Prairie View A&M University
Chemical Engineering Department
CHEG 3043-P02: Separation Processes
Spring 2019 Syllabus

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Office Hours: M 5:00-6:60PM T 9:30 AM. to 1:00 PM

COURSE
Meeting Time: MW 3:30 - 4:50 p.m.
Location: Juvenile Justice Building 257

Prerequisites: CHEG 2053, and CHEG 3053

Required Text: Geankoplis, C.J., Transport Processes and Separation Process Principles. 5th 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 Outcome 1.

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 reaction engineering processes.

Outcomes: The student will have demonstrated the ability to:

1. Identify and formulate for processes involving separation using principles of engineering, mathematics, and science.
2. Solve complex separation process problems using graphing and computing tools. Identify, formulate, and solve complex separation problems.

GRADING POLICY

ITEM	Percentage
Homework	5%
Assignments/quizzes/participation	15%
3 Exams	45%
Final (Comprehensive) Exam	20%
Project (ASPEN)	15%
Total	**100**

Grade Scale
A = 100 - 90
B = 89 - 80
C = 79 - 70
D = 69 - 60
F = 59 or below

Tests: Tests will be closed book or open 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: 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. Attendance is added in to the participation grade.

Project: Group projects will be discussed at a later time and will be due at the end of the semester. The ASPEN assignments will cover various separation processes and the units associated with them. The final solution of the assignments will require either a MEMO or a technical report that discusses the results of the assignment. Students should not print insignificant tables and graphs to simply add pages to the report. Assignments should be completed by individual students only and submitted in class and online.

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
1 Review of syllabus;	Introduction to Mass Transfer	Ch. 18	Ch. 17	2 lectures
	Steady state Mass Transfer	19	17	2 lectures
2	Convective mass transfer	21		2lectures
3	Absorption	22		2 lectures
	ASPEN Assignment 1			
3	Absorption/Humidification	22/23		2 Lectures
5	Humidification	23		1 lecture
	Exam I on Wednesday, February 13, 2019			
6	Distillation	26		2 lecture
7	Distillation	26	21	2 lectures
8	Distillation	26	21	2 lectures
	ASPEN Assignment 2			
9	SPRING BREAK			
10	Distillation	27	23	1 lectures
	EXAM II on Wednesday March 20 2019			
11	Liquid Liquid Extraction	27	23	2 lectures
12	Liquid Liquid Extraction	27	23	2 lectures
	ASPEN Assignment 3			
13	Liquid Liquid Extraction	27	23	1 lectures
	Exam III on Monday, April 24, 2019			
14	Evaporation/ Drying	32/33		2 lectures
15	Crystallization	29		2 lectures
	ASPEN Assignment 4			
16	Review			
	Final Exam:			

*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.

NOTICE: **Class participation is a part of your grade.**

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 engagingin 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 1.
Students will have the ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

1. Identify and formulate for processes involving separation using principles of engineering, mathematics, and science.

Given a complex engineering problem, the students are able to:

(i) Solve for an unknown process variable using general algebra and linear algebra techniques.
(ii) Apply calculus and differential equation principles when determining diffusion.
(iii) Interpret and construct graphs and tables such as a triangle plot and calculating area under a curve.
(iv) Write and reduce mass balance equations around trays, stages, or overall processes.
(v) Write and reduce energy balance equations around trays, stages, or overall processes.
(vi) Identify the phases present and select an appropriate method of separation.
(vii) Depict a process in a flow diagram labeling unknown and known quantities.
(viii) Utilize Henry's and Raoult's laws to determine vapor and liquid composition.
(ix) Calculate compositions for single stage and multiple stage systems using Fenske equation.
(x) Calculate mass fluxes, molar fluxes, and overall fluxes using correct formulas.
(xi) Calculate tower heights, number of trays, and efficiency using correct formulas.

2. Solve complex separation process problems using graphing and computing tools.

Given a CEP that has been formulated, students are able to:

(i) Graph equilibrium data using Excel.
(ii) Simulate separation processes using computer software such as Aspen/Hysys.
(iii) Graph operating lines such as the stripping line and enriching line in Excel.
(iv) Plot equilibrium data and operating lines on an XY plot and determine the number of stages/trays and the feed location.
(v) Discuss simulation results and recommendations in memos and reports.