PRAIRIE VIEW A&M UNIVERSITY
Roy G. Perry College of Engineering

COURSE SYLLABUS
CHEG 3043 – Separations
Spring 2021
Hybrid/Online Course Format

TIME: TR 2:55 – 4:15 PM
Credit Hours: 3

DESCRIPTION: Equilibrium Stage Separation Processes. (3-0)
Credit 3 semester hours. Applications of heat and mass balances and phase equilibria to the design of staged separation processes. Use of graphical methods such as McCabe Thiele for the treatment of binary systems. Application to distillation, absorption, stripping, and extraction.

PREQUISITE: CHEG 2053 and 3053.

INSTRUCTOR Dr. Irvin W. Osborne-Lee, Professor of Chemical Engineering
Office: Virtual, Phone (936) 261-9406, Mobile (281) 217-1169
Email: oslee@pvamu.edu

OFFICE HOURS: MWF 9-11:50 AM or by appointment. Email request for Zoom Video Conference Meeting.


SYNOPSIS: Separation processes are an integral part of all chemical manufacturing plants. They may represent a significant or dominant source of energy consumption in the plant. This course introduces methods of analyzing separations processes on the basis of thermodynamic equilibrium, mass balances, and energy balances, applied to distillation, absorption, and other modern separation processes. The design project will enable students to apply these principles to an open-ended problem.
Course Objectives and Anticipated Outcomes

COURSE OBJECTIVES: Expressed as anticipated outcomes with regard to student skills and abilities, the objectives for this course are as follows:

1. Demonstrate knowledge of nomenclature, dimensions, and units relevant to this course topic.

2. Apply key equations to single and multiple stage separation processes, as follows:
   
   A. Thermodynamic equilibrium
   B. Conservation of mass, and
   C. Conservation of energy.

3. Develop and apply equations and solution methods for analyzing equilibrium staged separation processes.

4. Simulate equilibrium staged separation processes to determine the degree of separation achieved, and design equilibrium staged separation processes to achieve a desired degree of separation using the following methods:
   
   A. Graphical analysis methods
   B. Computer based simulation

5. Decide between alternative methods of separation to determine which is most applicable for a given separation process.

MEASURED STUDENT OUTCOMES: As described below, student will

- demonstrate an understanding of, and ability to apply knowledge of, mathematics, science and engineering concepts; and
- demonstrate an ability to identify, formulate and solve complex engineering problems.

ATTENDANCE:

This course will meet virtually. Scheduled meetings are required. Additional office hour sessions will be held on request with questions answered, concepts discussed, and tips given on assignment completion. All class activities and assignments are mandatory. Missing assignments will receive a grade of zero on the due date. Assignments submitted after the due date may receive reduced credit or no credit at all. Missing or late assignments can earn the student a failing grade (F) for the course. (Note that late or missing assignments may be considered as excused, in line with excused absences as for face-to-face courses. Please see the official university policy on class attendance and excused absences.)
GRADING POLICY:
The overall grade will be based on the set of course assignments, including exercises, quizzes, exams, projects, and other activities, as shown in the table below. There may be major assignments such as exams or projects at midterm and during the final exam period. Exercises and quizzes will occur on a daily to weekly basis. There will be at multiple reports, based on a project assignments. The grade will be composed as shown below.

### Typical Grade Composition

<table>
<thead>
<tr>
<th>Grade Element</th>
<th>Weight</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion/Forum Activities</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Quizzes and Exercises</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Video Presentations (YouTube style)</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Project Reports (oral and/or written)</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Overall Grade</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

| Office Hour Participation                  | +10%   |        |
| Other Extra Credit                        |        |        |

**Adjusted Grade**

1 The *Actual* column may be used to record your grade elements and your overall grade (calculated as a weighted sum of the elements).

2 The regular office hours held provide an interactive mode of discussion of concepts, tips on assignment completion, and an opportunity to have questions answered. Extra credit points are earned in each active visit not to exceed the max shown.

3 Extra credit assignments may be applicable to this course and would consist of extra project work available to all. Discuss with instructor.

Letter grades will be assigned based on the numeric value of your adjusted grade (above) using a scale similar to the one below:

- **A** 90-100%
- **B** 80-89%
- **C** 70-79%
- **D** 60-69%
- **F** 00-59%

**NOTE ON SCHOLASTIC DISHONESTY:**
Please note that scholastic dishonesty will not be tolerated. Cheating or other such behaviors will result in a grade of zero (0) being assigned. All assignments are to be completed and turned in individually, unless otherwise specified by the instructor.
### TOPICS:

The topics to be covered are listed below in the approximate sequence in which they will be address. Note that the scope and sequence of topics covered are each subject to change at the instructor’s discretion.

<table>
<thead>
<tr>
<th>Calendar*</th>
<th>Topics</th>
<th>Reading Assignments</th>
<th>Key Events</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day #</strong></td>
<td><strong>Topics</strong></td>
<td><strong>Reading Assignments</strong></td>
<td><strong>Key Events</strong></td>
</tr>
<tr>
<td>1</td>
<td>Mass Transfer and diffusivity concepts and examples</td>
<td>Geankoplis 6, MSH 17, Wankat 15</td>
<td>Practice quiz</td>
</tr>
<tr>
<td>2</td>
<td>Mass Transfer and diffusivity problem solving</td>
<td></td>
<td>Quiz</td>
</tr>
<tr>
<td>3</td>
<td><strong>Topic deferred due to inclement weather:</strong> Complete asynchronously</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 &amp; 5</td>
<td>Evaporation and drying concepts and examples; Evaporation and drying operations problem solving</td>
<td>Geankoplis 8&amp;9, MSH 16&amp;20</td>
<td>Upload BP Notes, Complete Quiz, Upload Exercise</td>
</tr>
<tr>
<td>6</td>
<td>VLE review and flash calculations</td>
<td>Geankoplis 11, S&amp;H 4, Wankat 2</td>
<td>Problem Solving Test 1</td>
</tr>
<tr>
<td>7</td>
<td>Cascades, distillation columns</td>
<td>Geankoplis, S&amp;H 5, Wankat 3</td>
<td>Quiz</td>
</tr>
<tr>
<td>8</td>
<td>McCabe-Thiele analysis</td>
<td></td>
<td>Quiz</td>
</tr>
<tr>
<td>9</td>
<td><strong>Topic deferred due to inclement weather:</strong> Complete asynchronously</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 &amp; 12</td>
<td>Multiple feeds and side streams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Multicomponent distillation</td>
<td></td>
<td>Problem Solving Test 2</td>
</tr>
<tr>
<td>14</td>
<td>Column design (sizing)</td>
<td>Geankoplis 10&amp;11, S&amp;H 6&amp;7, Wankat 10</td>
<td>Quiz</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Packed column separations (absorbers and strippers)</td>
<td>Geankoplis 10, MSH 7, Wankat 12</td>
<td>Quiz</td>
</tr>
<tr>
<td>17</td>
<td>Packed column separations (absorbers and strippers)</td>
<td></td>
<td>Quiz</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>19</td>
<td>Liquid-Liquid Extraction – Ternary Systems</td>
<td>Geankoplis 12, MSH 8, Wankat 13</td>
<td>Problem Solving</td>
</tr>
<tr>
<td>20 &amp; 21</td>
<td>Liquid-Liquid Extraction – Graphical Methods</td>
<td></td>
<td>Quiz</td>
</tr>
<tr>
<td>22</td>
<td>Adsorption</td>
<td>Geankoplis12, S&amp;H 15, Wankat 18</td>
<td>Quiz</td>
</tr>
<tr>
<td>23</td>
<td>Adsorption (cont.)</td>
<td>Chap. 15, pp. 831-848.</td>
<td>Quiz</td>
</tr>
<tr>
<td>24 &amp; 25</td>
<td>Membrane Processes</td>
<td>Geankoplis 13, MSH 14, Wankat 17</td>
<td>Problem Solving</td>
</tr>
<tr>
<td>26</td>
<td>Project work</td>
<td></td>
<td>Quiz</td>
</tr>
<tr>
<td><strong>Added 3-Hour Session</strong></td>
<td><strong>Supplemental meeting due to missed class meetings:</strong> Simulation Saturday</td>
<td>Meet in computer lab with social distancing and masks or participate virtually or complete asynchronously</td>
<td>Complete simulation assignments</td>
</tr>
<tr>
<td>27</td>
<td>Project work</td>
<td></td>
<td>Quiz</td>
</tr>
<tr>
<td>28 &amp; 29</td>
<td>Project work</td>
<td></td>
<td>Quiz</td>
</tr>
<tr>
<td>30</td>
<td>Upload video presentation &amp; paper style report for final exam grade</td>
<td></td>
<td>Project Due</td>
</tr>
</tbody>
</table>

*Schedule of topics and readings are subject to change by the instructor.*
Student Support and Success

John B. Coleman Library
The library and its partners have as their mission to provide resources and instructional material in support of the evolving curriculum, as a partner in Prairie View A&M University's mission of teaching, research, and service and to support the University's core values of access and quality, diversity, leadership, relevance, and social responsibility through emphasis on ten key areas of service. It maintains library collections and access both on campus, online, and through local agreements to further the educational goals of students and faculty. https://www.pvamu.edu/library/
Phone: 936-261-1500

University Tutoring Center
The Center offers tutoring via peer tutoring. The services include workshops (i.e., Save My Semester, Recalculate Your Route), seminars (i.e., Tools You Can Use: TI-84), group review sessions (i.e., College Algebra Topic Reviews, GRE Preparation), group study opportunities (i.e., TSIA, HESI, Study Break, Exam Cram), and test-taking strategies (How to take Notes, Study Buddy, 5 Day Study Guide). The Learning Curve is a nationally certified tutoring program through the National Tutoring Association. The peer tutors are trained and certified by the coordinator each semester. Location: J.B. Coleman Library Rm. 307. Phone: 936-261-1561

The Student Academic Success Center
The Student Academic Success Center is designed to help Prairie View students in their second year and beyond navigate towards graduation by providing the following services: Academic Advisement, Targeted Tutorials for Personalized Learning, Campus-Wide Referrals, and Academic & Social Workshops. Location: J.B. Coleman Library Rm. 306. Phone: 936-261-1040

Writing Center
The Writing Center provides student consultants on all aspects of the writing process and a variety of writing assignments. Writing Center consultations assist students in such areas as prewriting, brainstorming, audience awareness, organization, research, and citation. Students taking on-line courses or courses at the Northwest Houston Center or College of Nursing may consult remotely or by email. Location: Hilliard Hall Rm. 121. Phone: 936-261-3724

Student Counseling Services
The Student Counseling Services unit offers a range of services and programs to assist students in maximizing their potential for success: short-term individual, couples, and group counseling, as well as crisis intervention, outreach, consultation, and referral services. The staff is licensed by the State of Texas and provides assistance to students who are dealing with academic skills concerns, situational crises, adjustment problems, and emotional difficulties. Information shared with the staff is treated confidentially and in accordance with Texas State Law. Location: Owens-Franklin Health Center Rm. 226. Phone: 936-261-3564

Testing
The Department of Testing administers College Board CLEP examinations, the HESI A2 for pre-nursing majors, LSAT for law school applicants and MPRE for second-year law students, the Experiential Learning Portfolio option, the Texas Success Initiative (TSI) Assessment, which determines college readiness in the state, and exam proctoring, among other service such as SAT and ACT for high school students. Phone: 936-261-3627

Office of Disability Services
As a federally-mandated educational support unit, the Office of Disability Services serves as the repository for confidential disability files for faculty, staff, and students. For persons with a disability, the Office develops individualized ADA letters of request for accommodations. Other services include: learning style inventories, awareness workshops, accessibility pathways, webinars, computer laboratory with adapted hard and software, adapted furniture, proctoring of non-standardized test administrations, ASL interpreters, ALDs, digital recorders, livescribe, Kurtzweil, and a comprehensive referral network across campus and the broader community. Location: Evans Hall Rm. 317. Phone: 936-261-3585

Veteran Services
Veterans Services works with student veterans, current military and military dependents to support their transition to the college environment and continued persistence to graduation. The Office coordinates and certifies benefits for both the G.I. Bill and the Texas Hazlewood Act. Location: May Hall Rm. 118. Phone: 936-261-3563
Office for Student Engagement
The Office for Student Engagement delivers comprehensive programs and services designed to meet the co-curricular needs of students. The Office implements inclusive and accessible programs and services that enhance student development through exposure to and participation in diverse and relevant social, cultural, intellectual, recreational, community service, leadership development and campus governance. Location: Memorial Student Center Rm. 221. Phone: 936-261-1340

Career Services
Career Services supports students through professional development, career readiness, and placement and employment assistance. The Office provides one-on-one career coaching, interview preparation, resume and letter writing, and career exploration workshops and seminars. Services are provided for students at the Northwest Houston Center and College of Nursing in the Medical Center twice a month or on a requested basis. Distance Learning students are encouraged to visit the Career Services website for information regarding services provided. Location: Evans Hall Rm. 217. Phone: 936-261-3570

University Rules and Procedures

Disability Statement (Also See Student Handbook):
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Evans Hall, Room 317, or call 936-261-3585/3.

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.

Title IX Statement
Prairie View A&M University (PVAMU) is committed to supporting students and complying with the Texas A&M University System non-discrimination policy. It seeks to establish an environment that is free of bias, discrimination, and harassment. If you experience an incident of sex- or gender-based discrimination, including sexual harassment, sexual assault or attempted sexual assault, we encourage you to report it. While you may talk to a faculty member about an incident of misconduct, the faculty member must report the basic facts of your experience to Ms. Alexia Taylor, PVAMU's Title IX Coordinator. If you would like to speak with someone who may be able to afford you privacy or confidentiality, there are individuals who can meet with you. The Title IX Coordinator is designated to handle inquiries regarding non-discrimination policies and can assist you with understanding your options and connect you with on- and off-campus resources. The Title IX Coordinator can be reached by phone at 936-261-2123 or in Suite 013 in the A.I. Thomas Administration Building.

**Class Attendance Policy (See Catalog for Full Attendance Policy)**

Prairie View A&M University requires regular class attendance. Attending all classes supports full academic development of each learner whether classes are taught with the instructor physically present or via distance learning technologies such as interactive video and/or internet.

Excessive absenteeism 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 during regular semesters and summer terms.

**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 Catalog and by doing so within thirty days of receiving the grade or experiencing any other problematic academic event that prompted the complaint.

**TECHNICAL CONSIDERATIONS**

**Minimum Recommended Hardware and Software:**
- Intel PC or Laptop with Windows 7; Mac with OS X; Smartphone or iPad/Tablet with Wi-Fi
- High speed Internet access
- 8 GB Memory
- Hard drive with 320 GB storage space
- 15” monitor, 800x600, color or 16 bit
- Sound card w/speakers
- Microphone and recording software
- Keyboard & mouse
- Most current version of Google Chrome or Firefox

**Note:** Be sure to enable Java & pop-ups in the Web browser preferences

**Participants should have a basic proficiency of the following computer skills:**
- Sending and receiving email
- A working knowledge of the Internet
- Proficiency in Microsoft Word (or a program convertible to Word)
- Proficiency in the Acrobat PDF Reader
- Basic knowledge of Windows or Mac O.S.

**Netiquette (online etiquette):**

Students are expected to participate in all discussions and virtual classroom chats as directed. Students are to be respectful and courteous to others on discussions boards. Foul or abusive language will not be tolerated.

**Technical Support:**

Students should go to [https://mypassword.pvamu.edu/](https://mypassword.pvamu.edu/) if they have password issues. The page will provide instructions for resetting passwords along with whom to contact if login issues persist. For other technical questions regarding eCourses, call the Center for Instructional Innovation and Technology Services at 936-261-3283
Communication Expectations and Standards:
Emails or discussion postings will receive a response from the instructor, usually in less than 48 hours. Urgent emails should be marked as such. Check regularly for responses.

Discussion Requirement:
Online courses often require minimal to no face-to-face meetings. However, conversations about the readings, lectures, materials, and other aspects of the course can take place in a seminar fashion. This will be accomplished by the use of the discussion board. The exact use of discussion will be determined by the instructor.

It is strongly suggested that students type their discussion postings in a word processing application and save it to their PC or a removable drive before posting to the discussion board. This is important for two reasons: 1) If for some reason your discussion responses are lost in your online course, you will have another copy; 2) Grammatical errors can be greatly minimized by the use of the spell-and-grammar check functions in word processing applications. Once the post(s) have been typed and corrected in the word processing application, it/they should be copied and pasted to the discussion board.