Prairie View A&M University
Chemical Engineering Department
CHEG 3043-P01: Equilibrium-Stage Separation Processes
Spring 2018 Syllabus

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Office Hours: M: 2-4:30 pm; W: 8 am- 12 pm; R: 8-10:30 am

COURSE

Meeting Time: TR 12:30 - 1:50 p.m. Electrical Engineering Building 115
Prerequisites: CHEG 2053, and CHEG 3053
Required Text: Geankoplis, C.J., Transport Processes and Separation Process Principles. 4th Edition, ISBN: 0-13-101367-X [***McCabe, Smith, Harriott reference***]
Evaluation: This course will utilize the following instruments to determine student grades and proficiency of the learning outcomes for the course. The course has been designed to ensure that students acquire a solid grounding in ABET Outcomes **a, c,** and **e**.
Description: Applications of heat and mass balances and phase equilibria to the design of staged separation processes. Use of graphical methods such as McCabe Thiele. Application to distillation, absorption, stripping, and extraction.
Goals: The goal of this course is to teach students the science and design of separation processes.
Outcomes: The student will have demonstrated the ability to:

1. Apply conservation laws.
2. Use modern calculation tools in the design of separation equipment.
3. Identify, formulate, and solve complex separation problems.
4. Design complex separation equipment.

GRADING POLICY

Item	Points
Tests (2)	300
Homework/Computer	150
Quiz	150
Final	200
ASPEN	200

		Points
Grade Scale:	A =	1000 - 900
	B =	899 - 800
	C =	799 - 700
	D =	699 - 600
	F =	< 600

Tests: Tests will be closed book examinations with any needful information provided. NO MAKE-UP EXAMS WILL BE GIVEN. A missed exam due to an excusable absence will not be added into the students Test Average; therefore, only two tests will count for that student. Only the hardcopy of the text maybe used on any exams. No electronic device will be allowed including iPads and eReaders.
Homework: Homework assignments will be given each week. No late assignments will be accepted. Each assignment must be submitted on engineering paper that can be purchased at the bookstore or other retailers. Copying of assignments will not be allowed. Individuals associated with the sharing of solutions will be given a zero and referred to the department head. Homework assignment will cover Excel and Aspen.
Quiz: Open and closed-book quizzes will be given throughout the semester. Quizzes will be based on material covered in class and homework assignments.
Participation: Class time is an opportunity for the students to learn the material being covered NOT time for socializing. All students are expected to participate in class discussions and activities. Moreover, it is university policy that all students attend class regularly.
ASPEN: Four assignments on individual processes.
Final: Comprehensive final exam will have a closed book and open book section.

TENTATIVE LECTURE SCHEDULE

Week	Lecture Topic	Geankopolis	McCabe et al	No. of lectures	Grade
1	Review of syllabus; Mass Transfer and Diffusivity	Ch. 6	Ch. 17	2 lectures	
2	Mass Transfer and Diffusivity ***Separation Quiz***	6	17	2 lectures	Q1
3	Evaporation/Contact Stages	8	16 20	2 lectures	H1
4	Absorption	12	23	2 lectures	AS1
5	Distillation	11	21	2 lectures	H2
6	Distillation ***Exam I on Thursday, February 22^{h}, 2018***	11	21	1 lecture	E1
7	Distillation	11	21	2 lectures	AS2
8	Distillation ***Distillation Quiz***	11	21	2 lectures	Q2
9	SPRING BREAK				
10	Leaching/Extraction	12	23	2 lectures	H3
11	Leaching/Extraction (Handout)	12	23	2 lectures	H4, Q3
12	Adsorption	12	23	2 lectures	AS3
13	Crystallization/Filtration	14	27	2 lectures	H5
14	Crystallization/Filtration ***Exam II on Tuesday, April 17th, 2018***	14	27	1 lecture	E2
15	***AIChE Spring Meeting***				AS4
16	Review Day Final Exam: ***Tuesday, May 8, 2018*** ***10:30 a.m. – 12:30 p.m.***			Review	FE

**This schedule represents a tentative schedule only and is subject to change at the instructor's discretion.*

CLASSROOM CONDUCT

- Students will conduct themselves in a manner that is respectful to their fellow classmates and the instructor at all times.
- **Cell phones MUST be turned off and stored during class time.**
- Students will arrive to class prepared to discuss and participate in the lesson. NOTICE: Class participation is added to the course grade.
- Students should dress appropriately for class.
- Students who disrupt class will be asked to leave. No sleeping allowed!
- No headphones are allowed during class including quizzes and exams.

UNIVERSITY RULES AND PROCEDURES

Disability statement (See Student Handbook)

Students with disabilities, including learning disabilities, who wish to request accommodations in class should register with the Services for Students with Disabilities (SSD) early in the semester so that appropriate arrangements may be made. In accordance with federal laws, a student requesting special accommodations must provide documentation of their disability to the SSD coordinator.

Academic misconduct (See Student Handbook)

You are expected to practice academic honesty in every aspect of this course and all other courses. Make sure you are familiar with your Student Handbook, especially the section on academic misconduct. Students who engage in academic misconduct are subject to university disciplinary procedures.

Forms of academic dishonesty

1. Cheating: deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not mastered; giving or receiving aid unauthorized by the instructor on assignments or examinations.

2. Academic misconduct: tampering with grades or taking part in obtaining or distributing any part of a scheduled test.

3. Fabrication: use of invented information or falsified research.

4. Plagiarism: unacknowledged quotation and/or paraphrase of someone else's words, ideas, or data as one's own in work submitted for credit. Failure to identify information or essays from the Internet and submitting them as one's own work also constitutes plagiarism.

Nonacademic misconduct (See Student Handbook)

The university respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with either (1) the instructor's ability to conduct the class, (2) the inability of other students to profit from the instructional program, or (3) campus behavior that interferes with the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated by the Dean of Students under nonacademic procedures.

Sexual misconduct (See Student Handbook)

Sexual harassment of students and employers at Prairie View A&M University is unacceptable and will not be tolerated. Any member of the university community violating this policy will be subject to disciplinary action.

Attendance Policy

Prairie View A&M University requires regular class attendance. Excessive absences will result in lowered grades. Excessive absenteeism, whether excused or unexcused, may result in a student's course grade being reduced or in assignment of a grade of "F". Absences are accumulated beginning with the first day of class.

Student Academic Appeals Process

Authority and responsibility for assigning grades to students rests with the faculty. However, in those instances where students believe that miscommunication, errors, or unfairness of any kind may have adversely affected the instructor's assessment of their academic performance, the student has a right to appeal by the procedure listed in the Undergraduate Catalog and by doing so within thirty days of receiving the grade or experiencing any other problematic academic event that prompted the complaint.

COURSE OUTCOMES

Three major course outcomes will be assessed in this course using a number of performance criteria. The Course outcomes and their performance criteria are detailed below:

Course Outcome 1: This outcome is the same as program outcome a.
Students will have the ability to apply knowledge of mathematics, science, and engineering.

The two performance criteria used to measure this outcome include:

1. **Ability to apply knowledge of mathematics.**
   (i) Ability to solve for an unknown process variable using general algebra and linear algebra techniques.
   (ii) Ability to apply calculus and differential equation principles.
   (iii) Ability to interpret and construct graphs and tables such as a triangle plot and calculating area under a curve.

2. **Ability to apply conservation laws.**
   Students are able to:
   (i) Write and reduce mass balance equations around trays, stages, or overall processes.
   (ii) Write and reduce energy balance equations around trays, stages, or overall processes.

Course Outcome 2: This outcome is the same as program outcome c.
Students will have the ability to design a system, a component, or a process to meet desired needs.

The two performance criteria used to assess this outcome consist of:

1. **Ability to use computer software for the design of separation units.**
   (i) Graph equilibrium data using Excel.
   (ii) Simulate separation processes using computer software such as Aspen/Hysys and risk in Aloha.
   (iii) Graph operating lines such as the stripping line and enriching line in Excel.

2. **Ability to design separation processes.**
   Students are able to:
   (i) Identify the phases present.
   (ii) Identify the type of separation process needed.
   (iii) Evaluate design parameters.
   (iv) Determine the number of stages or trays needed for a process.
   (v) Find feed points for columns and towers.
   (vi) Present design results in memos and reports based on guidelines.

Course Outcome 3: This outcome is the same as program outcome e.
Students will have the ability to identify, formulate, and solve engineering problems.

The three performance criteria used to measure this outcome include:

1. **Ability to identify and formulate the separation process.**
   Given a problem, the student is able to:
   (i) Describe each separation process covered.
   (ii) Identify the component(s) that will separate under operating conditions.
   (iii) Depict the process in a flowchart.
   (iv) Identify phases associated with the separation processes.
   (v) Label separation streams with flow rates and composition.

2. **Ability to solve complex separation problems.**
   Given a problem, the student is able to:
   (i) Determine phase composition based on operating conditions.
   (ii) Utilize Henry's and Raoult's laws to determine vapor and liquid composition.
   (iii) Calculate compositions for single stage and multiple stage systems.
   (iv) Calculate mass fluxes, molar fluxes, and overall fluxes.
   (v) Calculate tower heights, number of trays, and efficiency.