CHE 425

Engineering Economics and Design Principles

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Course Objective

- Introducing the Process flow diagrams
- Understanding the process conditions
- Technical analysis of a chemical processes and use of heuristics in design and analysis, and synthesis of a process using a simulator.

Course Objective (cont.)

- Engineering economic analysis of chemical processes with particular emphasis on:
  - cost estimation
  - time value of money
  - depreciation
  - profitability and financial analysis
  - methods for decision making among alternatives

Course Outcomes

- Upon successful completion of this course, the student will be able to:

1. Understand the process flow diagrams of a chemical process.
2. Understand and justify the process conditions
3. Be able to use heuristics in process design and analysis

Course Outcomes (cont.)

4. Estimate capital investment.
5. Estimate manufacturing cost.
6. Understand engineering economics and perform profitability analysis.
7. Be familiar with using simulation for equipment design.

Grading

❑ Major exam I	25%	Saturday, March 22, 2008
❑ Major exam II	25%	Saturday, May 3, 2008
❑ Quizzes/Assignments	12%	
❑ Class Participation	3%	
❑ Attendance	3%	
❑ Final exam	32%	

Notes

- Attendance will be strictly followed as per university policy.
- Quiz will be held regularly during lecture hours. No make up quiz will be given.
- Attendance marks will be deducted for each missed lecture

Why Economics with Design?

- Special emphasis is placed on the economic and engineering principles involved in the design of chemical plants and equipment.
- An understanding of these principles is a prerequisite for any successful chemical engineer, no matter whether the final position is in direct design work or in production, administration, sales, research, development, or any other related field.

Why Economics with Design? (cont.)

- The expression *plant design* immediately connotes industrial applications; consequently, the **dollar sign** must always be kept in mind when carrying out the design of a plant.
- The theoretical and practical aspects are important, of course; but, in the final analysis, the answer to the question "***Will we realize a profit from this venture?"*** almost always determines the true value of the design.
- **The chemical engineer, therefore, should consider plant design and applied economics as one combined subject.**

The Scope of Design

- Design should be viewed as the focal point of chemical engineering practice.
- Far more than the development of a set of specifications for a new chemical plant, **design is that creative activity** through which engineers continuously improve the operation of facilities to create products that enhance the quality of life.
- Whether developing the grass roots plant, proposing and guiding process modifications, or troubleshooting and implementing operational strategies for existing equipment, engineering design requires a broad spectrum of knowledge and intellectual skills to be able to analyze the big picture and the minute details and, most importantly, to know when to concentrate on each.

The Scope of Design (cont.)

- The purpose of this text is to assist chemical engineering students in making *the transition from solving well-posed problems in a specific subject to integrating all the knowledge that they have gained in their undergraduate education and applying it to solving open-ended process problems*.
- Many of the "nuts and bolts" issues regarding plant design (for example, what schedule pipe to use for a given stream or what corrosion allowance to use for a vessel in a certain service) are not covered.
- Although such issues are clearly important to the practicing engineer, several excellent handbooks and textbooks are available to address such problems.