

## CHE 421 Chemical Plant Economics

Date: 28L2L2006

**Instructor:** K.M.Wagialla

**Total credits:** 3

**Lecture Cr:** 3

**Lab Cr:** 0

**Recitation Cr:** 0

**Pre Req(s):** CHE 321

**Co Req(s):**

**Contribution to professional component:**

Math and Basic science Cr: 1

Engineering Cr: 2

General Education Cr:1

### Catalog Data:

The use of chemical engineering and economic principles in the design of a complete chemical plant. General design considerations regarding environmental, health, safety and selection of plant location. Process design development. Sizing, selection and costing of equipment. Capital and operating cost estimation. Profitability indicators: ROI, PBP, NPV, and discounted cash flow return (IRR). Alternative investments and replacements. Introduction to computer-aided design. Optimization solution methodology. Linear programming (Graphical and computer application).

### Textbook:

M.S. Peters, K.D. Timmerhaus and R.E. West, "Plant Design and Economics for Chemical Engineers", 5<sup>th</sup> Edition, McGraw – Hill, 2003.

### Topics covered

1. Introduction (2 classes).
2. General design considerations (2 classes).
3. Process design development. (3 classes).
4. Software use in process design. (2 classes).
5. Capital cost and operating cost estimation. (6 classes).
6. Profitability analysis. (4 classes).
7. Alternative investments and replacements. (3 classes).
8. Optimum design and design strategy. (6 classes).

### Objectives

	a	b	c	d	e	f	g	h	i	j	k	L	M
1. Understand basic economic principles regarding plant economics.			1	1		2							
2. Steps in process design development.			3		3			2			2		
3. Methodologies in cost estimation of capital and operating costs.			2		2								
4. Evaluation of chemical project profitability			3	1				1	1		2		
5. Construction and solution of optimization problems with special emphasis on linear programming	1		3		3					2			

- 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**