Separation Processes (CHBE 3225) Spring 2022
Lecture: TBD

Instructor: Professor Ryan Lively, ryan.lively@chbe.gatech.edu, 404.894.8795 **Office Hours:** TBD
ES&T 2206
Teaching Assistants: TBD **Office Hours:** TBD
Grader: TBD **Office Hours:** TBD

Note: A calendar of available help sessions will be attached once finalized (*"Help will always be given [in Separations] to those who ask for it."*)

Textbook: Seader, Henley, Roper, Separation Process Principles, Wiley, 4th edition. Complete reading before each lecture—this will maximize the amount of information you get out of each class.

Course Prerequisites: Undergraduate Semester level CHBE 3200 Minimum Grade of C and Undergraduate Semester level CHBE 3210 Minimum Grade of C and (Undergraduate Semester level CHBE 3110 Minimum Grade of C or Undergraduate Semester level CHBE 3130 Minimum Grade of C)

Overall Course Objective: Teach the *fundamental aspects of separation processes, show how the principles are applied to real process technologies* and provide a solid foundation for all subsequent ChBE courses

Instruction: This is an in person class on the Georgia Tech Atlanta campus and attendance is expected each class period. Pre-recorded videos from prior semesters or recordings of class may be provided by the instructor at his discretion, but providing recordings will not be the default.

Course Outcomes:

1. Calculate the properties (e.g., compositions and flow rates) of product streams, as well as energy requirements, for single-stage operations such as flash tanks.
2. Identify separations equipment of various types and their components.
3. Design multistage separation systems for specific operations involving distillation, absorption, stripping, extraction/leaching, crystallization.
4. Calculate the properties of membrane units for separations.
5. Understand certain design fundamentals for bioseparations.
6. Use computer modeling to design and simulate complex separation systems.
7. Evaluate competing separation technologies on factors such as simplicity, reliability, and cost.

Grading System:
Homework: 10% // Quizzes 10% // Project: 10% // Exams (2): 40% // Final Exam: 30%

Letter grades will be assigned based on the numerical distribution of the class, but 90-100 will always be an A, 80-89 a B and so forth. There is no predetermined number of As, Bs, etc. Grade estimates are given after exams.

Homeworks:

Homework is a very important learning component of the class. It is the primary way by which you can learn the course material and it is specifically designed to extend the topics from the lectures. Learning involves getting stuck, making mistakes, and correcting those mistakes.

• Each homework problem will be graded on a three point scale: 0 points for no answer or an irrelevant answer, 1 point for submitting a mostly incorrect solution, 2 points for submitting a mostly correct solution, and 3 points for submitting a correct solution.

• Homework must be done neatly and according to the online submission guidelines and submitted via Canvas (Instruction file on canvas "Guidelines for formatting problem set answers"). Each homework assignment is due at 11:59 PM on the date it is due. If an emergency, medical situation or other scenario accompanied by a note from the Dean of Students occurs, please contact the instructor.

• The lowest homework grade will be dropped in calculation of your final course grade.

• All homework must be entirely a student's own work. Discussion with other students on homework is encouraged, but copying from one another will be considered academic misconduct. Students are strongly encouraged to work on the homework and extra problems from the book. Note that since the homework represents 10% of the course grade, neglecting the homework will jeopardize the measurement of your performance in the class. You can ask questions regarding your homework, although you should try to think about the problems before asking the instructor or the TA(s).

• Homework answers will be posted within 30 minutes of the due date to enable review and studying, so no late assignments will be accepted.

Quizzes:

Around 8 quizzes will be given through the semester on the work **addressed by the homework problems and in lectures.** These will be 5-10 minutes at the beginning of the lectures. They *may* be announced one or two lectures in advance. Experience shows that students who work through the homework problems in detail often have the most success on the exams and quizzes. The quizzes will be closed-book, closed note. **The two lowest quiz grades will be dropped.** To be excused from a quiz for an Institute-Approved absence, a student must notify the instructor prior to the start of class via email (9:30 AM).

Projects: There will be projects during this class. they will emphasize multiunit separation processes and distillation. More details will be provided during the semester.

Exams:

Two cumulative exams and a final exam will be given during the semester. **All exams are open book and open notes.** You may use calculators up to the equivalent of a TI-89, no wireless devices are permitted. All equations and derivations must be shown in your solutions. Questions will include problems requiring brief explanations and short calculations. An example of what you can expect from each exam will be given to you ahead of time. In addition to the main problems, each exam will have five true or false questions to test your grasp of the fundamental concepts and are graded as follows: two points will be awarded for each correct answer, no points will be awarded to problems left blank, and one point will be taken away for each incorrect answer.

A letter from a physician or Institute official describing an illness or other appropriate reason for missing an exam is required before a make-up exam will be given. The make-up exam may be written or oral. Exam re-grade requests must be submitted in writing the following class period and should explain why the grade is in question. Be aware that the entire exam will be re-graded, not just the problem in question.

Everyone can have a bad day. Considering this, **we will replace 50% of your lowest exam grade with your score on the final** (for instance, each exam is worth 20% of your grade. Let's say you receive a 40 on one exam and a 60 on the final. In this scenario, 10% of the exam grade would be weighted at a 40 and the other 10% would be weighted at a 60). However, don't plan on doing this, as the final is comprehensive and tough.

Piazza:

We will be conducting all class-related discussion items here this term. The quicker you begin asking questions on Piazza (rather than via emails), the quicker you will benefit from the collective knowledge of your classmates and instructors. I encourage you to ask questions when you are struggling to understand a concept (you can even do so anonymously to your classmates). We may offer some extra credit for actively participating in Piazza discussions.

Make up policy:

Late homework will not be accepted. Those with Institute sanctioned activity excuses will be allowed to take missed exams, per Institute policy. Make-up exams and in class activities will only be permitted when absences are due to institute approved reasons such as illness, religious observance, or other events. You must contact the instructor in advance of the exam via email to schedule a make-up exam and provide documentation from the Dean of Students. If you do not contact the instructor in advance, it may not be possible to schedule a make-up exam. Make-up exams may be different from those administered during the regular examination period.

Grade Accuracy:

Errors in grading and/or recording of scores must be addressed within 7 days of posting the grade on Canvas by contacting the instructor via email. Disputes after this one-week period will not be considered.

Final Exam Conflicts:

The Institute has established the policies for final exam scheduling conflicts. If you request an accommodation, please contact the instructor via email and include a list of all of your courses (course numbers and sections) and their exam periods on the day in question. If you have additional questions about the Institute's policies, please refer to the Office of the Registrar's website (http://registrar.gatech.edu/students/examguide.php).

Statement on the use of Artificial Intelligence (AI):

Large language models and other related model systems – often referred to as AI – are tools that can accelerate, decelerate, enlighten, confuse, sharpen, or blunt high level engineering analysis like that covered in this course. The usage of such tools is permitted on homework assignments. One "best practice" suggestion is to only use AI tools as one of many, and not solely rely on its output to inform your learning – it is easy to offload your critical thinking skills onto the AI. As the majority of the course grade comes from in-class assignments, it is important to develop your independent ability to solve complex problems.

Prior Materials:

Use of any previous semester course materials is allowed for this course; however, I remind you that while they may serve as additional practice for you, they are not guidelines for any tests, quizzes, homework, or any other coursework that may be assigned during the semester.

Disability Services:

If you have already established accommodations with the Offices of Disability Services, please communicate this to your instructor so we can discuss your needs in this course. If you have not yet established services through Disability Services, but have a temporary health condition or permanent disability that requires accommodations, please contact the Office of Disability Services (https://disabilityservices.gatech.edu/ (Links to an external site.).)

Recordings of Class Sessions and Required Permissions:

Classes may not be recorded by students without the express consent of the instructor unless it is pursuant to an accommodation granted by the Office of Disability services. Class recordings, lectures, presentations, and other materials posted on Canvas are for the sole purpose of educating the students currently enrolled in the course

Students may not record or share the materials or recordings, including screen capturing or automated bots, unless the instructor gives permission. Digitally proctored exams may require students to engage the video camera, but those recordings will not be shared with or disclosed to others without consent unless legally permitted.

Electronic Devices: The following are required technological expectations for this course. If you do not have access to devices and internet that meet these requirements during class times and exams, you may not be able to complete all required items and earn your full grade.

- Computer or tablet with Windows 10, MacOSX 10.13, or ChromeOS 79 and higher
- Broadband internet connection with speed of 1.5 Mbps download, 750 Kbps upload