CBEMS 130 SEPARATION PROCESSES

Catalog Data: **CBEMS 130 Separation Processes (Credit Units: 4).** Application of equilibria and mass and energy balances for design of separation processes. Use of equilibrium laws for design of distillation, absorption, stripping, and extraction equipment. Design of multicomponent separators.
Prerequisite: CBEMS40B. (Design units: 3)

Textbook: P.C. Wankat, *Equilibrium Staged Separations*, Prentice Hall, 1998

References:

Coordinator: Nancy A. DaSilva

Course Objectives: To design separation processes, a chemical engineer must understand the principles of equlibrium staged separations. This course is an introduction to the design of distillation, absorption, stripping, and extraction equipment. The course builds on concepts from thermodynamics and mass and energy balances.

Course Outcomes: Students are able to:

Apply chemical engineering fundamentals such as material and energy balances to the design of equilibrium staged separation processes.
Design and analyze staged and packed columns.
Design and analyze flash distillation, binary and multi-component column distillation, absorption, stripping, and extraction processes
Selection of separation technology

Prerequisites by Topics: Chemical engineering thermodynamics, Mass and energy balances, Computer literacy and basic skills

Lecture Topics:
Thermodynamics/Equilibrium
Flash Distillation
Column Distillation: Introduction, External Balances
Column Distillation: Internal Stage-by-Stage Balances
McCabe-Thiele and Lewis Analyses
Multicomponent Distillation
Approximate Methods for Multicomponent Distillation
Complex Distillation Methods
Batch Distillation
Staged and Packed Column Design
Absorption and Stripping
Extraction

Class Schedule: Each class meets 4 hours per week for 10 weeks.

Computer Usage: Computer literacy and basic skills are required. Fortran or C++ is used for binary and multicomponent distillation calculations.

Laboratory Projects:

Professional Component: This course is designed to contribute to the students' knowledge of engineering topics, and design experience. The following considerations are included in this course: economic, environmental, health and safety, manufacturability.

Relationship to Program Outcomes:

This course relates to Program Outcomes 1, 3, 5, 11, and 13 as stated at: http://www.eng.uci.edu/dept/objective_chemical

Design Content Description:

Approach:Multiple lectures on the design of binary and multicomponent separation systems. Homework and computer problems reinforce the lecture topics.
Lectures: 100%
Laboratory Portion: 0%

Grading Criteria:

Homework:	20 %
Quizzes:	10 %
Midterm Exam:	35 %
Final Exam:	35 %
	100%

Exams and quizzes are closed book and notes. In general, exams and quizzes cannot be made up and no late homework sets will be accepted.

Estimated ABET Category Content:

Mathematics and Basic Science: 0 credit units or 0%
Engineering Science: 1 credit units or 25%
Engineering Design: 3 credit units or 75%

Prepared by: Nancy A. Da Silva **Date: June 2005**

CEP Approved: Fall 2001