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### CHMY 141N.00: College Chemistry I

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# CHMY 141: COLLEGE CHEMISTRY I

## Spring 2022

### Lead Instructor

Professor Kent Sugden, Office: CHEM 116, e-mail: kent.sugden@umontana.edu

### Office Hours

T,Th 10:00–11:00 AM or by appointment.

### Electronic Reserve (Moodle)

Moodle contains this syllabus including a calendar of dates, topics, and keys for quizzes/midterm exams.

### Prerequisites

MapleSoft M02  $\geq$  12 or better, or ALEKS Placement Level 4 or M 095 Intermediate Algebra w/ C+ or better.

### Course Purpose and Learning Objectives

We follow the standard curriculum in the United States, as suggested by the American Chemical Society. This is the first semester of a two-semester sequence (the second semester of this sequence, CHMY 143, is offered in the summer for those who wish to start Organic Chemistry in the fall). The sequence provides an introduction to the principles of physical and inorganic chemistry appropriate for the level of knowledge necessary for students who plan on majoring in the health sciences, engineering, or the physical sciences. Students taking CHMY 141 generally have majors that require two years or more of chemistry. CHMY 221–224 is a two-semester sequence in organic chemistry that is typically taken after CHMY 141–144, and thus concepts from organic chemistry are only touched upon lightly in the course.

There are three major goals in this course:

- 1. Development of your scientific reasoning skills.** In other words, we will work to help you with the development of your ability to think, specifically with respect to those thinking patterns commonly used by scientists.
- 2. Development of your content knowledge.** This is knowledge of facts, models, laws, and other information associated with chemistry.
- 3. Development of your understanding of the nature of science.** We want you to understand that science is a process of developing causal questions, proposing explanations, planning a test of the proposed explanation and predicting the result, and drawing conclusions about the natural world based on the observed results.

### Covid Protocols.

Please follow current Covid protocols. At this time, these include wearing a mask and staying home if you are sick. Expect changes as the semester goes along.

### Course Topics and Learning Outcomes

The topics to be covered and the learning outcomes for this course are given in detail in the textbook.

## Required Materials

- Cracolice, M.S., & Peters, E.I. (2021). *General Chemistry: An Inquiry Approach Part I: Lessons 1–38 Autumn 2021–Spring 2022 Version*. Boston, MA: Cengage Learning. The course textbook (the authors do not receive royalties for sales of this textbook). [Available through the Redshelf App on Moodle](#).
- Cracolice, M. S. (2021). *Think Out Loud! Part I. Autumn 2021–Spring 2022 Version*. Boston, MA: Cengage Learning. The lecture workbook (the author does not receive payment for sales of this supplement). [Available from bookstore](#).
- A nonprogrammable, single-line display scientific calculator. You may *not* use a programmable calculator or one that displays more than one line of information for exams and quizzes in this course. Use this calculator while doing homework so that you get familiar with it.
- *Molecular Model Set for General and Organic Chemistry*. It will not be needed until late in the semester, but the bookstore usually runs out early, and if you try to order one near the point in the semester at which we need it, they typically cannot get it in on time. I recommend that you get one now. It also can (and should) be used next year in organic chemistry.
- Spiral-bound college-lined (or grid-lined) paper notebook. Consistently doing the homework is the key to success in this course. An organized homework notebook will provide you with a mechanism to get feedback on homework-like quiz and exam questions. Bring your homework notebook with you to Team Education workshop and when you attend office hours.
- Pack of 40 or more 3 × 5 index cards. You will use these to summarize each lesson by writing concept definitions, problem-solving approaches, data to be memorized, etc., for each lesson. Use them to study for the comprehensive final exam in both CHMY 141 and 143.

## Recommended

Eubanks, L.T., & Eubanks, I.D. *Preparing for Your ACS Examination in General Chemistry*. Examinations Institute, American Chemical Society. [A study guide for the final examination](#).

Kean, E., & Middlecamp, C. (1986). *How to Survive and Even Excel in General Chemistry*. McGraw-Hill. A book that focuses on how to learn chemistry. An excellent supplement if you want to improve your study skills.

The course consists of two components: Lecture and Team Education workshop.

## Lecture

MWF 9:00 AM–9:50 AM, Chem 123. Each lecture begins with a ten-minute quiz based on the homework assigned in the lecture immediately prior (except for days immediately following a test). The remainder of the period is used to introduce new material, generally using *Think Out Loud!* and working with your peers and your PLTL leader.

## Laboratory

CHMY 142, College Chemistry I Lab, is a course co-requisite. Prof. Dong Wang is the laboratory coordinator; he supervises the laboratory instructors. You will meet your laboratory instructor—typically a graduate student in Chemistry or Biochemistry—at the first laboratory meeting.

## Team Education Workshop

A list of workshop sections and their times and locations may be found on Moodle.

Team Education is a method of instruction that involves well-trained peers: undergraduate students who have done well in the course previously who undergo pre-instruction training and continuous training throughout the semester. It is designed to actively engage you in the process of learning chemistry, with the help of your team. In addition to gaining content knowledge, both declarative and procedural, Team Education is designed to improve your Thinking and Reasoning Competencies and your Interpersonal Competencies.

## Grading Distribution

Midterm Examinations	40%	Final Examination	30%
Quizzes	28%	Team Education Workshop	2%

## Midterm Examinations

Four midterm exams are given on the Thursday evenings specified in the calendar, 5:00 PM–6:45 PM. Each midterm exam is comprehensive, covering all material in the course to that date. Exams generally consist of one question from workshop, and questions from the newer material. Students who have a conflict with the evening exam may take the exam 7:30 AM–9:15 AM on the morning of the exam date. To take the morning exam, submit a 3 × 5 card with the following information to me in lecture on the Wednesday one week before the exam: (a) name, (b) lab instructor, (c) workshop leader, (d) brief description of the nature of the conflict with the evening exam, and (e) name and phone number of person who can verify your conflict. If you qualify for the morning exam, you will receive a permission/conduct form with the location by Wednesday of the week of the exam.

## Final Examination

The final examination is given on the date and time specified by the registrar, **Wednesday 11, May 10:10 AM–12:00 PM**. The exam is a standardized exam developed by the American Chemical Society. It is a 70-item multiple-choice instrument. Your raw score on this exam is converted to your final exam score based on a conversion curve that has been established based on historical performance at UM and national norms. The final is mandatory; you will be assigned a grade of F for the course if you do not take the final exam, regardless of your point total prior to the exam.

## Quizzes

Each lesson in *Think Out Loud!* ends with a reading and homework assignment from the textbook. The homework questions should be the primary focus of your study. At the *beginning* of each lecture, a ten-minute, ten-point quiz will be administered with questions drawn from the textbook reading, programmed text examples, *TOL!*, and/or homework questions. In general, when a lesson focuses on numerically-oriented concepts, the quiz question(s) will be a homework question with often times, the compounds and/or numbers changed. When the lesson is more conceptually oriented, the quiz question(s) will be derived to test your grasp of the concepts from the reading. Make-up quizzes are not administered. To allow for illness, emergencies, and other legitimate

reasons to miss class, only the best 28 quizzes are used in the calculation of your final grade, for a total of 280 points.

### Team Education Workshop

Each workshop is graded based on preparation, attendance, and participation. You will receive 2 points for coming to workshop prepared and then participating actively, 1 point if you do not come prepared or do not make any significant contribution while attending, and no points if you do not come prepared and do not attend and participate in the entire workshop session. The best 10 workshop grades are used in the calculation of your final grade, for a total of 20 points.

### Grading Distribution

The homework and workshop actually count for *much* more than the 30% then it may first appear. An actual percentage calculation is not possible because all course components are integrated, but keep in mind that every exam contains homework and workshop questions.

### Grading

4	Midterm Exams	@ 100 points =	400 points
1	Final Exam	@ 300 points =	300 points
28	Quizzes	@ 10 points =	280 points
10	Workshop Evaluations	@2 points =	20 points

**Total 1000 points**

A+ Not awarded at UM      A 900–1000 points      B 899-800 points

C 799–700 points      D 699-600 points      F 599-0 points

(600 or more required for CR for those using CR/NCR option)

(+ and – grades are given at the discretion of the instructor and are not punitive)

### Make-up Exams, Quizzes, Workshops

*No make-ups are allowed.* In a class of this size, there is no possible way to fairly design special make-up exams for individual students. Students who miss exams for legitimate emergencies or illnesses will be allowed to replace one midterm score with the final exam score. If circumstances are such that you have to miss two or more midterms, it is unlikely that you have been able to learn the major concepts of the course. See me about a medical withdrawal. Only the best 28 quiz scores and best 10 workshop scores are used to calculate the course grade to allow you to be excused from missed quizzes or workshops because of special circumstances such as emergencies and illnesses.

### Midterm Exam Grading Standards

Midterm exams are graded on a 100-point scale by a process called “modified multiple choice.” The philosophy is to establish a general pattern for grading that can be consistently and fairly applied to an exam that is scored by a number of graders. The typical grading criteria for an eight-point calculation question are:

8 points	Solution setup clearly and correctly shown, correct answer and sig figs
4 points	Solution setup clearly shown but with one error
0 points	Two or more errors in the solution setup

Additionally, one point is subtracted for any of the following: (a) significant figures error, (b) calculational error, (c) not showing unit cancellation or omitting units. Questions worth 4 points or

less are generally graded 4 = correct, 0 = one error or more, with the additional subtractions above on otherwise correct clearly-shown solution setups.

*Not all questions will fit this pattern.* Nonetheless, you hopefully can understand the general philosophy from this example. 50% or more of the possible credit is reserved for solutions that clearly show a correct understanding of the answer. 50% of the credit is awarded to answers that have one error in the solution process. No credit is given for answers with no work, a difficult-to-follow solution setup, or those with two or more errors. Errors include “dumb mistakes” as well as not-dumb mistakes, whatever those are. We treat missing a  $10\text{ mm} = 1\text{ cm}$  conversion factor equally with missing any other conversion factor. Learn the fundamentals well! In all cases, the lab instructors will establish grading criteria for their questions and apply them consistently.

### Quiz and Midterm Grading Errors

When quizzes or midterm exams are returned, please check your quiz or exam for grading errors promptly. The answer key is posted the day following the quiz or exam at the course electronic reserve website. Barring emergencies, quizzes are returned at the next class meeting and exams are returned by the Monday following the exam. If you believe that a grading error has occurred:

(a) On a piece of lined notebook paper or using a word processing program, divide the paper into two columns. In the left column, write the correct solution setup to the question, using no more than one line per step. In the right column, rewrite your solution setup, matching each step in the correct solution. Annotate your solution setup with an explanation of your error. In general, for six- or eight-point questions, one error should be awarded half credit, and two or more errors are awarded no credit. Any error on a 4-point question should be scored zero. One point is also subtracted for calculational or significant figure errors, or not showing units and/or unit cancellation.

(b) Attach the page to the front of your unaltered exam. Regrade requests for *quizzes* go to your *workshop leader*. Suspected *midterm exam* grading errors must be submitted to *me in class* no later than one week after your graded exam is returned. Regrade requests are returned to the original grader, who will explain in more detail why their original assessment was correct or s/he will adjust your grade if an error did occur. Graders are allowed to adjust your grade up or down or make no adjustment.

In the rare case where there is more than one suspected grading error, use two separate sheets, one for each suspected error.

### Dropping the Course and Changing Grade Option

**Feb 7 is the last day to drop by CyberBear (5:00 PM). Dropping on or before this date results in NO RECORD of taking this course on your transcript. This is also the last date to change your grade option to AUDIT.**

**30 March is the last day to drop with the approvals of your advisor and the course instructor. Dropping between 7 Feb and 30 March results in a grade of W on your transcript.**

**After 30 March, you have effectively made the decision to stay in the course until the end. After this date, you must have documented justification of a circumstance beyond your control to drop the course.** In addition to the written external proof of your claim, you have to acquire the approval of your advisor, course instructor, and dean of your major.

If this is the case, submit your completed drop petition *and a copy of the documentation* to me immediately before or after class in the lecture hall. If you have less than 50% of the possible exam

points on that date, you will be assigned a WF grade; if you have more than 50% of the exam points to date, you will be assigned a WP grade.

Any time during the semester up to **6 May** (the last day of classes before finals week), you may change your grading option between traditional and credit/no credit (by petition; your advisor must also approve). Your choices are:

1. Traditional letter grade. Details are given elsewhere in this syllabus.
2. Credit/No Credit grading. *If you choose the CR/NCR option in this course, it will not count toward General Education Requirements.* The credit/no credit option does not extend to courses required for the student's major or minor, except at the discretion of the department concerned. CR and NCR grades do not affect grade point average. The University cautions students that many graduate and professional schools and some employers do not recognize non-traditional grades or may discriminate against students who use the credit/no credit option for many courses. Additionally, the option is often problematic for students who transfer.

### Disabilities

If you are a student with a disability who will require reasonable program modifications in this course, please meet with Disability Services for Students in Lommasson 154 for assistance in developing a plan to address program modifications. If you are already working with Disability Services, correspond with me by email and/or arrange to meet with me during my office hours to discuss reasonable modifications that may be necessary. For more information, visit the Disability Services website at [Disability Accommodations](#). For the daily quizzes, students with DSS accommodations can take the quiz at 8:30 am at DSS on the morning of lecture. Exams will be scheduled on the same day as that for the rest of the class and as close to the regular time as possible.

### Legal Notices

This course syllabus is *not a contract*; it is a tentative outline of course policies. Changes may be made before, during, or after the semester at my discretion.

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the university. All students need to be familiar with the Student Conduct Code. The Code is available for review online at [Student Conduct](#).

Week	Event	Mon	Tue	Wed	Thu	Fri
1	Lecture	17 Jan	18 Jan	19 Jan L1	20 Jan	21 Jan L2
	Assessment	No Class				HC 1
	Workshop					
2	Lecture	24 Jan L3	25 Jan	26 Jan L4	27 Jan	28 Jan L5
	Assessment	HC 2		HC 3		HC 4
	Workshop	0-1	0-1			
3	Lecture	31 Jan L6	1 Feb	2 Feb L7	3 Feb	4 Feb L8
	Assessment	HC 5		HC 6		HC 7
	Workshop	2-5	2-5			
4	Lecture	7 Feb L9	8 Feb	9 Feb Review	10 Feb	11 Feb L10
	Assessment	HC 8		HC 9	Exam 1	No quiz
	Workshop	6-8	6-8		5:00-6:45 pm	
5	Lecture	14 Feb L11	15 Feb	16 Feb L12	17 Feb	18 Feb L13
	Assessment	HC 10		HC 11		HC 12
	Workshop	9-10	9-10			
6	Lecture	21 Feb	22 Feb	23 Feb L14	24 Feb	25 Feb L15
	Assessment	No class		HC 13		HC 14
	Workshop	Pres day	11-12			
7	Lecture	28 Feb L16	1 Mar	2 Mar L17	3 Mar	4 Mar L19
	Assessment	HC 15		HC 16		HC 17
	Workshop	11-15	13-15			
8	Lecture	7 Mar L20	8 Mar	9 Mar Review	10 Mar	11 Mar L21
	Assessment	HC18		HC 19	Exam 2	No Quiz
	Workshop	16-17	16-17		5:00-6:45 pm	
9	Lecture	14 Mar L22	15 Mar	16 Mar L23	17 Mar	18 Mar L24
	Assessment	HC 20		HC 21		HC 22
	Workshop	18-21	18-21			
10	Lecture	21 Mar	22 Mar	23 Mar	24 Mar	25 Mar
	Assessment	Spring Break		Spring Break		Spring Break
	Workshop					
11	Lecture	28 Mar L25	29 Mar	30 Mar L26	31 Mar	1 Apr L27
	Assessment	HC 23		HC 24		HC 25
	Workshop	22-24	22-24			
12	Lecture	4 Apr L29	5 Apr	6 Apr Review	7 Apr	8 Apr L30
	Assessment	HC 26		HC 27	Exam 3	No Quiz
	Workshop	25-26	22-26		5:00-6:45 pm	
13	Lecture	11 Apr L31	12 Apr	13 Apr L32	14 Apr	15 Apr L33
	Assessment	HC 28		HC 29		HC 30
	Workshop	27-30	27-30			
14	Lecture	18 Apr L34	19 Apr	20 Apr L35	21 Apr	22 Apr L36
	Assessment	HC 31		HC 32		HC 33
	Workshop	31-32	31-32			
15	Lecture	25 Apr L37	26 Apr	27 Apr Review	28 Apr	29 Apr L38
	Assessment	HC 34		HC 35	Exam 4	No quiz
	Workshop	33-35	33-35		5:00-6:45 pm	
16	Lecture	2 May Review	3 May	4 May	5 May	6 May
	Assessment	HC 36				
	Workshop	Final	Final			

Final Exam: Wednesday 11, May 10:10 AM–12:00 PM. Chem 123.