

## **ChE460 -101 – Separation Processes II - 10992 – Fall 2017**

(Central King Building 204; Wednesday 6:00 – 9:05 PM)

**Instructor:** Dr. Saeid Savarmand, Sun Chemical Corporation

**Office Hours:** Wednesday 5:00 – 6:00 PM at Tiernan 373 Conf. room.

**Teaching Assistant:** Na Yao (ny36@njit.edu) will be TA for this course.

**Description:** This second course in separations examines nontraditional methods and technologies such as fixed-bed processes, membranes, crystallization, and mechanical separations.

**Prerequisites by Course:** ChE360 - Separation Processes I

**Prerequisites by Topic:** Thermodynamics, Heat/Mass Transfer, Calculus/Diff. Equations

### **Textbooks:**

**Required:** Geankoplis, 4th Ed., Prentice Hall (You already have this book as it is the textbook of ChE260/CHE370).

**Recommended:**

McCabe, W.L., Smith, J.C. & Harriot, P., “Unit Operations of Chemical Engineering”, 7<sup>th</sup> Ed., McGraw-Hill.

Seader, J.D. & Henley, E.J. “Separation Process Principles”, 3<sup>rd</sup> Ed., Wiley

### **Course Outline:**

1. Introductory remarks & Dimensional Analysis.
2. Membrane separation processes
3. Filtration and Centrifugal separation processes
4. Fixed-bed separation processes
5. Evaporation and Drying processes

### **Assessment/Grading:**

- First mid-term exam accounting 20% (Oct. 11<sup>th</sup>)
- Second mid-term exam accounting 20% (Nov. 15<sup>th</sup>)
- Final exam accounting 30% (Dec. 20<sup>th</sup>)
- Quizzes/homework accounting 15%
- A term project with presentation accounting 15%.
- Course letter grades will be as following: A = 90+; B+ = 85+; B = 75+; C+ = 70+; C = 65+; D = 60+; F < 60.

### **HW/Quiz Assignments:**

- Once assigned, a HW is due the following week before class time unless otherwise indicated. Please use instructor’s office hours for HW related questions as well as other questions/inquiries.
- Quizzes will NOT be announced.

**Exams Policy:** Only justifiable absence warrants a make-up test.

**Classroom Policy:** Eating and talking with friends are not permitted in the class. Use of cell phones, notepads, tablets and laptops is not allowed. Cell phones should be silent or preferably turned off.

**NJIT Honor Code:** The NJIT honor code will be followed at all times.

**Attendance:** Students are expected to be in the class earlier than the class starts or at least on time. Missing lectures will negatively affect your performance in this course; so, attendance is strongly recommended.

### **Policies and Expectations about Exams/Grades**

- Students can dispute the exam scores within a week following the announcement of the scores.
- Students cannot dispute their prior exams or HWs after one week or at the end of the semester!
- After the first review of the dispute, if the score is not modified, but the student is unconvinced and asks for an additional review, then s/he assumes the possibility of instructor reviewing the whole exam paper and removing points as well as giving points.
- Students may be asked to return their graded exam papers within a week.
- No cell phones (to be turned off), Ipads, laptops, etc. can be used during the exam.
- Students get 0 for no-show to exams.
- Make-up exams (no make-up quizzes) may only be given under extreme circumstances (e.g., major close-family emergency, serious accident or acute medical problem) at the sole discretion of the instructor. Students bear the responsibility of due proof and documentation to the Dean of Students. It is the student's responsibility to inform the instructor and Dean of Students ASAP.
- Show all work, otherwise no partial credit means you cannot simply skip important intermediate steps during a calculation/derivation. You will lose significant points even if the final answer is correct.
- In exams, students are required to use high-end calculators to solve non-linear equations, perform linear regression, and spread-sheet calculations. Students are required to know how to perform these operations on their calculators and consult with the user manual and web sources for their specific calculator model.

### **Groups**

- Term projects and group quizzes require groups of 5 or 6 students.
- Students can select their group members by communicating their group members with instructor by the end of the second session (Sep 13<sup>th</sup>, 2017). After that, the remaining students will be assigned to random groupings and no further changes could be made.

### **Term Project**

- Groups of 5 or 6 students will choose 3 topics from the topics of the course, such as "gas membrane separations" or "filtration", etc. These topics are communicated with instructor. Due date: Sep 27<sup>th</sup>, 2017.

- Instructor will assign to each group one of the 3 topics submitted by that group.
- By Oct 18<sup>th</sup>, each group will provide at least 4 closely related articles from peer-reviewed chemical engineering journals to instructor. Complete addresses of the articles are necessary so they could be found for review. In case any of the articles are not suitable in terms of their materials and/or relevance, students are required to provide replacing article(s).
- First drafts of the presentations are due on Nov. 8<sup>th</sup>. Instructor will provide comments/feedback for final modifications.
- Final presentation are due on Nov 29<sup>th</sup>.
- Class presentations start on Nov 29<sup>th</sup> randomly. So all groups should be ready for presentation.

### **Term Project Grading**

- The above dates (Sep. 27<sup>th</sup>, Oct 18<sup>th</sup>, Nov 8<sup>th</sup>, and Nov 29<sup>th</sup>) should be respected. Each date accounts for one fifth of the total 15% of the term project. The presentation accounts for another fifth of the total of 15%. An average of the grades related to each date and the presentation will provide the total grade. So getting a total average of 100 will provide 15% of the total course grade.
- Each one day delay reduces 10% of that section point. For example, if providing the 3 topics has a 2-day delay, then the maximum grade for Sep. 27<sup>th</sup> would be 80%, and so on.
- On Nov. 29<sup>th</sup>, students will present their works in the class and how it is delivered in front of an audience.
- The rubric of the presentation is described in the next section. The “organization” of the presentation, the “quality” of the slides, and the “timeliness” of the presentation are significant factors in addition to the “mastery” of the presenter over the content of the slides and the whole subject matter of the presentation.
- It is important to engage the audience to the point that the presentation invokes questions or comments from them. It is expected a few questions or comments raised following the presentation. Questions/comments are indications of the degree of impact on the audience.

### **Term Project Rubric**

The following sections need to be included in the presentations.

- Title, Authors, Date, Department
- Introduction / Background
  - Schematic drawing of the system/control volume
- Problem Statement
- Objectives
  - Challenges, Potential Benefits, ...
- Mass/Heat/Momentum Balance Eqs.
- Transfer Eqs. (Mass, Heat, Momentum)
  - Boundary/Initial conditions
- How the equations are treated/solved?
- Outcome
  - Results

- Solutions
  - Next Steps
- Conclusions
- References and the points taken from them along the presentation.
- Presentation time is 10 minutes.
- About 10 slides.
- Practise to make sure the presentation can be performed in a timely manner.