. Quickly contribute in their focus area.
- M. Team contributors.

**Key: 3: strong 2: moderate 1: weak**