The University of Iowa  
Department of Chemical and Biochemical Engineering  
CBE:2105—Process Calculations

**Instructors:**  
Dr. Rundlett  
4130 Seamans Center  
319-467-0353  
beth-rundlett@uiowa.edu  

Dr. Fiegel  
4128 Seamans Center  
319-335-5162  
jennifer-fiegel@uiowa.edu  

**TAs:**  
Rachel Buck  
rachel-buck@uiowa.edu  

Nathan Jarvey  
nathan-jarvey@uiowa.edu  

Sarah Chou  
hsien-chou@uiowa.edu  

Sarah Hoadley  
sarah-hoadley@uiowa.edu

**Office Hours:**  
TBD

**Discussion Section:**  
Mondays, 4:30-5:20 PM, 2217 SC  
The discussion section is optional for students. It is used to provide an overview of the main concepts that will be covered in the class during the coming week, as well as to work additional examples. Questions from the previous week will also be addressed.

**Course Description:**  
This course will introduce you to the fundamental principles of chemical process analysis. It will equip you with problem solving techniques and will give you experience in the application of these techniques to a wide variety of chemical engineering problems. During this course you will: i) learn to synthesize and integrate process information; ii) develop critical thinking and analytical skills; iii) develop the ability to explain engineering concepts in your own words; and iv) gain valuable experience in teamwork.

**Textbook:**  

**Lecture Capture:**  
Lecture by Dr. Julie Jessop UICapture “CBE:2015 Fall 2016, Process Calc, Jessop”  
https://engineering.uicapture.uiowa.edu located under Fall 2014 folder

**Screencasts:**  
LearnChemE Education Resources for Chemical Engineering, University of Colorado Boulder  
http://www.learncheme.com/screencasts/mass-energy-balances

**Web Course Lessons:**  
http://www.engineering.uiowa.edu/~webmeb/web_course/index.html

**On-line Quizzes, In-class Activities, and Homework:**  
(15% of grade)  
Since Process Calculations is a “flipped” course, the lecture and out-of-class elements are reversed. You will review course content (see attached schedule) and complete an on-line quiz that will test your understanding of the concepts presented and solicit questions for review in the first 15 minutes of class. Note that the online quizzes must be completed before 10 AM the day of class and are to be done individually (i.e., no collaboration or group work allowed).

I am pleased that we are able to have our classes in a TILE classroom. The room setup and technologies will enable us to cover concepts at a deeper level than in a traditional classroom format. In-class activities will include both individual and group assignments. Attendance and participation are required for credit. Preparation before class is essential to make the most of the class time. You should expect to spend at least
2-3 hours in outside preparation for every hour in class.¹ Tangible outputs of in-class activities will be collected in various formats (e.g., Excel spreadsheets and photos of whiteboard work uploaded to the ICON Dropbox; flipchart sheets and notebook papers submitted physically; etc.).

Homework is due at the **beginning** of class on the day it is due. Late homework will not be accepted.

True learning of the course concepts must begin with practice, and the homework provides you with the opportunity to apply the course concepts to realistic (although in some cases simplistic) engineering problems. Group discussion of the problems is allowed (and encouraged); however, homework is to be completed individually and professionally. Homework that has been copied, either from another student or from a solutions set, will be assigned a zero and a report of academic misconduct² will be filed with the Associate Dean for Academic Programs in the College of Engineering.

For all assignments (both in-class and at-home), follow homework presentation guidelines listed on ICON Content page, including:

- Always show all of your work (it should be clear how the problem was solved)
- Always carry along units in your calculations
- Always display an appropriate number of significant figures in your final answer
- Always box in or underline your final answer and include units

Assignments not adhering to these guidelines will be returned with a warning for the first offense, with a grade penalty for the second offense, and with no grade for any offenses thereafter.

**Exams:** (three exams, 65% total)
The first exam is scheduled for September 26 (Weds) from 6:30-8:30PM in 2229SC. The date of the second exam is scheduled for the October 24 (Weds) from 6:30-8:30PM in 2229SC. The final exam will be given in the scheduled period during finals week. Unless otherwise announced, these exams will be closed-book with one standard 8.5 x 11 inches page of handwritten notes (type notes are not allowed) allowed. Calculators without wireless communication capability may be used during the examinations. The exam period will be two hours for completion of the problems.

A makeup exam may be arranged if you notify me **before** the regularly scheduled exam with a valid reason for missing the exam. Verifiable illness with notification through the Associate Dean for Academic Programs or family emergencies may be valid reasons for missing an exam.

**Group Project and Report:** (15% of grade)
You will complete material and/or energy balances for various production units and prepare a report recommending the best operating procedures. You will work together in interdependent groups of 3-4, with each group member assuming a different role essential to the success of the project. Anyone not participating in this project will automatically receive an F for CBE:2105, regardless of other grades earned in this class. The final project report will be due on Monday Dec. 3.

**Topical Paper:** (5% of grade)
This writing assignment will consist of a 500-1000 word (~1-2 single-spaced pages) report written for a general audience. Possible topics include: Sustainable energy in the future, future advancements in biotechnology, innovation of novel materials, or any other future development that chemical engineers are

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² [http://www.engineering.uiowa.edu/ess/current-students/academic-policies-standards/academic-misconduct](http://www.engineering.uiowa.edu/ess/current-students/academic-policies-standards/academic-misconduct)
destined to impact. A draft of your paper (due September 14) will initially be evaluated by the Hanson Center for Technical Communication (20% of the final topical paper grade), and your final rewrite will be evaluated by Dr. Rundlett (due October 8).

**Professionalism:** Since this course is the first in the chemical engineering curriculum, it is a good time to reinforce positive patterns of professionalism and class conduct. Learning should be fun and interesting, but at the same time, you should approach everything you do with high professional standards. Professional traits include honesty, integrity, courtesy to others, and a clear motivation to understand and master the subject matter of the course.3

**Course Learning Goals:**
The course activities are designed to develop your competency in the following areas:

- By the end of the course the student will be able to perform material balances on systems including, but not limited to, single unit processes, multi-unit processes, recycle, bypass, chemical reaction and combustion systems.
- By the end of the course the student will be able to choose and apply the simplest equation of state that yields accurate results for the problem under consideration, including the ideal gas law, compressibility equation of state and cubic equations of state.
- By the end of the course the student will understand and be able to apply relationships that describe phase equilibria (gas/liquid and liquid/liquid) including Raoult’s Law, Henry’s Law, the Gibbs Phase Rule, phase diagrams and thermodynamic tables.
- By the end of the course the student will be able to perform energy balances on closed and open systems, with and without chemical reactions, either independent of or simultaneous with mass balances.
- By the end of the course the student will have had opportunities to further his/her professional development through studying professional ethics, practicing written communication skills and being exposed to contemporary issues.

This course is given by the College of Engineering. This means that class policies on matters such as requirements, grading, and sanctions for academic dishonesty are governed by the College of Engineering. Students wishing to add or drop this course after the official deadline must receive the approval of the Dean of the College of Engineering. Details of the University policy of cross enrollments may be found at: [https://education.uiowa.edu/coe-policies/cross-enrollment-policy](https://education.uiowa.edu/coe-policies/cross-enrollment-policy)

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3 [https://www.aiche.org/about/code-ethics](https://www.aiche.org/about/code-ethics)