

CBE:2105 Process Calculations Syllabus

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Our names and
how to contact us

TAs: Anna: anna-stinson@uiowa.edu

Electronic Communication

We will contact you through announcements on ICON and/or through email sent to student's UI email address (@uiowa.edu). Students are responsible for checking these communication.

Check ICON and UI email for
announcements

Administrative Home

The College of Engineering is the administrative home of this course. This means that class policies on matters such as requirements, grading, and sanctions for academic dishonesty are governed by the College of Engineering. (<https://www.engineering.uiowa.edu/current-students/academic-information/policies>).

Each University of Iowa student is expected to know and adhere to the Code of Student Life (<https://dos.uiowa.edu/policies/code-of-student-life/>). Misconduct is reported to the College, resulting in a grade reduction, failure of the course, and/or possible suspension from the College.

Course Description:

This course will teach you problem solving techniques and will give you experience in the application of these techniques to a wide variety of chemical engineering problems.

Course Goals:

By the end of the course the student will be able to:

- identify chemical engineering variables, components, and processes.
- sketch process flow diagrams
- solve increasingly complex problems using material and energy balances.
- consider ethical, safety implications within problems
- practice with teamwork skills to accomplish group tasks and building positive relationships within their peers.

Class Schedule and Work Requirements:

The concepts in this class are simple but applying them in different chemical problems and situations is much more difficult. This class is designed so you will learn the concepts on your own and then apply the concept to challenging problems under the guidance of the TAs and professors.

For each topic, you can learn the basic concepts using the resources listed below.

1. Primary Electronic Lecture:
B. Rundlett, ICON.
2. Primary Electronic Textbook:
CBE 2105: Process Calculations, M. Liberatore,
Zybooks, 2020.

\$58 Zybook can be bought by
clicking on ICON link and
purchasing through their site.
Use you uiowa email to sign up.

You should expect to **spend at least 2-3 hours** in outside preparation for every hour in class. To prepare for class, you must watch my lecture, and read the textbook. The textbook will have participation problems to answer throughout the reading to help you prepare for the class. **Trying to learn the concepts “on the fly” does not work and hurts you and your peers in the group.**

Class will consist of problem solving sessions where you and a team of your peers will work through a challenge problem where you will have to apply one or more of the concepts that you learn before class. These problems will be examples (if simplified) of problems you would see in the field. This work will be performed under the guidance of the professors and TA who will help you apply the concepts you have learned. We have an extremely high ratio of instructors and TA to students to ensure everyone can get individualized attention and coaching on these problems. Challenges must be solved in class as a team unless previous approval by the professor is given prior to class time.

Grading and Concept Progression:

There are units for this class. Each unit builds upon the topics learn from the previous unit. It is vital to understand these concepts. Once you learn the material in class, you will be given a quiz (similar to the exam) to direct you on what you need to review/study on those concepts over the next few days.

- If you score $> 90\%$, you have shown you know the concept and can skip the exam and do some skill enhancement work instead.
- If you score $< 75\%$, you will be given extra review/practice on the concepts that are not clear before taking the exam.
- If you score between $75\text{-}90\%$, the instructor (with your input) will decide if you review the concepts or do skill enhancements work.

GRADE TOTALS

Unit Exams	60%
Challenges	20%
Readings	10%
Professionalism	10%

QUIZ and EXAMS: Quizzes and exams will be given in class or arranged by the instructor. Unless otherwise announced, these exams will be closed book with one standard 8.5 x11 inches page (front and back) of your handwritten notes (type notes are not allowed, handwriting will be matched to the exam) allowed. Calculators without wireless communication capability may be used during the examinations and are encouraged. A makeup exam may be arranged if you notify me before the scheduled exam with a valid reason for missing the exam.

TEXTBOOK READINGS: The Zybook chosen for this class is an interactive e-book intended to replace a traditional textbook and help facilitate learning. Within this textbook, there will be several electronic **participation activities** to complete with each section. This are expected to be read before class to help prepare you for the day’s challenge.

CHALLENGES: True learning of the course concepts must begin with practice, and the challenges provides you with the opportunity to apply the course concepts to realistic (although in some cases simplistic) engineering problems.

Challenges will be worked on in class and at home. They are due at the beginning of the following class. Late homework will be accepted with a 10% per day up to 5 days. Group discussion of the problems is allowed (and encouraged).

For all submitted assignments and test questions, the following guidelines must be adhered to:

- Always show all of your work. Even if you get the right answer you will not receive all the credit unless it is clear how the problem was solved
- Work should be legible and sequenced in a logical order. We will go over how to set up the problems and you should follow this method. Also, if the work cannot be read, you will receive no credit.
- 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, and with no grade for any offenses thereafter. Tests answer not adhering to guidelines will result in a loss of credit.

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. Attendance, teamwork, class participation, will be evaluated as part of your professionalism score.

Spring 2024 Tentative Course Schedule

Date	Day	Unit	Lecture
Jan. 17	W	Unit 0 Day 1	Logistics syllabus – Team Building
Jan. 19	F	Unit 1 Day 1	Engineering Calculations: Unit Conversion
Jan 22	M	Unit 1 Day 2	Eng. Calc.: Interpolation, Process Variables: Temp/ Pressure/ Phases
Jan 24	W	Unit 1 Day 3	Process Variables: Concentrations / Flow Rates (kg/moles)
Jan 26	F	Unit 1 Day 4	Setting Up the Problem: PFDS/Material Balances
Jan 29	M	Unit 1 Day 5	Material Balance: Single Units/INOUT charts
Jan 31	W	Unit 1 Day 6	Material Balance: Multi-Unit process
Feb 2	F	Unit 1 Day 7	Material Balance: Recycle and Bypass
Feb 5	M	QUIZ	Review , QUIZ at 4:30 PM
Feb 7	W	Unit 1 Day 8	Numerical Equations
Feb 9	F	Unit 1 Day 9	Unsteady State
Feb 12	M	TEST	Safety GHS symbols, TEST at 4:30 PM
Feb 14	W	Unit 2 Day 1	Process Variable: Temp/ Pressure / Phases
Feb 16	F	Unit 2 Day 2	Process Variable: Volume and Density (Solids, Liquids)
Feb 19	M	Unit 2 Day 3	Process Variable: Volume and Density (Ideal Gases, Real Gases)
Feb 21	W	Unit 2 Day 4	Process Variable: Humidity/ Vapor Pressure
Feb 23	F	Unit 2 Day 5	Material Balance: VLE and Flash Drum –
Feb 26	M	Unit 2 Day 6	Material Balance: Raoult's Law
Feb 28	W	Unit 2 Day 7	Material Balance: Review Raoult's law
Mar 1	F	QUIZ	Review, QUIZ At 2:30 PM
Mar 4	M	Unit 2 Day 8	Monometers/Thermometers
Mar 6	W	Unit 2 Day 9	Triangle Diagrams
Mar 8	F	TEST	Ethics, TEST at 2:30 PM
Mar 11-Mar 15 Spring Break			
Mar 18	M	Unit 3 Day 1	Reaction Material Balance: Extent of Reaction Method
Mar 20	W	Unit 3 Day 2	Reaction Material Balance: Combustion (Excess Air/N ₂)
Mar 22	F	Unit 3 Day 3	Reaction Material Balance: With Recycle
Mar 25	M	Unit 3 Day 4	Reaction Material Balance: Equilibrium
Mar 27	W	Unit 3 Day 5	Reaction Material Balance: Atomic Method
Mar 29	F	Unit 3 Day 6	Reaction Material Balance: Review
Apr 1	M	QUIZ	Review , QUIZ at 4:30 PM
Apr 3	W	Unit 3 Day 7	Predict reactions
Apr 5	F	Unit 3 Day 8	
Apr 8	M	TEST	Ethics, TEST at 4:30 PM
Apr 10	W	Unit 4 Day 1	Energy 1st law – Internal energy vs Enthalpy (Table values and reference)
Apr 12	F	Unit 4 Day 2	Reactions: Reference States, and Heat of Formation
Apr 15	M	Unit 4 Day 3	Changing Temperature: Enthalpy Heat Capacity
Apr 17	W	Unit 4 Day 4	Changing Phases: Heat of Vaporization
Apr 19	F	Unit 4 Day 5	Review
Apr 22	M	Unit 4 Day 6	Combustion Adiabatic Reaction -
Apr 24	W	Unit 4 Day 7	Hess Law, Heat of Reaction
Apr 26	F	Unit 4 Day 8	Review
Apr 29	M	QUIZ	Review , QUIZ at 4:30 PM
May 1	W	Unit 4 Day 9	Energy balance of ice melting
May 3	F	Unit 4 Day 10	
May 6- May 10 Final			

WHAT TO DO IF:

You need to miss or have missed a class

In order to prevent the spread of disease, please do not come to class, meet with other groups of students, attend office hours, or contact offices in person while you are ill. Your grade will not be penalized if you notify Prof. Rundlett by email as soon as possible to inform her of your absence before class. You will be required to make up the work given in class or other assigned work to make sure you learn the concepts.

The University is prepared to make reasonable accommodations for students whose religious holy days coincide with their classroom assignments, test schedules, and classroom attendance expectations. Students must notify their instructors in writing of any such Religious Holy Day conflicts or absences within the first few days of the semester or session, and no later than the third week of the semester. If the conflict or absence will occur within the first three weeks of the semester, the student should notify the instructor as soon as possible.

Multiple absences may put you too behind to catch up on the work and the best course of action will be determined on a case-by-case basis.

Need to make-up an assignment or have a late assignment

A student may request to turn in an assignment late in the case of an illness or unavoidable situation. Students should get prior approval from the instructor to reschedule the assignment if there is a professional schedule conflict. Late assignments will be accepted with a penalty on 10% per day up to 5 days.

Have a complaint about class

If you feel that we have treated you unfairly or acted unprofessionally or otherwise failed to meet our responsibilities as instructors, please bring the matter to our attention so that we can work together to resolve the problem. If you remain unsatisfied you may contact the chair of the Chemical & Biochemical Engineering department, Professor Jun Wang (jun-wang-1@uiowa.edu). If your concerns have still not been resolved, you may submit a written complaint to the Associate Dean for Academic Programs.

Need an accommodation for a disability

The University is committed to providing an educational experience that is accessible to all students. If a student has a diagnosed disability or other disabling condition that may impact the student's ability to complete the course requirements as stated in the syllabus, the student may seek accommodations through Student Disability Services (SDS). SDS is responsible for making Letters of Accommodation (LOA) available to the student. **The student must provide a LOA to the instructor as early in the semester as possible**, but requests not made at least two weeks prior to the scheduled activity for which an accommodation is sought may not be accommodated. The LOA will specify what reasonable course accommodations the student is eligible for and those the instructor should provide. Additional information is found on the SDS website or the SDS office located at 3015 Burge Hall, 319-335-1462.

CLASSROOM POLICY:

Classroom Expectations:

- Show up and participate in class (attendance is graded)
- Treat everyone with courtesy and respect
- Do the work both individually and as part of a team
- Communicate problems early!!!!

Summary of the
Classroom Policies

Attendance Policy

Class participation is critical for learning the concepts through hands-on problem solving therefore is included in the overall course grade. Attendance will be taken at each class meeting through either activities that will be turned in during class or a sign-in sheet.

Collaboration Policy:

Discussion of problems with other students in the class and/or **working in groups is encouraged and expected**. This is a good way to develop the team concept and to learn from each other. Feel free to work together; however, **direct copying of an assignment in part or in total is not allowed**. Some assignments will be designated for individual efforts. A zero will be given in the assignment if this policy is violated, and academic misconduct regulations will be applied

Nondiscrimination in the Classroom

The University of Iowa prohibits discrimination and harassment on the basis of race, creed, color, religion, national origin, age, sex, pregnancy, disability, genetic information, status as a U.S. veteran, service in the U.S. military, sexual orientation, gender identity, associational preferences, or any other classification that deprives a person of consideration as an individual. For more information, contact the Office of Equal Opportunity and Diversity (319-335-0705, or diversity@uiowa.edu).

Sexual Harassment/Misconduct and Supportive Measures

The University of Iowa prohibits all forms of sexual harassment, sexual misconduct, and related retaliation. The Policy on Sexual Harassment and Sexual Misconduct governs actions by students, faculty, staff and visitors. Incidents of sexual harassment or sexual misconduct can be reported to the Title IX and Gender Equity Office or to the Department of Public Safety. Students impacted by sexual harassment or sexual misconduct may be eligible for academic supportive measures and can learn more by contacting the Title IX and Gender Equity Office.

Classroom Civility Policy

Students should expect common courtesies from each other and from the instructor. The instructors expect the students to extend them the same courtesies. Students are expected to comply with University policies regarding appropriate classroom behavior as outlined in the Code of Student Life. While students have the right to express themselves and participate freely in class, it is expected that students will behave with courtesy and respect whether in-person or online. Failure to follow behavior expectations as outlined in the Code of Student Life may be addressed by the instructor.

The University of Iowa supports and upholds the First Amendment protection of freedom of speech and the principles of academic and artistic freedom. We are committed to open inquiry, vigorous debate, and creative expression inside and outside of the classroom. For information on the university's policies on free speech and academic freedom, see <https://freespeech.uiowa.edu>