University of Alabama  
Department of Chemical and Biological Engineering  

CHE 305 – Separation Processes  
Spring 2015  

Instructor:  Dr. Stephen Ritchie  
3476 SEC2  
348-2712  
sritchie@eng.ua.edu  

Office Hours:  MWF 8:30 – 9:30 AM  


Textbook Companion Website:  
http://bcs.wiley.com/he-bcs/Books?action=index&itemId=0470481838&bcsId=6005  

Time and Place:  MWF 10:00 – 10:50 AM, 126 HM Comer  
Exam Time and Place:  W 5:00 – 6:30 PM, 126 HM Comer  
Course Website:  http://www.bama.ua.edu/~sritchie/teaching.html  

Additional Materials:  
The following materials may aid you in understanding the material in this course:  

Course Pre/Co-Requisites:  
CHE 255 (Chemical Engineering Thermodynamics) – Prerequisite  

Course Description:  
Separation processes are ubiquitous in the chemical processing industry. In general, the cost of separation may be 40-70% of the capital and operating cost of a plant. Hence, a good understanding of separations is crucial for the practicing chemical engineer. This course will provide a unified approach to the basic calculations and fundamental concepts involved in the design of equilibrium-stage separations processes and continuous contacting equipment. Computer proficiency is required for a passing grade in this course.  

Topics:  
1. Thermodynamics and Separations  
2. Single Stage Separations  
3. Binary Distillation  
4. Basics of Mass Transfer  
5. Absorption and Stripping
6. Extraction
7. Adsorption

Expected Outcomes:
Students will have the ability to explain/design/analyze:
1. how thermodynamics is used to obtain parameters necessary for the design of separation unit operations,
2. single stage equilibrium separators,
3. distillation columns for the separation of binary mixtures,
4. basic equations for mass transfer,
5. driving forces for mass transfer,
6. solvent and surface area driven separations.

Important Dates (regular exam dates subject to change):
January 7   First class session
January 19   Martin Luther King, Jr. Holiday (no class)
February 11  Exam I
March 14 – March 22  Spring Break
March 25  Exam II
April 28  Final Exam (11:30 AM – 2 PM)

Lectures and Reading:
Reading assignments will parallel the notes. Notes for each chapter are available on the course website. It is strongly encouraged that you read these before the lecture as they will greatly enhance your grasp of the material and make the lectures much more useful. Please note that lectures are for clarification of the course material, and that quizzes and tests may contain material from the reading that has not been explicitly covered in the lecture.

Quizzes:
There will be announced quizzes during the semester. These will be short (~ 10 minutes) and will be held at the end of the class period. One quiz score may be dropped.

Homework Assignments:
Homework will be assigned approximately once a week and will be due at the beginning of class. No late homework will be accepted. Homework assignments should be completed independently. The use of spreadsheets and simulation software is encouraged where appropriate. Sample calculations should be included when not apparent from the output. One homework score may be dropped.

Design Project:
You will be required to design a separation process on ChemCAD. This will be accompanied by a report and hand calculations. More information will be dispensed during the semester.
Attendance and Make-up Policy:
On-time and regular attendance is expected. There are a number of in-class exercises, quizzes, and exams during the semester besides normal interactions during lecture that make attendance important. I recognize that you are adults, however, and you are free to choose not to attend. This decision has consequences, and there are no make-up opportunities for missed quizzes or exams. One homework score and one quiz score may be dropped during the semester.

Grading:
At worst a straight grading scale will be used in this course. The grade of A+ will only be assigned for 100% or greater. There will be one extra credit assignment during the course.

Grade Composition:

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>15%</td>
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<tr>
<td>Design Project</td>
<td>10%</td>
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<tr>
<td>Quizzes</td>
<td>15%</td>
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<tr>
<td>Exams (2)</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
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Academic Integrity:
All students in attendance at the University of Alabama are expected to be honorable and observe standards of conduct appropriate to a community of scholars. The University of Alabama expects from its students a higher standard of conduct than the minimum required to avoid discipline. I expect everyone to abide by the Academic Honor Pledge. Violators will be dealt with in the strictest possible manner in accordance with University policy.