

ROWAN UNIVERSITY
DEPARTMENT of CHEMICAL ENGINEERING

Course

CHE 06.314 1
Separation Processes II

Time

Spring 2007
M 12:15 - 1:30 PM (Rowan 340)
W 10:50 - 12:05 PM (Rowan 102)
F 12:15 - 3:00 PM (Rowan 340)

Instructors

Dr. Brian G. Lefebvre
139 Rowan Hall (256-5338)
lefebvre@rowan.edu
Office hours as posted

Dr. C. Stewart Slater
336 Rowan Hall (256-5312)
slater@rowan.edu
Office hours as posted

Course Description

This course is the second course of a two semester sequence in mass transfer and separation processes. The course presents several separation processes and their relevant theory, design and applications for gas, liquid and solid separation in both traditional and emerging industries. These processes include distillation; adsorption and chromatography; membrane separations, reverse osmosis and gas permeation; and solid-liquid separations, centrifugation and particle filtration.

Pre-requisites: Process Fluid Transport (CHE 06.309), Separation Processes I (CHE 06.312)

Text

“Transport Processes and Separation Process Principles,” 4th Ed., C. Geankoplis, Prentice Hall Publishers, Upper Saddle River, NJ, 2003.
Hand-outs, and selected readings provided

Web resources

Web CT; login at <http://webct.rowan.edu/>

Objectives

- Apply vapor-liquid equilibrium data and relationships to distillation
- Analyze binary distillation using the McCabe-Thiele method
- Analyze multicomponent distillation using the FUG method and ASPEN simulator
- Understand the governing principles of adsorption and chromatography processes
- Apply equilibrium data to various adsorption isotherms and determine constants
- Understand adsorption operations using batch systems and packed columns for gas and liquid separations
- Apply chromatography as a selective separation device for multicomponent mixtures
- Understand the basic differences (theory, design and applications) between the family of membrane processes
- Apply membrane mass transfer and design equations to solve system parameters for some of the more common membrane operations, i.e., reverse osmosis and gas permeation
- Understand the operation, principles and design of solid-liquid separation processes such as centrifugation and particle filtration and their governing relationships

Content

Tentative Week/Topic Schedule Lefebvre/Slater

Week	Dates – M, W, F			Topic (Geankoplis Chapter)
1		Jan 17	19	Introduction Distillation (Ch 11)
2	Jan 22	24	26	Distillation (Ch 11)
3	Jan 29	Jan 31	Feb 2	Distillation (Ch 11)
4	Feb 5	7	9	Distillation (Ch 11), Membranes (13), Exam I
5	Feb 12	14	16	Membrane Processes (Ch 13)
6	Feb 19	21	23	Membrane Processes (Ch 13)
7	Feb 26	Feb 28	Mar 2	Membrane Processes (Ch 13)
8	Mar 5	7	9	Membrane Processes (Ch 13), Exam II
9	Mar 12 <i>No Class</i>	14 <i>No Class</i>	16 <i>No Class</i>	No Class – Spring Break
10	Mar 19	21	23	Centrifugation (Ch 14)
11	Mar 26	28	30	Particle Filtration (Ch 14)
12	April 2	4	6 <i>No class</i>	Adsorption (Ch12)
13	April 9	11	13	Adsorption (Ch 12)
14	April 16	18	20	Chromatography (Ch 12)
15	April 23	25	27	Chromatography (Ch 12)
16	April 30	* X		*Final Exam (Finals wk, May 1-7)

Exam I covers Distillation

Exam II covers Membrane Processes

Final Exam covers Adsorption/Chromatography, Solid-Liquid Separations and Distillation, Membranes

Topics may be changed due to time constraints, etc. Students will be informed of changes in course policy and conduct as appropriate. You are responsible for all material presented in class, texts, handouts, assigned readings, homework, etc.

Grading Policy:

Exam I (20%), Exam II (20%), Final Exam (40%)

Homeworks, Mini-projects (20%) (done on a team basis)

Individual scores on team-based items will be modified using Felder's "Peer Rating of Team Members" form

Attendance

Attendance is consistent with University policy

Professionalism and Safety

Responsibilities: To succeed in this class, you should come to class prepared, ask questions on points that you do not understand, and attempt all homework problems. In this class, if you have not worked diligently on the homework assignments, don't follow what is covered in class, and do not read the book (including the examples/exercises that are in the book), the tests will be difficult. Doing only one third of the homework problems and not reading the book while your teammates do the work is a recipe for disaster in this course. I will lecture on material (that covered in the book and some not), make myself available for questions both in and out of class, attempt to answer all serious questions, and administer fair but demanding exams.

Policies:

1. Regular attendance is expected. You are responsible for all material whether you are in class or not.
2. Proper safety protocols must be followed in the laboratory at all times.
3. Late work of any kind will not be graded, you have multiple team members – one must be able to hand in the work for the group on time.
4. Collaboration in study teams for homework is acceptable and encouraged, but all tests must be done independently.
5. If you feel that a test problem has been graded improperly (except for miscalculation of points), you must resubmit the problem within 24 hours along with a written appeal and explanation. Upon receipt of this formal appeal, I will regrade the problem. This means that your score may go up or down.
6. Academic dishonesty of any kind will result in failure for the course. Academic dishonesty includes, but is not limited to, copying on an exam, submitting work performed by another as your own, tampering with or in any way altering another persons work without their knowledge and consent, and misrepresenting your contribution to a group project.

Your academic success is important. If you have a documented disability that may have an impact upon your work in this class, please contact me. Students must provide documentation of their disability to the Academic Success Center in order to receive official University services and accommodations. The Academic Success Center can be reached at 856-256-4234. The Center is located on the 3rd floor of Savitz Hall. The staff is available to answer questions regarding accommodations or assist you in your pursuit of accommodations. We look forward to working with you to meet your learning goals.