ChEE 201
Elements of Chemical Engineering I
Fall 20XX
University of Arizona

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Active Learning Environment: Day(s) / Time / Location TBD

Office Hours:
TBD

Course Description:
This course will introduce you to the fundamental principles of mass and energy balances in both chemical and environmental 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 process-related problems. This course will also begin demonstrating how mathematics and spreadsheets can be a fundamental tool for solving complex engineering problems.

Text: *Elementary Principles of Chemical Processes*, 4th Edition, Special Printing
R. M. Felder and R. W. Rousseau, John Wiley and Sons, 2005.

Syllabus Inclusive Access information:
Course materials are being delivered digitally via D2L through the Inclusive Access program.
Please access the material through D2L on the first day of class to make sure that there are no issues with delivery so any problems can be addressed quickly.
You automatically have access to the course materials FREE through September XX, 20XX.

You **must** take action (even if you have not accessed the materials) to opt-out if you do not wish to pay for the materials, and choose to source the content independently. **The deadline to opt-out is September XX, 20XX.** If you do not opt-out and choose to retain your access, the cost of the digital course materials will appear on your September Bursars account.

Please refer to the Inclusive Access FAQs at https://shop.arizona.edu/textbooks/Inclusive.asp for additional information.

Course Objectives:
Upon completion of this course, students should be able to:
1) use unit conversions while solving problems
2) transfer a verbal problem statement into a mathematical form
3) write and solve mass balances for a process
4) identify what phase a substance is in and then be able to relate volume to mass and moles
5) use diagrams and tables to obtain information needed to solve problems

6) apply Raoult's law when solving mass balances
7) identify and use different energy terms to solve energy balances
8) combine material and energy balances to solve complex problems

Other metaconcepts the students should be proficient at:
1) be able to identify personal difficulties during problem solving and to take corrective action
2) be able to knowledgeably think of everyday examples where material and energy balances are important
3) be able to conceptually link levels of information and ideas in a problem solving framework
4) begin to use the library and electronic resources effectively to find high quality information

Course Prerequisites:
The courses you must have taken before this course are:
MATH 124 or MATH 125; CHEM 151, CHEM 152, ENGR 102. You should have also completed ECE 175 or AME 105 and be concurrently in AME 205. If you have not fulfilled the co- or prerequisite courses you may be dropped from the course at the instructor's discretion since you may not succeed based on past student performance.

If the class becomes too large for the classroom it is scheduled in, students who do not meet the 2.0 U of A GPA may be dropped from the course. 2.0 is the minimum GPA to be a student at U of A.

Course Website: D2L website for ChEE 201

Instructional Managers:
Name TBD
Name TBD
These are the people you should contact if there is a problem with a quiz, if you have a technology issue, if there is an aspect of the course that you are having an issue with, and if you do not know where else to turn. They have created an email that they both will monitor and it is:
cheeinstructionalmanager201@gmail.com

Undergraduate Preceptors:
Name(s) TBD

Supplemental Hours:
Day(s), Time(s), Location(s) and Name(s) TBD

Students are required to enroll in one of the supplemental hour sessions and to attend each week. Credit will be given for preparing for the supplemental hour of active instruction for attempting the problems and being ready to work on them.

Getting Help Outside of Class and Out of Office Hours:
Students will be helping each other after hours using the piazza discussion boards that have been set up. You can join them either through course orientation or by going to (website TBD). You should check these discussion threads when you have a question as someone may have posted a hint or asked a question that you also have and someone may have posted an answer. *The preceptors will be responding, as will the instructor if student peer answers are not clear. Extra credit can be earned as described later in the syllabus.*

Communicating with the Teaching Team Outside of Class:
Use the piazza discussion board to ask questions about the course or course content: website TBD
If you have other unrelated matters to discuss, particularly about being successful in the course or in career mentoring, you may contact either instructor via email: blowers@email.arizona.edu or klh15@email.arizona.edu

Important Dates to Keep in Mind:
A listing of all important drop and add dates is here: website TBD

Course Grading Policies:
This section details the graded elements of the class, first in a big picture way and then in detail.
Big Picture View of Graded Elements

Individual HW	due weekly	15%
Group HW	due weekly	5%
Pre-Class Quizzes	due daily	10%
Attendance	due daily	10%
Midterm Exams	four times/sem	42%
Final Exam	end of semester	18%
Total		100%

Teamwork is required in all engineering jobs and we will start building your skills in this area by working in teams inside and outside of class. You should help your classmates master content even as you ask questions of them when you are stuck. To help your team, make sure you attend class, do the pre-quizzes, and work with them. You will find that the group homework will not be solvable by one person so certainly work with your team on those activities.

Individual Homework: (15 % of grade for individual problems)
Individual homework is due at the ***beginning*** of the class on the day it is due to the d2l dropbox for that day. Late homework will be accepted in the same dropbox in d2l until 11:59 pm if you just miss a deadline but will be docked 10% of the points. A clear scan, picture from your device, or other clear materials will be acceptable. Each week, one problem will be graded for detail and will make up the bulk of the points for the individual homework grade, while the other problems will be assessed for completion and be worth 10% each for making a good attempt. The problem graded in detail will be selected at random from the week's set of cumulative problems. Only the last submission will be retained so make sure you include all the files you need in that final submission.

Group HW: (5% of final grade)
This homework will be due once a week with one submission from the team, and will typically be the one or two toughest problems from each set of concepts for that weeks' worth of content. Your team should submit only one single copy to a team member's dropbox before class on the day that set is due and you should communicate accordingly that you have a full submission with the last one that you submit. These problems will be graded for detail.

Pre-class Quizzes on D2L: (10 % of grade)
There are many elements of being ready for new topics and part of that is to do the class readings ahead of time so you are ready for what happens in class. The online quizzes developed to help you be ready for class will make up 10 % of the grade and you will have three attempts on each quiz and your highest score will be the one recorded. These quizzes are designed so students will know the most important details from each reading section. If you want to efficiently study, open the quiz and start reading, looking for the details the questions ask you to notice, and take notes on the details. You'll quickly find out that the quizzes are randomized and if you are unhappy with your score and retake, that you get a new set of

questions that cover the same content in a slightly different way. You'll be faster if you take the quiz seriously the first time.

Attendance (10% of grade)
An active learning environment involves everyone working together to help master the content. Points will be assigned for attendance for each lecture based on use of your clicker/responseware during class, but up to two missed days will be dropped for each student. If you were present on a day in class and did not have your clicker, email a scan of your notes to that day to the attendance preceptor, clearly telling them which lecture number the notes are for and which date.
All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion; the Panopto recording will need to be watched and the attendance preceptor emailed to earn the credit. The complete list of UA approved holidays is available at: http://registrar.arizona.edu/calendar-religious-holidays
Absences pre-approved by the UA Dean of Students are also honored, but the Panopto recording will need to be watched and the attendance preceptor emailed to earn the credit.

Exams (four exams, 10.5 % each, 42 % of grade total).
These in-class exams are **comprehensive** and are scheduled on later pages of the syllabus. Unless otherwise announced, these exams will be open book. Don't get too excited about this fact since you will need to know how to problem solve. On each exam, you will submit a concept map that you have built with your team and added to as the weeks pass, and this will count for 5 points on the exam. You can use your team generated concept map on your exam and will submit a copy with your exam.

Make-up exams: There will be no make-up exams. If a student has a valid medical or emergency excuse, the missed exam grade will be replaced by the average of the other midterm grades.

Regrading policy:
Your exams will scanned in and graded in Gradescope, a tool for providing detailed feedback to students. When grades are posted, you will have one week to ask for regrades through Gradescope. The process is very clean and easy to follow and we'll ask that you specifically tell us which page to look at and which area of the paper. We'll have codes in the rubric that let you know how to communicate how to match what we looked for with what you think you demonstrated. We ask you to realize that when we grade, we do our best, but sometimes miss details.

Final exam: (18 % of grade).
Comprehensive final on Monday December XX, Time TBD. A comprehensive final will be given during the scheduled period during finals.

Extra credit: (up to 1 % increase in final grade)
Students who answer other students' questions posted to the piazza discussion board can earn up to 1% extra credit towards their final course grade, at the discretion of the instructor.

Possibility of Dropping some Scores Based on Class TCE Response Rates:
If 80% of the class completes the Teacher Course Evaluation at the end of the semester, then the lowest two pre-quiz D2L grades will be dropped for every student in the class.
If 90% of the class completes the Teacher Course Evaluation at the end of the semester, then the lowest individual HW score will be dropped.

Grading Rubric:
Letter grades on exams or assignments will not be determined; a final letter grade will be given at the end of the semester instead. This course will be graded on a straight scale as follows:

Total percentage of points earned	Final Grade
90 - 100 %	A
78 – 89.999 %	B
66 – 77.999 %	C
54 – 65.999 %	D
< 54.999%	E

Plagiarism: Although this course is not writing intensive, plagiarism is unacceptable. The plagiarism policies within the Student Code of Academic Integrity will be strictly followed: http://doc.web.arizona.edu/uapolicies.

Threatening Behavior: The general policies against threatening behavior by students will be followed: http://policy.web.arizona.edu/~policy/threaten.shtml

Inclusivity: This course supports elective gender pronoun use and self-identification; rosters indicating such choices will be updated throughout the semester, upon student request. As the course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect

Course Lectures and Attendance Policies:
Telephones/electronic devices, or other communication technologies are strongly discouraged unless used for legitimate learning purposes, like finding information to solve a problem assigned in class. Students who disrupt class or learning activities will be asked to leave the classroom. Developing your ability to effectively work in teams is an important aspect of this course, so you will regularly work in small groups in class, and you will complete weekly group homework.

Accessibility and Accommodations: At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations.

SALT Center and Disability Resource Center: Students who are able to use the services of the Strategic Alternatives Technology Center or may have other educational needs may see the professor at any time to discuss accommodations for their needs. However, this should be done at least 1 week prior to the first exam to allow for preparations that may be needed. Students who are registered with the Disability Resource Center must submit appropriate documentation to the instructor if they are requesting reasonable accommodations: http://drc.arizona.edu/teach/syllabus-statement.html.

Student Success in This Course
Students who succeed in this class, i.e., those who earn grades of A or B, typically are serious students who follow the Arizona Board of Regents policy of studying three hours for every in class hour. This means that you should expect to spend 9-10 hours of outside time on this class each week, consistently, throughout the semester. This means:
1) Students should attend class for all scheduled lecture periods and get notes from classmates when they are unable to attend.
2) Students will often be referring to the book during class so you should make sure you have an electronic or bound version of the book in class.
3) Students should come to class prepared to participate in active learning methods that encourage them to explore and question the material they are learning. This means that students should not expect any time during class for other activities like text messaging, telephone calls, other courses, or activities not part of

the class. An active learning environment like the one used in the class maximizes exposure to problem solving techniques and mastery of the information.
4) Students should do their homework in a timely manner. Most homework assignments will be covered in class approximately three to five days in advance of when they are due. This leaves students ample time to reflect on the examples in class, come to office hours, and submit complete and correct homework solutions. Students should begin working on their solutions as soon as the topics are covered in the active learning lectures so they have time to reach the correct answer.

Standards for Homework Problems and Quizzes:
1. Briefly restate the problem using a sketch or diagram where appropriate. Label the sketch or diagram with all quantities involved.
2. Indicate the basis you select, and indicate any change of basis within the problem. State assumptions.
3. Include both the numerical value and units for all quantities involved, including intermediate results.
4. Answers should be circled or otherwise marked, and reported to an appropriate number of significant digits.
5. Values obtained from a handbook or other reference should be accompanied by a citation. For example:

CCl_4 boiling pt. 76.5 ^oC (CRC, pg C-373)

6. Show how you have checked your work if appropriate.
7. Be clear and concise when writing answers to questions.

Substandard work will result in a loss of credit.

Required Extracurricular Activities: none

Special Materials Required for the Class: See online course content.

Changes to the Syllabus: The information contained in the course syllabus, other than the grade and absence policies may be subject to change with reasonable advanced notice as deemed appropriate by the instructor.

ChEE 201 Fall 2019 Class Schedule (subject to change - check D2L for updates)

Week	Date	Day	Lec #	Reading Assigned	Homework Due	Pre Class Activities	Topic
1	**x/xx**	**X**	1	Preface, Chap 1, 2.1-2.4	Recent Picture and 2-3 personal facts	**Concept Inventory done in Discussion**	Introduction to Course and Chemical Engineering
	x/xx	**X**	2	3.1-3.3		**D2L Post 1 Quiz and Pre lecture 2**	Physical Properties and Unit Conversions
	x/xx	**X**	3			Pre lecture 2 recording and **Prelecture 3 D2L quiz**	Physical Properties and Unit Conversions 2
2	**x/xx**	**X**		**Labor Day - No Class**			
	x/xx	**X**	4	3.4-3.5	**Writing Assignment HW 1**	**Prelecture 4 D2L Quiz**	Heads of Pressure
	x/xx	**X**	**5**	3.6		**Prelecture 5 D2L Quiz**	Manometers
3	**x/xx**	**X**	6	4.0-4.3c		**Prelecture 6 D2L Quiz Lecture 6 Gradescope Attempt**	Mass Balance 1
	x/xx	**X**	7	**DO NOT read 4.3d**	**HW 2**	**Prelecture 7 D2L Quiz**	Mass Balance 2 Stream Tables and Being Organized
	x/xx	**X**	8	4.3e-4.4		**Prelecture 8 D2L Quiz Elevator Speech to Dropbox**	Multi Unit with Bypass
4	**x/xx**	**X**	9		**Test 1**	PL 9 Quiz	
	x/xx	**X**	10	4.5,		**Prelecture 10 D2L Quiz**	Multi Unit with Bypass 2
	x/xx	**X**	11	Chapter Summaries 1-4		Problem attempt in dropbox	Multi Unit with Subsidiary Relationships
5	**x/xx**	**X**	12			**Prelecture 12 Quiz**	Multi Unit with Subsidiary Relationships 2
	x/xx	**X**	13		**HW 3**	**Prelecture 13 Quiz**	Multi Unit with Recycle
	x/xx	**X**	14			**Prelecture 14 Quiz**	Multi Unit with Recycle 2
6	**x/xx**	**X**	15			**Prelecture 15 Quiz**	Multi Unit Practice
	x/xx	**X**	16	4.6a-b	**HW 4**	**Prelecture 16 Quiz**	Start of Reactions
	x/xx	**X**	17	4.6c		**Prelecture 17 Quiz In**	Reactions Again

7	**x/xx**	**X**	18	4.6d		**Class Quiz 18 a**	Extents of Reaction
	x/xx	**X**	19	4.7a-e	**HW 5**	**PL Gradescope Attempt 30 minutes**	Multiple reactions 1
	x/xx	**X**	20	4.7f-4.10			Multiple reactions 2
8	**x/xx**	**X**	21		Test 2		
	x/xx	**X**	22			**PL 22 Quiz**	Multiple reactions 3
	x/xx	**X**	23				Multiple reactions
9	**x/xx**	**X**	24			**Post Lecture 18 Quiz**	Multiple Reactions 2
	x/xx	**X**	25	4.7d again		**Prelecture 25 Quiz**	Atomic Balances
	x/xx	**X**	26	5.0-5.2	**HW 6**	**Prelecture 26 Quiz**	Atomic Balances 2
10	**x/xx**	**X**	27	5.3-5.4		Prelecture 27 Quiz	Non ideal Gases
	x/xx	**X**	28			PL 28 Quiz	Non ideal Gases 2
	x/xx	**X**	29	6.0-6.1a			Conceptual Understanding
11	**x/xx**	**X**	30	6.1b	Test 3		
	x/xx	**X**	31		**HW 7**	PL 31 Quiz	Vapor pressure table for water
	x/xx	**X**	32	6.2		PL 32 Quiz	Vapor pressures, weather
12	**x/xx**	**X**	33				Antoine's equation, vapor pressure table, extrapolation
	x/xx	**X**	34	6.3		PL 34 Quiz	Raoult's law: example start
	x/xx	**X**	35	6.4a	**HW 8**	PL 35 Quiz	Raoult's law: dew point and relative humidity
13	**x/xx**	**X**	36	**Veteran's Day – no class**			No class
	x/xx	**X**	37	6.4b		PL 37 Quiz	Single phase temperature profiles and comparing substances
	x/xx	**X**	38	6.4c	**HW 9**		Raoult's law Jello shots and Solver in Excel
14	**x/xx**	**X**	39		Test 4		Exam four
	x/xx	**X**	40				(Exam 4 redo)
	x/xx	**X**		**Thanksgiving Break**			

15	**x/xx**	**X**	41				Raoult's law misconceptions and start of last example
	x/xx	**X**	42	6.6	**HW 10**	PL 42 Quiz	Ternary phase diagram
	x/xx	**X**	43	None		PL 43 Quiz	Ternary phase example
16	**x/xx**	**X**	44	7.0-7.1		PL 44 Quiz	Energy balance start
	x/xx	**X**	45	7.2-7.3	**HW 11**	PL 45 Quiz	Energy balance example
					Concept Inventory Post Class		
	x/xx	X			Final Exam– 1 pm – 3:00 pm		

All homework is due on the days listed above unless otherwise designated on a specific problem handout.

ChEE 201 Fall 20XX Supplemental Meeting Schedule (subject to change - check D2L for updates)

Week	What to Have with You	What you Will Be Doing
1	Computer/Tablet/Ipad – A device you can use for an online quiz	A pre-evaluation of what the class collectively knows about what we will learn this year
2	A book from at least one person on your team A computer from at least one person	HW 2 individual and group
3	A book from at least one person on your team A computer from at least one person	Sample exam from a prior year
4	A book from at least one person on your team A computer from at least one person	HW 4
5	A book from at least one person on your team A computer from at least one person	Test 2
6	A book from at least one person on your team A computer from at least one person	HW 5
7	A book from at least one person on your team A computer from at least one person	HW 6
8	6.0 A book from at least one person on your team A computer from at least one person -6.1	Test 3
9	A book from at least one person on your team A computer from at least one person	HW 8
10	A book from at least one person on your team A computer from at least one person	Test 4
11	A book from at least one person on your team	HW 9

	A computer from at least one person	
12	A book from at least one person on your team A computer from at least one person	Test 5
13	A book from at least one person on your team A computer from at least one person	HW 11
14	No Supplemental Session Due to Thanksgiving Break	Test 6
15	A book from at least one person on your team A computer from at least one person	HW 12
16	Have an electronic device for taking the online concept inventory for completion credit	Post Concept Inventory