Spring 2-1-2019

CHMY 121N.00: Introduction to General Chemistry

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Introduction of General Chemistry
CHMY 121N Spring 2019

Instructor Information

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Office Hours

T 1:00–3:00 PM, W 1:00–2:00pm, and by appointment. Email is the best way to reach me. I am frequently available outside of office hours. Walk in the outer 101 door (no need to knock). Please come in 101A any time my inside office door is open.

Electronic Reserve

This syllabus, keys for quizzes and midterm exams will be posted on Moodle. Grades will NOT be posted on Moodle; you must keep track of your grades yourself.

Prerequisites

Fundamental algebraic skills – rearrange equations, work with fractions, able to calculate logs and exponents. You should be *eligible to enroll* in MATH 117 or higher to satisfy the math prerequisites for this course.

Course Description

CHMY 121N is aimed at students who require a working knowledge of chemistry for careers in fields such as forestry, resource management, wildlife biology, botany, zoology, nursing, medical technology, physical therapy, athletic training, exercise science, forensic anthropology and environmental studies. It provides a foundation of chemical principles illustrated through their application to "real world" examples, especially those with environmental, physiological or medical implications. The course systematically develops skills in fundamental chemistry: atomic and molecular theory, nuclear chemistry, chemical bonding, chemical reactions (precipitation, acid/base and redox), states of matter, and aqueous solution chemistry. In addition, you will gain experience with analytical thinking and quantitative problem solving. Organic chemistry - the study of carbon-containing compounds - is integrated into lecture throughout the semester.

Required Materials

- **Text Book:** ***Introduction to General, Organic, and Biochemistry. 11th Edition*** by Morris Hein, Scott Pattison and Susan Arena, John Wiley & Sons, 2015. We are using a custom version of this text which consists of the first 18 chapters of the full textbook. The full textbook may also be used if the custom version is unavailable. A hard copy of the custom textbook, bundled with WileyPlus, is available in the University of Montana Bookstore. You are **not required** to have the copy that is bundled with WileyPlus. Several full-copy options are available via Amazon that are not bundled.
- **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.

Recommended Materials

- **A molecular model set for general and organic chemistry**. Most students need a model set to learn how to visualize molecules in three dimensions. Unless you have a talent for creating a mental three-dimensional image from a two-dimensional sketch, I strongly recommend the purchase of a ball-and-stick model set. 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 the general/organic/biochemistry course.
- **A 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 when you attend office hours.

- **A pack of 40 or more 3 × 5 index cards**. You can 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 CHMY 121N.

Lecture

MWF 9–9:50am, Gallagher Business Building 106. Each regular lecture will be used to introduce new material and to work on problems.

Homework & Study Time

Homework will be assigned three days per week, after lecture. There will be times when homework will be assigned but you may not be able to complete all of it until after a later lecture. In those cases, the homework assigned will likely remain the same until all material has been covered. Only problems with the answers provided in the back of the book will be assigned so you can check your answers. There are groups of similar questions so if you need more practice you can do the problems not assigned. As these answers will not be in the back of the book you can check with the instructor for correct answers. Homework will not be graded but the quizzes and midterms will be homework problems with different numbers or compounds, etc. The only way then for you to succeed in this course is to complete and understand the homework. A standard formula used in colleges and universities is to allow for an average of two hours of study time for each hour of lecture.

The course content is cumulative. It doesn't get any easier than the introductory material, and subsequent material depends on understanding the material in the first 1/4 of the course. A lot of help is available, so take advantage of it.

In addition to gaining content knowledge, both declarative and procedural, the course and homework will hopefully improve your Thinking and Reasoning Competencies, as defined below by the Association of American Medical Colleges (www.aamc.org):

Thinking and Reasoning Competencies

Critical Thinking Uses logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.

Quantitative Reasoning Applies quantitative reasoning and appropriate mathematics to describe or explain phenomena in the natural world.

Scientific Inquiry Applies knowledge of the scientific process to integrate and synthesize information, solve problems and formulate research questions and hypotheses; is facile in the language of the sciences and uses it to participate in the discourse of science and explain how scientific knowledge is discovered and validated.

Written Communication Effectively conveying information to others using written words and sentences.

Evaluation for the purpose of establishing a course grade is based on:

Grading Distribution

Quizzes	30%
Midterm Examinations	40%
Final Examination	30%

Recitations

Tuesday 9–9:50am, Section 01, Social Science 352
Tuesday 9–9:50am, Section 02, Health Science 207
Monday 10–10:50am, Section 03, Native American Center 105
Monday 12–12:50pm, Section 04, Education 214
Monday 12–12:50pm, Section 05, Forestry 206

You must be registered online for the recitation you attend. If you choose to switch sections, you must Add/Drop on Cyberbear to ensure you are registered for your desired section.

Each recitation will be used to administer a 30-point quiz. These quizzes will act as homework checks for the previous week's homework assignments and will be done independently. You will have the entire recitation time to complete the quiz. Questions will be drawn from the textbook reading, lecture examples, and/or homework questions. In general, when a lesson focuses on numerically-oriented concepts, the quiz question(s) will be a homework question with 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 10 quizzes are used in the calculation of your final grade, for a total of 300 points.

If you have questions on homework prior to the quiz you will have the week before to meet with your TAs or attend office hours. The Learning Center is also available to provide help.

Midterm Exams

Four midterm exams will be given during this course on dates specified on the calendar (see below). Each midterm exam is comprehensive, covering all material in the course to that date. Exams will typically consist of 40-50 minutes of multiple choice and worked questions. About 20-30 minutes of the questions will be worked problems. These will be based on homework, just like the quizzes. A couple questions may be from older material, the rest from the newer material. Make-up exams are not administered. *No scantrons will be required for the multiple-choice sections.

Final Exam

The final examination is given on the date and time specified by the registrar, Tuesday 30 April 10:10 AM–12:10 PM. The exam is a standardized exam developed by the American Chemical Society. It is a 60-item multiple-choice instrument meant to cover material from the semester. Your raw score on this exam is converted to your final exam score based on a conversion curve I have established based on 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.

Grading Philosophy

An A student is someone who can solve homework-like problems under exam conditions with near-100% accuracy, who conceptually understands the material and can demonstrate that understanding through the correct solution of application questions on quizzes and exams, and who can successfully solve novel problems on exams.

A B student is someone who can solve homework-like problems under exam conditions with near-100% accuracy, who conceptually understands the material and can demonstrate that understanding through the correct solution of application questions on quizzes and exams but struggles with novel problems on exams.

A C student is someone who can solve most homework-like problems under exam conditions, who conceptually understands the material and can demonstrate that understanding through the correct solution of most application questions on quizzes and exams and has a demonstrable understanding of the major concepts of the course.

A D student earns a passing grade. Thus, a demonstrated understanding of the major concepts of the course is required. This includes the ability to solve homework-like problems on quizzes and exams.

A student who cannot demonstrate an understanding of the major concepts of the course through their performance on quizzes and exams does not earn a passing grade.

Assessment and Grades

10 Recitation Quizzes	@ 30 points each =	300 points
4 Midterm Exams	@ 100 points each =	400 points
1 Final Exam	@ 300 points =	300 points
Total		**1000 points**

A+ Not awarded at UM !

≥93.33% guarantees A	≥90.00% guarantees A-	≥86.67% guarantees B+ !
≥83.33% guarantees B	≥80.00% guarantees B-	≥76.67% guarantees C+ !
≥73.33% guarantees C	≥70.00% guarantees C-	≥66.67% guarantees D+ !
≥63.33% guarantees D	≥60.00% guarantees D-	<60.00% guarantees F !

Makeup Quizzes and Exams

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 it benefits your grade to do so. 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 10 quizzes are used in the calculation of your course grade to allow you to be excused from missed quizzes because of special circumstances such as emergencies and illnesses.

You are responsible for attendance and taking notes during lecture. If you miss class contact another student to get the homework assignment and their notes.

Midterm Exam Grading Standards

Midterm exams are graded on a 100-point scale by a process I call "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 a 15-point calculation question are:

15 points	Solution setup(s) clearly and correctly shown, correct answer and sig figs
10 points	Solution setup(s) clearly shown but with one error
5 points	Solution setup(s) clearly shown but with two errors
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) omitting units. Questions worth five points or less are generally graded 5 = 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 setup errors, depending on the overall number of points for the problem. Errors include "dumb mistakes" as well as not-dumb mistakes, whatever those are. We treat missing a 10 mm = 1 cm conversion factor equally with missing any other conversion factor. Learn the fundamentals well!

"Stupid error" flaws and "smart error" (?) flaws are treated equally. It pays to know the fundamentals, and it costs not to know them. A patient who is administered a medication dosage that is "just" off by a factor of ten is a dead patient. A bridge that is too weak to handle a weight load "just" off by a factor of ten is an engineering catastrophe.

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–Moodle. Barring emergencies, quizzes will be returned at the next lecture class meeting and exams will be 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 from the key, 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 ten- or fifteen-point questions, one error should be awarded half credit, and two or more errors are awarded no credit. Any error on a 4- or 5-point question should be scored zero. One point is also subtracted for calculational or significant figure errors or not showing units.

(b) Attach the page to the front of your unaltered exam. Regrade requests for *quizzes* go to your *recitation 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.

Change in Perspective from High School to College

General chemistry is a difficult course and, depending on your level of current study skills, it may be one of the most challenging courses you will experience in college. Advanced courses are more difficult, of course, but you will

develop skills as you mature as a student that will put you in a better position to deal with the more advanced courses. The standard formula for out-of-class time for college courses is to schedule two hours out of class for each hour in class for an average student. Given that this is a 3-credit course, as a minimum, you should schedule 6 hours per week of study time. If you wish to earn an A or a B in this course, you should schedule 9 hours per week or more outside of class. The exact number of hours largely depends on your previous preparation and the development of your scientific reasoning skills; only you can judge. The distribution of your time is also important. You will maximize the probability of learning the course material well and therefore being rewarded with a good grade by studying one to two hours each day, every day, rather than cramming all 9 hours per week of study time into a couple of days.

Dropping the Course and Changing Grade Option

The 15th instructional day 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.

The 45th instructional day is the last day to drop with the approvals of your advisor and the course instructor. Dropping between 16th and 45th instructional day results in a grade of W on your transcript.

After the 45th instructional day, 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. Here are the guidelines on what the CHS Dean's office historically has regarded as appropriate verification:

1. Medical. *Memo from physician or another medical professional.*
2. Change in work schedule. *Memo from employer with pertinent information.*
3. Family/personal emergency. *Memo from appropriate professional.*

If this is the case, submit your completed drop petition *and a copy of the documentation* to me immediately before or after class. 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 **26 April** (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). (The audit option cannot be selected after **the 15th instructional day.**) Your choices are:

1. ! Traditional letter grade. Details are given elsewhere in this syllabus.

2. ! Credit/No Credit grading. A freshman or sophomore with a GPA of 2.00 or better may elect one undergraduate course a semester on a credit/no credit basis. Juniors and seniors may elect more than one credit/no credit course a semester. No more than 18 CR credits may be counted toward graduation. *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 does 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 to another institution.

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 (406-243-2243) 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 http://www.umt.edu/disability.

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 http://www.umt.edu/vpsa/policies/student_conduct.php.

Schedule

Week	Day	Date	Lecture	Book Chapter	Topic	Recitation	Homework
1	Friday	11-Jan	1	1,2	Course overview, Algebra, Dimensional Analysis intro		Read the Syllabus; Read sections 1.1 & 2.6, try to do the problems while you read; Algebra hwk on Moodle
	Saturday	12-Jan					
	Sunday	13-Jan					
2	Monday	14-Jan	2	2	Ratios, Metric System, Uncertainty in Measurement, Significant Figures	10–10:50 or 12–12:50 *Quiz 1*	Ch 2. 6 a,c,e; 8; 10; 12;14 a,c,e; 16; 18; 20 c,e,g; 22 a,c,e; 24–42 (evens); 52; 54; 56; 60; 61; 72; 75; 77; 79; 82; 87
2	Tuesday	15-Jan				9–9:50 *Quiz 1*	
2	Wednesday	16-Jan	3	1,2	Density, Problem Solving, Classification of matter		Unfinished Ch 2. hwk; Read through Ch. 1; All review questions (check answers within the chapter); PE #6; AE 9a,c & 12a,c
2	Friday	18-Jan	4	12	Scientific Method, Gas Laws		Ch. 12 sections 2, 3, & 5; PE #8-18 (evens)
	Saturday	19-Jan					
	Sunday	20-Jan					
3	Monday	21-Jan	**HOLIDAY**		Martin Luther King, Jr. Day	NONE	
3	Tuesday	22-Jan				NONE	
3	Wednesday	23-Jan	5	3	Atomic composition; Law of definite proportions; Law of multiple proportions		Ch. 3 PE #4-26 (evens & only blue letters) **You may have to wait until Lecture 8 to do some of these
3	Friday	25-Jan	6	5	Atomic & Nuclear Structure		Ch. 5 PE-AE #2-26 evens, 29, 31 (blue)
	Saturday	26-Jan					
	Sunday	27-Jan					
4	Monday	28-Jan	7	3,6	Nomenclature I: elements to acids	10–10:50 or 12–12:50 *Quiz 2*	Ch. 3 PE #4-26 (evens & blue); Ch. 6 PE-AE #4 blue, 6 b,f, 12 c,g, 14 blue, 28 blue, 30
4	Tuesday	29-Jan				9–9:50 *Quiz 2*	
4	Wednesday	30-Jan	8	6,13	Nomenclature II: acids, ionic compounds, hydrates		Ch. PE 6 #2, 6a,c-e, 8, 10, 12a&e, 16, 18, 20, 22, 24 (only blues); Ch. 13 #12
4	Friday	1-Feb	9	NA	**EXAM 1 (Lectures 1–7)**		
	Saturday	2-Feb					
	Sunday	3-Feb					

5	Monday	4-Feb	10	7	Mole, Molar mass, % composition	10–10:50 or 12–12:50 *Quiz 3*	Ch. 7 PE #2-28 (evens & blue)
5	Tuesday	5-Feb				9–9:50 *Quiz 3*	
5	Wednesday	6-Feb	11	7	Empirical & molecular formulas		Ch. 7 PE #30-44 (evens & blue)
5	Friday	8-Feb	12	8	Writing & balancing equations		
	Saturday	9-Feb					
	Sunday	10-Feb					
6	Monday	11-Feb	13	9	Stoichiometry I: mass to mass	10–10:50 or 12–12:50 *Quiz 4*	Ch. 9 PE #2-18 (evens & blue)
6	Tuesday	12-Feb			*Darwin's Bday (1809)*	9–9:50 *Quiz 4*	
6	Wednesday	13-Feb	14	9	Stoichiometry I: limiting reactant, percent yield		Ch. 9 PE #20-32 (evens & blue)
6	Friday	15-Feb	15	12	Ideal gas law, Gas stoichiometry, Avogadro's Hypothesis		Ch. 12 PE #20-50 (evens)
	Saturday	16-Feb					
	Sunday	17-Feb					
7	Monday	18-Feb	**HOLIDAY**		President's Day	NONE	
7	Tuesday	19-Feb				NONE	
7	Wednesday	20-Feb	16	4,8	Energy & Thermodynamics		Read through Chs 4 & 8; Ch. 8 PE # 2, 20, 22 (evens & blue)
7	Friday	22-Feb	17	4,13	Heat of fusion & vaporization, Thermodynamics		Ch. 4 PE #2-10, 14-22; Ch. 13 PE # 22, 24, 26 (evens & blue)
	Saturday	23-Feb					
	Sunday	24-Feb					
8	Monday	25-Feb	18	10	Atomic Theory I, light	10–10:50 or 12–12:50 *Quiz 5*	Read Ch. 10; Catch up if you need to and solidify other chs.
8	Tuesday	26-Feb				9–9:50 *Quiz 5*	
8	Wednesday	27-Feb	19		**EXAM 2 (Lectures 8–17)**		
8	Friday	1-Mar	20	10	Quantum mechanics		Read Ch. 10; Catch up if you need to and solidify other chs.
	Saturday	2-Mar					
	Sunday	3-Mar					
9	Monday	4-Mar	21	10	Electron configurations	10–10:50 or 12–12:50 *Quiz 6*	Ch. 10 PE # 2-38, 42-46 (evens & blue)
9	Tuesday	5-Mar				9–9:50 *Quiz 6*	
9	Wednesday	6-Mar	22	11	Periodic Trends		Ch. 10 PE #40; Ch. 11 2,4,10,14,16
9	Friday	8-Mar	23	11	Bonding, ionic & covalent		Ch. 11 PE #6,8,12,18-38 evens
	Saturday	9-Mar					
	Sunday	10-Mar					

10	Monday	11-Mar	24	11	Lewis dot diagrams	10–10:50 or 12–12:50 *Quiz 7*	Ch. 11 PE #6,8,12,18-38 evens
10	Tuesday	12-Mar				9–9:50 *Quiz 7*	
10	Wednesday	13-Mar	25	11	Molecular geometry		Ch. 11 PE #40,42,44
10	Friday	15-Mar	26	13	Properties of liquids, phase equilibria, uniqueness of water		Ch. 13 PE #2-20 evens (this applies to topics we've already discussed as well)
	Saturday	16-Mar					
	Sunday	17-Mar					
11	Monday	18-Mar	27	14	Solutions, Molarity, Colligative properties	10–10:50 or 12–12:50 *Quiz 8*	Ch. 14 PE #2-44 (evens & blue)
11	Tuesday	19-Mar				9–9:50 *Quiz 8*	
11	Wednesday	20-Mar	28		**EXAM 3 (Lectures 18–26)**		
11	Friday	22-Mar	29	15	Electrolytes, state symbols, Net ionic equations		Ch. 15 PE #4-16, 20-34 (evens & blue)
	Saturday	23-Mar					
	Sunday	24-Mar					
Week 12: Monday 25-Mar – 29-Mar, **SPRING BREAK**							
	Saturday	30-Mar					
	Sunday	31-Mar					
13	Monday	1-Apr	30	15	Electron-Transfer Rxns/Net ionic equations cont., titrations	10–10:50 or 12–12:50 *Quiz 9*	Ch. 15 PE #4-16, 20-34 (evens & blue)
13	Tuesday	2-Apr				9–9:50 *Quiz 9*	
13	Wednesday	3-Apr	31	16	Chemical Equilibria, Le Chatelier's Principle		Ch. 16 PE #2-14 (evens)
13	Friday	5-Apr	32	15	Acids & Bases, definitions		Ch. 15 PE #2
	Saturday	6-Apr					
	Sunday	7-Apr					
14	Monday	8-Apr	33	16	Kw, Ka, pH	10–10:50 or 12–12:50 *Quiz 10*	Ch. 15 PE #18,36,38,40; Ch. 16 PE #16
14	Tuesday	9-Apr				9–9:50 *Quiz 10*	
14	Wednesday	10-Apr	34	16	Ka, % ionization, buffers		Ch. 16 PE #18-48 (evens)
14	Friday	12-Apr	35	17	Redox rxns, oxidation #'s, voltaic cells		Ch. 17 PE #2-10 (evens)
	Saturday	13-Apr					
	Sunday	14-Apr					
15	Monday	15-Apr	36	17	Balancing redox rxns in acidic and basic solns	10–10:50 or 12–12:50 *Quiz 11*	Ch. 17 PE #12-20 (evens)
15	Tuesday	16-Apr				9–9:50 *Quiz 11*	

15	Wednesday	17-Apr	37		**EXAM 4 (Lectures 27–35)**		
15	Friday	19-Apr	38	18	Nuclear chemistry history, definitions, transmutation		Ch. 18 PE #2-14 (evens)
	Saturday	20-Apr					
	Sunday	21-Apr					
16	Monday	22-Apr	39	18	Half-life, measurement instruments, fission, fusion, atomic bomb, nuclear power, genetic effects, environmental effects	10–10:50 or 12–12:50 *Quiz 12*	Ch. 18 PE #16
16	Tuesday	23-Apr				9–9:50 *Quiz 12*	
16	Wednesday	24-Apr	40	18	Fusion, genetic effects, environmental effects		Ch. 18 PE #18,20
16	Friday	26-Apr	41	NA	Go over Final & Evaluations		
	Saturday	27-Apr					
	Sunday	28-Apr					
17	Tuesday	30-Apr	**FINAL** 10:10 am–12:10pm				

Frequently Asked Questions

But I'm a special case because I'm _____. I need to take the exam on _____.
I cannot write a separate make-up exam for each student with special circumstances. It takes me approximately one entire work day to write an exam. Even if I had an "extra" day to write an exam just for you, it wouldn't be fair because it would not be at an equivalent difficulty level. You can take the exam when it is scheduled, early by permission, or you cannot take it.

Why won't you consider my special circumstances?
The primary criterion that I use to guide my decisions in the course is *fairness*. If I do a special favor for one student, I will do it for all students. If I can't do it for all students, I won't do it for one.

I'm not doing too well in this course, so I want to take an incomplete now and finish the course next semester, OK?
No. The only circumstances that a grade of "incomplete" is assigned is for students who are passing the course but have a documented reason for missing the final such as serious illness, etc.

I'm not a whiner, but I study more for this course than I have for any other course in my whole life and I'm still getting a B. What can I do to bring my grade up to an A?
This is a tough question, as the answer may lie in a number of different areas. First and foremost, you probably need to spend more time studying. Research shows that you initially make great gains in learning with very little studying, but then the gains become smaller and smaller per unit time as the work continues. In other words, you may need to study 6 hours a week outside of class to get a C, 50% more hours to get a B, and another 50% more hours to get an A. The C-to-B gap is smaller than the B-to-A gap. Have your recitation leader set you up with an A student and talk with that person about their study behavior.

Someone told me to study smarter, not harder. How can I study smarter?
As Thomas Edison said, "Genius is one percent inspiration and ninety-nine percent perspiration." You can improve the most by studying harder. Many people don't want to accept the fact that it takes work, sacrifice, and self-discipline to get good grades, so they look for some miracle system. However, many students can "study smarter" simply by scheduling 2 hours a day, every day, alone and distraction-free, for this course. "Smarter" can also mean making sure you work the homework problems before checking the answers and to learn from feedback on quizzes and midterms.

How do I prepare for the exams?
Learn the fundamentals and learn them well. In a classic psychology experiment, a bird was trained, in separate episodes, to do each of the following tasks: open a door in its cage, drag a box across its cage, stand on the box, and peck at a target. When the target was hung from the top of the cage and the box was placed behind the closed door, the bird figured out all by itself how to open the door, drag the box across the cage, stand on the box, and peck the target. Hopefully you are a bit more intelligent than a birdbrain (ugh, bad pun) and can do the same with chemistry knowledge. Consider the opposite situation. If you don't know the fundamentals, you have no opportunity to assemble them to solve a problem. Always include a review of the quiz questions in your exam preparation routine.

Even though I earned a D according to the number of points I have, I deserve a C because of the circumstances of my life. Will you reconsider my grade?
No. I understand that some of you have jobs and are single parents, etc., and I commend you for taking this course under those circumstances, but your grade in this class is based solely on your performance on the evaluative instruments.

Why don't you announce the class average for exams? I "heard" that the average was ____, and I'm below/at/above the average, so does that mean my grade is going to be poor/average/good?
The average score for the class on any quiz or exam has no bearing on any individual student's grade. If you earn 90% of the possible points or more, your grade is guaranteed to be an A– or A. If all students in the course earn 90% of the possible points or more, all students will earn a grade of A– or A. If no student in the course earns 90% of the possible points or more, no student will earn a grade of A– or A. Focus on your performance, not the performance of others.

I need a grade of ___ to graduate/keep a scholarship/remain eligible, and I earned a final grade of ___. Can I do extra credit to change my grade?
No. Your grade in this class is based solely on your performance on the evaluative instruments. Work diligently *during* the semester to be sure that you earn the grade you need. Grades are not changed after the semester.

A BRIEF PRIMER ON *DELIBERATE PRACTICE*

by Geoffrey Colvin

The best people in any field are those who devote the most hours to what the researchers call "deliberate practice." It's activity that's explicitly intended to improve performance, that reaches for objectives just beyond one's level of competence, provides feedback on results and involves high levels of repetition.

For example: Simply hitting a bucket of balls is not deliberate practice, which is why most golfers don't get better. Hitting an eight-iron 300 times with a goal of leaving the ball within 20 feet of the pin 80 percent of the time, continually observing results and making appropriate adjustments, and doing that for hours every day—that's deliberate practice.

Consistency is crucial. As Ericsson notes, "Elite performers in many diverse domains have been found to practice, on the average, roughly the same amount every day, including weekends."

Evidence crosses a remarkable range of fields. In a study of 20-year-old violinists by Ericsson and colleagues, the best group (judged by conservatory teachers) averaged 10,000 hours of deliberate practice over their lives; the next-best averaged 7,500 hours; and the next, 5,000. It's the same story in surgery, insurance sales, and virtually every sport. More deliberate practice equals better performance. Tons of it equals great performance.

All this scholarly research is simply evidence for what great performers have been showing us for years. To take a handful of examples: Winston Churchill, one of the 20th century's greatest orators, practiced his speeches compulsively. Vladimir Horowitz supposedly said, "If I don't practice for a day, I know it. If I don't practice for two days, my wife knows it. If I don't practice for three days, the world knows it." He was certainly a demon practicer, but the same quote has been attributed to world-class musicians like Ignace Paderewski and Luciano Pavarotti.

Many great athletes are legendary for the brutal discipline of their practice routines. In basketball, Michael Jordan practiced intensely beyond the already punishing team practices. (Had Jordan possessed some mammoth natural gift specifically for basketball, it seems unlikely he'd have been cut from his high school team.)

For most people, work is hard enough without pushing even harder. Those extra steps are so difficult and painful they almost never get done. That's the way it must be. If great performance were easy, it wouldn't be rare. Which leads to possibly the deepest question about greatness. While experts understand an enormous amount about the behavior that produces great performance, they understand very little about where that behavior comes from.

The authors of one study conclude, "We still do not know which factors encourage individuals to engage in deliberate practice." Or as University of Michigan business school professor Noel Tichy puts it after 30 years of working with managers, "Some people are much more motivated than others, and that's the existential question I cannot answer—"why."

The critical reality is that we are not hostage to some naturally granted level of talent. We can make ourselves what we will. Strangely, that idea is not popular. People hate abandoning the notion that they would coast to fame and riches if they found their talent. But that view is tragically constraining, because when they hit life's inevitable bumps in the road, they conclude that they just aren't gifted and give up.

Maybe we can't expect most people to achieve greatness. It's just too demanding. But the striking, liberating news is that greatness isn't reserved for a preordained few. It is available to you and to everyone.

Success in Studying for UM CHMY 121N

1. ! Briefly preview each lesson before coming to class. Focus on the key words and concepts so that you have a sense of the big picture for the lecture and you know the new words and phrases that are going to be used.
2. ! Attend lecture and complete each breakout while the instructor is working through it. During lecture, take your own notes. If you get stuck during a breakout, make a note of why you are stuck. As soon as possible after class, work on correcting any missing prerequisite knowledge or problem-solving skill by reviewing the pertinent lesson(s).
3. ! Complete the recommended homework set—*all* of it—before the next class meeting. Make a reasonable attempt at the solutions before you look at the textbook solution, but don't spend hours on any single problem. Mark questions as "easy," "medium," and "challenging." Summarize the lesson on a 3 × 5 card.
4. ! Take the quiz during recitation and demonstrate that you can do homework-like questions under exam-like conditions.
5. ! Assess the returned quizzes for anything that you may have misunderstood by comparing the work in your homework notebook, your work on the quiz, and the key (and/or the textbook solution to the problems from which the quiz questions were drawn). If your solution does not exactly match the solution in the key, figure out why, no matter whether or not the grader deducted points. Keep notes in your homework notebook describing how you are learning from the feedback loop.
6. ! Repeat for each lecture cycle. Stay caught up! Set a goal of working each and every day on the homework, even if you only have a half hour available on some days. Be sure that your study environment is conducive to high-quality study (e.g., put your phone away for at least 1-hr intervals).
7. ! Approximately a week before each midterm exam, begin to re-do the homework sets, starting with the problems marked as "challenging," and work down to less challenging problems as time permits. Be sure that you can do problems without the cue of knowing which lesson they came from. You could try reviewing by copying the homework questions and cutting the copies into individual questions, and then putting the individual questions in a container and randomly drawing questions from the set of lessons being tested on the next midterm.
8. ! Assess the returned midterms in a manner similar to assessing the returned quizzes. Identify what you didn't learn and learn it via the feedback loop. Continually keep in mind that you prepare for the final by correcting errors as they occur during the semester.

Feedback Loop

Utilizing the feedback loop is probably the most important part of learning. The first thing you should do when you start studying after Quiz n is returned is go to your homework notebook and the Lesson n problem set and match the quiz questions to their corresponding homework questions and try to figure out why you didn't get each answer exactly correct. Ignore the grading and concentrate on achieving perfection. If your answer didn't exactly match the solution in the book, figure out why. Did you answer the question correctly as homework but not on the quiz? Did

you answer incorrectly as homework and then repeated the same error on the quiz? Did you omit a key word, not know a conversion factor, neglect to think about sig figs? Etc. Keep notes in your homework notebook about what the feedback loop told you. This analysis will teach you what you need to work on as you go through the homework–quiz–diagnosis cycle. Seek to reduce the number of that type of mistake on the next quiz by learning from your mistakes so that you don't repeat them. Then after an exam, do the same analysis. Compare your exam performance with your quiz performance with your homework performance. Figure out where the breakdown is occurring and take action to improve your learning process at the exact point at which it is not working.

Metacognition

Metacognition is thinking about your thinking. This is particularly important when you are doing the homework questions. After you do each question, check your answer against the key, and diagnose if you have learned to solve that type of problem or demonstrate understanding of that concept, think about the point of assigning that question in a broad, general sense. Always be thinking about the fact that the homework is not a process of getting the "right answer" and then moving to the next question. The homework is there to help you learn the chemical principles and the problem-solving techniques. So always ask yourself, "What was that problem meant to teach?" and "Did I learn that principle or problem-solving approach?" before moving to the next problem.

What *Not* To Do

Do *not* mindlessly do the homework over and over again for hours with the hope that the concepts will magically stick in your mind. Study to achieve comprehension, not memorization. You must have a conscious plan focused on improvement. If you need new problems to practice with, work on similar questions that were not assigned. You may check with the instructor for the solutions.

POINT-BY-POINT COMPARISON BETWEEN HIGH SCHOOL AND COLLEGE *by Pat Feldman and Vicki Hill of Southern Methodist University's Altschuler Learning Enhancement Center*	
PERSONAL FREEDOM IN HIGH SCHOOL VS. PERSONAL FREEDOM IN COLLEGE	
High school is mandatory and free (unless you choose other options).	College is voluntary and expensive.
Your time is usually structured by others.	You manage your own time.
You need permission to participate in extracurricular activities.	You must decide whether to participate in extracurricular activities. (Hint: Choose wisely in the first semester and then add later.)
You need money for special purchases or events.	You need money to meet basic necessities.
You can count on parents and teachers to remind you of your responsibilities and to guide you in setting priorities.	Guiding principle: You're old enough to take responsibility for what you do and don't do, as well as for the consequences of your decisions.
HIGH SCHOOL TEACHERS VS. COLLEGE PROFESSORS	
Teachers check your completed homework.	Professors may not always check completed homework, but they will assume you can perform the same tasks on tests.
Teachers remind you of your incomplete work.	Professors may not remind you of incomplete work.
Teachers approach you if they believe you need assistance.	Professors are usually open and helpful, but most expect you to initiate contact if you need assistance.
Teachers are often available for conversation before, during, or after class.	Professors expect and want you to attend their scheduled office hours.
Teachers have been trained in teaching methods to assist in imparting knowledge to students.	Professors have been trained as experts in their particular areas of research.
Teachers present material to help you understand the material in the textbook.	Professors may not follow the textbook. Instead, to amplify the text, they may give illustrations, provide background information, or discuss research about the topic you are studying. Or, they may expect you to relate the classes to the textbook readings.
Teachers often write information on the board to be copied in your notes.	Professors may lecture nonstop, expecting you to identify the important points in your notes. When professors write on the board, it may be to amplify the lecture, not to summarize it. Good notes are a must.
Teachers impart knowledge and facts, sometimes drawing direct connections and leading you through the thinking process.	Professors expect you to think about and synthesize seemingly unrelated topics.
Teachers often take time to remind you of assignments and due dates.	Professors expect you to read, save, and consult the course syllabus (outline); the syllabus spells out exactly what is expected of you, when it is due, and how you will be graded.
TESTS IN HIGH SCHOOL VS. TESTS IN COLLEGE	

Testing is frequent and covers small amounts of material.	Testing is usually infrequent and may be cumulative, covering large amounts of material. You, not the professor, need to organize the material to prepare for the test. A particular course may have only 2 or 3 tests in a semester.
Makeup tests are often available.	Makeup tests are seldom an option; if they are, you need to request them.
Teachers frequently rearrange test dates to avoid conflict with school events.	Professors in different courses usually schedule tests without regard to the demands of other courses or outside activities.
Teachers frequently conduct review sessions, pointing out the most important concepts.	Professors rarely offer review sessions, and when they do, they expect you to be an active participant, one who comes prepared with questions.
Mastery is usually seen as the ability to reproduce what you were taught in the form in which it was presented to you, or to solve the kinds of problems you were shown how to solve.	Mastery is often seen as the ability to apply what you've learned to new situations or to solve new kinds of problems.
GRADES IN HIGH SCHOOL VS. GRADES IN COLLEGE	
Grades are given for most assigned work.	Grades may not be provided for all assigned work.
Consistently good homework grades may help raise your overall grade when test grades are low.	Grades on tests and major papers usually provide most of the course grade.
Initial test grades, especially when they are low, may not have an adverse effect on your final grade.	Watch out for your first tests. These are usually "wake-up calls" to let you know what is expected—but they also may account for a substantial part of your course grade. You may be shocked when you get your grades.
You may graduate as long as you have passed all required courses with a grade of D or higher.	You may graduate only if your average in classes meets the departmental standard--typically a 2.0 or C.
Guiding principle: "Effort counts." Courses are usually structured to reward a "good-faith effort."	Guiding principle: "Results count." Though "good-faith effort" is important in regard to the professor's willingness to help you achieve good results, it will not substitute for results in the grading process.

UM CHEMISTRY 121N SPRING 2019 GRADE SUMMARY

Name (Last, First) _____

790 ID #_____

Section # _____

Exam 1	Exam 2	Exam 3	Exam 4		Exams Total 400 Possible
Quiz 1	Quiz 2	Quiz 3	Quiz 4	Quiz 5	
Quiz 6	Quiz 7	Quiz 8	Quiz 9	Quiz 10	
Quiz 11	Quiz 12				Quiz Total 300 Possible

Final Exam Scaled Score: _____ × 3 = _____ Final Exam 300 Possible

Course Grade: _____ Course Total