ChE 425 – PROCESS DESIGN I

Type (check one): Required: X Elective: _____

2005-2006 Catalog Data: ChE 425. Process Design I. Application of principles and concepts of prior course work with safety, economic and practical considerations to design equipment to meet a processing need. The emphasis is placed upon a particular unit or subsystem rather than a complete process, which is the subject of ChE 426, Process Design II. Prerequisite: ChE 330. Corequisite: ChE 443. Offered in the Fall semester. *One semester; three credits*.

Prerequisites: ChE 330
Co-Requisites: ChE 443

Textbook: *Analysis, Synthesis, and Design of Chemical Processes*, Richard Turton, Richard C. Bailie, Wallace B. Whiting, Joseph A. Shaeiwitz, 2nd Edition, Prentice Hall, New Jersey, 2003.

Other Required Materials: ASPEN PLUS

Other References: *Products & Process Design Principles*, Seider, Seader and Lewin, Wiley & Sons, New York, 2004 .

Instructor: Dr. Ali Pourhashemi, Associate Professor

Course Objectives: After course completion, students are expected to:

1. analyze and develop a process flow diagram (ABET: c),
2. use various fluid, heat transfer and kinetics models to evaluate system performance (ABET: a, e, l)
3. know the guidelines for tracing chemicals in a chemical process diagram (ABET: c)
4. understand the process conditions and utilize experience-based principles to examine the design of a process (ABET: a, c, e)
5. apply the ASPEN program to unit operations (ABET: c, k, m, n)
6. be able to recommend safe alternatives for various operations and participate in class discussion (ABET: g, j).

Prerequisites by Topics: Mass & energy balances, fluid mechanics

Topics:

1. Essential flow diagrams, BFD and PFD
2. Technical analysis and structure of chemical flow diagrams
3. Guide lines, tactics and limitation for tracing chemicals in PFD
4. Understanding process conditions and the role of experience in design and analysis of system performance, and engineering economics
5. Synthesis and optimization of chemical processes, key relationships, technical heuristics for analysis of system performance
6. Applications of fluid and heat transfer models to individual unit operations, Reactor performance and regulating process conditions, Process troubleshooting and debuttlenecknig
7. Application of a process simulator, ASPEN PLUS

Class Schedule Three 50-minute sessions per week

Prepared by: Ali Pourhashemi, Ph.D **Date:** August 2005

Professional Component:
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Category (check one)	____ Math/Basic Science __X__ Engineering ____ General Education ____ Other
Design (check one)	__X__ Significant ____ Some ____ None
Realistic Constraints (check all that apply)	__X__ Economic __X__ Environmental ____ Sustainability __X__ Manufacturability __X__ Ethical __X__ Health & Safety ____ Social ____ Political

Relationship to Program Outcomes:

Check all that apply:

__X__ (a) an ability to apply knowledge of mathematics, science, and engineering
____ (b) an ability to design and conduct experiments, as well as to analyze and interpret data
__X__ (c) an ability to design a system, component, or process to meet desired needs
____ (d) an ability to function on multi-disciplinary teams
__X__ (e) an ability to identify, formulate, and solve engineering problems
____ (f) an understanding of professional and ethical responsibility
__X__ (g) an ability to communicate effectively
____ (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
____ (i) a recognition of the need for and an ability to engage in life-long learning
__X__ (j) a knowledge of contemporary issues
__X__ (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
__X__ (l) a solid background in chemistry
__X__ (m) an ability to apply material and energy balances in chemical engineering and related areas
__X__ (n) an ability to use mathematical and graphical computer packages for solving engineering problems.