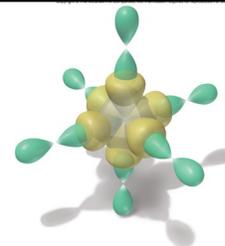


MWF, 1:25 – 2:15, Smith 100, 3 Credits  
Professor K. Leopold  
217 Smith Hall  
612 625-6072  
[kleopold@umn.edu](mailto:kleopold@umn.edu)



## WELCOME TO CHEM 1062!

If you're excited about taking chemistry, great! If you're uneasy about taking chemistry, stay calm! Our goal is to make the subject clear and accessible, and to underscore its broad relevance to the world we live in.

This will, of course, take some effort on your part, and this syllabus is intended to outline how the course works as well as some steps you can take to succeed. Look it over carefully, and hang on to it for reference!

### Prerequisites:

Passing CHEM 1061 or an equivalent course with a grade of C- or better is a prerequisite for this course. A C- grade in CHEM 1061 is a marginal pass and likely indicates that you will have to work extra hard in CHEM 1062. CHEM 1062 is generally a more difficult course than CHEM 1061.

### General Course Information:

Chemistry 1061/1065 and 1062/1066 are introductory courses, each accompanied by a lab course. They are designed to prepare students for science majors including chemistry, engineering, and the health sciences.

### Registration and Laboratory Assignments:

All registration matters are handled by the General Chemistry Office in 115 Smith Hall (612-624-0026).

### Textbooks and Materials:

*Chemistry: The Molecular Nature of Matter and Change*, by Martin Silberberg and Patricia Amateis (McGraw-Hill, 8<sup>th</sup> edition, 2018). As currently sold in the bookstore, the textbook is packaged with an access code to ALEKS, the publisher's on-line homework/learning system.

### Attendance:

Attendance is important! The lectures are meant to help you know what material to focus on, and sometimes there are important announcements. You are responsible for all announcements and for all material covered in class, whether or not the topic is in your text. Therefore, if you need to miss a lecture, please be sure to get the notes from someone else in the class.

### Liberal Education Physical Science Core Requirement:

CHEM 1062 (with the accompanying lab) satisfies the U of M Liberal Education Physical Science Core requirement. What does this mean? Core courses are intended to provide an in-depth look at how knowledge is created in a particular discipline. Naturally, they provide content knowledge but just as important, they teach "modes of inquiry": How do workers in a particular field think? How do they collect and process information? How do they create new knowledge? By taking a distribution of core courses during your time at the U of M, you gain an appreciation for the similarities and differences among disciplines. Much like learning a foreign language helps you to better understand your own language, a distribution of core courses provides the

perspective needed to understand a broad range of complex issues and can ultimately make you a better practitioner of your own chosen field. You learn different approaches to finding credible information, analyzing information, solving problems, and drawing reasonable conclusions based on facts. In doing so, you develop skills needed to be an informed citizen and life-long learner.

In CHEM 1062, we study chemistry, of course. For example, we talk about chemical reaction rates and equilibrium, and about the fundamental forces that drive chemical reactions to occur. We describe how these topics fit together to form a beautiful and coherent picture, allowing us to understand and make useful predictions about the world. To accomplish this, we do what scientists do all the time: We create ideas and then test their validity by applying them to new situations. Moreover, using the language of mathematics, we translate these ideas into quantitatively testable statements. We will pose and solve many problems in this course and, by working through them yourself, you are, in effect, doing what scientists do – you’re taking concepts and their mathematical incarnations and using them to gain understanding and make predictions. You’re *doing the work of the field*. This aspect of the course is particularly emphasized in the co-requisite laboratory course. In the lab, you do experiments. You test hypotheses. You take data, and manipulate those data so as to allow them to provide the clearest possible picture of the phenomenon you are studying. In some cases, you will also *use* the understanding obtained to offer workable solutions to practical problems. This is the way scientists approach the world and, in following suit, you get at the core of one important aspect of human endeavor.



### **Student Learning Outcomes (Some Obvious, Some Less Obvious):**

In this course, you will

***Master a Body of Knowledge and a Mode of Inquiry*** – We will cover a lot of useful principles of chemistry. However, these are not disconnected principles. They are tied together by some common threads and constitute a “body” of knowledge that has applications in many other areas. How to approach and apply this knowledge involves the practicing the “mode of inquiry” used routinely by chemists and, indeed, all scientists.

***Identify, Define, and Solve Problems*** – Aside from the principles themselves, think of this course as a vehicle for practicing problem solving and critical thinking. We will solve lots of problems in this class, but the solutions require conceptual understanding and true synthesis of ideas. This course is a place to step beyond algorithmic thinking.

***Can Locate and Critically Evaluate Information*** – You will have lots of new information in front you in this course. As you solve problems, half the challenge is figuring out what information is pertinent to any particular problem! This learning outcome is significantly strengthened in the companion lab course, where you will be involved in extended, open-ended assignments.

***Understand the Role of Creativity, Innovation and Discovery Across Disciplines*** – Most people don’t think about science as a creative endeavor. But it is! Scientists are always trying to explain what’s around them in terms they can understand and this sometimes takes real creativity! We will be discussing ideas created by some of the great geniuses of all time. As you take this course, think about what it must have taken for people to discover and shape these ideas. Note how physics and math blend seamlessly with chemistry, and how chemistry blends with almost every aspect of our lives and society.

***Acquire Skills for Effective Citizenship and Life-Long Learning*** – Chemistry plays a central role in many societal issues and the knowledge and critical thinking skills developed in this course provide a foundation for informed decision making and effective citizenship. Whenever possible, we will make connections to the “real world”.

## Class Websites:

There are 3 websites that are directly related to this course:

### **1. Lecture Canvas Site**

This site [CHEM 1062-001, Spring 2019](#) is where you will find any information associated with the lecture. It will contain this syllabus, practice exams, exam study guides, and other helpful information. Exam grades and grade distributions will also be available here. Note that the lab course, CHEM 1066, has a separate website.

### **2. ALEKS**

Assessment and LEarning in Knowledge Spaces (ALEKS) is a Web-based, artificially intelligent assessment and learning system. ALEKS uses adaptive questioning to quickly and accurately determine exactly what a student knows and doesn't know in a course. It then provides instruction on the topics the student is most ready to learn. ALEKS is very complete in its topic coverage and avoids multiple-choice questions. ALEKS also provides the advantages of one-on-one instruction, 24/7, from virtually any web-based computer for a fraction of the cost of a human tutor.

→ For more information about the ALEKS system, please see the posted pdf on our class Canvas site.

**3. General Information WebSite:** See <http://genchem.chem.umn.edu/> for general information about Chem 1062 (TAs, exams, lab schedules, etc.)

## Accessing Canvas

Connect to [canvas.umn.edu](http://canvas.umn.edu), log in, and look for CHEM 1062.

## Accessing ALEKS (For additional details, see the ALEKS Quick Start Guide that is posted on Moodle.)

1. Go to [www.aleks.com](http://www.aleks.com) (If you purchased ALEKS last semester, your access code should still be valid.)
2. Click on SIGN UP NOW!
3. Enter Course Code: **E3YXW-AYLCK**
4. Confirm you're in the right course (**Chem 1062 – Spring, 2019, Prof. Ken Leopold**)
5. Fill out student information webpage. **Enter your U of M email address in the "Student ID" field. YOU MUST DO THIS TO GET CREDIT. For example, I would enter [kleopold@umn.edu](mailto:kleopold@umn.edu).**

*Note that the above code is only for **our section only**. If you have friends in other sections, they should not use this code. They should get an equivalent code from their instructor.*

**Also Note:** If you do not have ALEX because you got a used textbook, you can still purchase access on the company's website. If you would like to try it for two weeks before deciding to buy it, you can do that, too! You can use the following code for this purpose: **24EDF-801F6-CF7ED-C4176**.

6. Once you have ALEKS, take the Initial Assessment:

- You will be asked to solve about 20-30 problems (this will take you anywhere from 30 to 90 minutes – at any time you can logout and log back on, it will keep your place).
- You'll get no help at all, nor should you try to find any. The idea is to find out where you should start learning, and you want ALEKS to get that just right. If you get your friend or chem grad student to help you, or if you do a lot of googling, you'll just end up with learning that **is way too hard and frustrating**.

because you'll be missing important pre-requisites. **If you don't take the assessment seriously, you'll just end up wasting time on material you already know.**

- The assessment may contain material you haven't seen, so you can expect to get problems you have no idea how to solve. Don't worry about that. This is a placement test, not a final exam. You're not going to be graded on it, and there's no reward for doing better or penalty for doing worse.

#### 7. Learning Mode

- After the assessment, you will see your ALEKS "pie." This shows you what you already know, what you're ready to learn, and what topics you'll eventually need to learn.
- You can begin working on topics by scrolling over your pie slices, available topics will be hyperlinked and you can begin! The goal is to fill your pie.

### **OFFICE HOURS AND GETTING HELP**

#### **Instructor:**

I will hold Office Hours:

Tuesday 1:00 – 2:00\*  
Friday 2:30 – 3:30

\* One known exception: The office hour that would normally be on Tuesday, 3/5 will be moved to **Thursday, 3/7.**

I will also be available in lecture to answer questions and/or make appointments for mutually convenient times. My office is 217 Smith. You can call (612-625-6072) or e-mail me ([kleopold@umn.edu](mailto:kleopold@umn.edu)).

#### **Walk-In Tutorial:**

- Room 124 Smith is the site of the regular 1062 help sessions conducted by the CHEM 1062 TAs. A schedule is available at <http://genchem.chem.umn.edu/chem-10151017/tutor-room-schedule>.

Other sources of help (not run by the Chemistry Department):

- The Smart Learning Commons in Walter Library also provides tutorials, peer assisted learning sessions, study space, and help with exam preparation. Go to <http://smart.umn.edu/> for more information.
- Peer Assisted Learning: Schedule will be announced in class. No need to sign up. Just come!  
Led by a trained, experienced undergraduate PAL facilitator  
Reinforce lecture and text material through small group work with other motivated peers  
Focus on course concepts; Practice solving problems  
Go to <https://www.lib.umn.edu/smart/about-pal> for more information.

#### **Students with Disabilities:**

We are happy to work with students requiring alternate accommodations. Students with disabilities that affect their ability to participate fully in class or to meet all course requirements are encouraged to bring this to the attention of the instructor so that appropriate arrangements can be made. You will need a letter from the Disability Resource Center (612-626-1333). If special accommodations are needed for examinations, please make these arrangements at least one week prior to *each* exam.

#### **Homework (aka, "Practice Problems"):**

Reading assignments are taken from Amateis and Silberberg. I suggest reading through the assigned sections once and then starting to work on the practice problems. Use the text (and the lecture notes) as resource material as you work on the problems.

## Comments on Studying for This Course:

There are two types of practice problems for this course: End-of-chapter problems and ALEKS.

### 1. End of Chapter Problems:

Recommended end-of-chapter problems are listed at the end of this syllabus. Doing these problems is the best way to ensure that you understand the material. The problems are assigned solely to help you master the material. **The importance of doing them cannot be overemphasized!!**

End-of-Chapter problems come in two varieties: **red** and **black** and I have assigned a mix of both types. Answers to the red problem are in the back of the book. For the black problems, I have provided the answers and have posted them on Canvas for each chapter. The net result is that you will have answers to all the assigned homework problems so you can check your own answers.

**Please Remember: The point of these problems is not to get the answers down on a piece of paper so that I can check off that you did them. The point is to help you learn. Getting someone else to show you how to do the assignments and then writing them down is not helpful. Please keep this in mind when studying for this course.**

Once you feel like you know the material, try one **practice exam** under exam conditions. Grade yourself with the posted key, go back and study items you had trouble with. Then try the second exam, again under exam conditions.

### 2. ALEKS Problems:

The ALEKS homework system will also be available for your use. You will have a choice as to whether to use the ALEKS system and whether or not it will count in your grade. See section below on Grades.

**Please Note:** One of the most common difficulties concerning exams is that they do not resemble or are harder than the problems worked in class or assigned for homework. There are many types of problems in chemistry, such as calculation of molarity of a solution, that are important, straightforward, and commonly stated in a familiar way. However, to try to determine whether a student understands a concept or is relying on memorization, we need to ask some problems in a different way. To help prepare for this, try the following while working problems and studying for exams:

(i) Work the problem as written and determine the answer, if possible. Note whether this is one of several very similar problems that were assigned. Determine the underlying concept(s) being applied. **Don't immediately rely on another source to show you how to do the problem. There is a big difference between being told how to do the problem and actually figuring it out yourself. This will become especially apparent on exams.**

(ii) Think about the problem and your answer: What does the problem ask? What does the answer mean?

(iii) Can this problem be worked backwards (i.e., could you, if asked, calculate any one of the given pieces of data from the answer)? Can you work a related problem from those listed under "Comprehensive Problems" at the end of the chapter?

(iv) Would you be able to explain to someone else how to understand and work this problem? In this respect, studying in a small group is very helpful.

**Note that re-reading the text several times may not be as useful in chemistry as in other subjects.** When study time is limited, I suggest

- (i) Reviewing notes after each lecture,
- (ii) Reading the text thoroughly once, working problems in ALEKS and at the end of the chapters, while re-reading relevant parts of the text and lecture notes as needed.

# MOST OF YOUR STUDY TIME IS BEST USED WORKING PROBLEMS (ALEKS AND END-OF-CHAPTER PROBLEMS)!!

## EXAMS

### Dates:

Midterm exams will be given during the regular class period on the following dates:

- |                                 |                |
|---------------------------------|----------------|
| 1. Wednesday, February 13, 2019 | 1:25 – 2:15 PM |
| 2. Wednesday, March 13, 2019    | 1:25 – 2:15 PM |
| 3. Wednesday, April 10, 2019    | 1:25 – 2:15 PM |
| 4. Wednesday, May 1, 2019       | 1:25 – 2:15 PM |

Locations will be announced prior to the exams.

**THE FINAL EXAM WILL BE ON  
SATURDAY, MAY 11 FROM  
**8:00 – 10:00 AM****

### Content and Format:

Exams will cover the material discussed in class or assigned as reading or homework. Material that is included in the text book but has not been touched on in class or in the assigned problems will not be covered on the exams. Exams will be multiple choice. Please be sure to bring **#2 PENCILS**, a **CALCULATOR**, and **STUDENT ID** to the exam. Other electronic devices may not be used during the exam. A periodic table and a number of important equations will be provided with each exam.

### CALCULATOR POLICY

Every student should have a calculator for both homework and exams which calculates all arithmetic and trigonometric functions, logarithms, and exponentiation. The calculator must also be capable of displaying numbers in scientific notation (e.g.  $6.02 \times 10^{23}$  or  $6.02E+23$ ), because many of the numbers we deal with in this course will be too small or too large to input or display any other way.

The TI-30Xa (right) is the suggested calculator for this and all CHEM 1XXX courses, and for most intro Physics courses. The bookstore stocks this calculator for around \$10. Other calculators that are acceptable are the following



Bico 98	Casio fx-250HC	TI-30X IIS
Casio /s-V.P M	Casio fx-300 MS	TI-30XS
Casio fx 300W	Casio fx-82 MS	TI-30XS IIS
Casio fx-115 ES	Casio S-V.P. M	TI-34 II
Casio fx-115 MS	Sentry CA 656	TI-36X
Casio fx-180P Plus	Sharp EL501W	TI-36X-Solar

**If you wish to use a calculator on exams which is not on this list, please have it approved by me first.**

**Graphing and programmable calculators are FORBIDDEN on exams. Their use on an exam will be considered cheating. Only calculators that are not programmable will be allowed during exams.**

### Regrade Policy:

All examination regrade requests should be directed to K. Leopold. If an issue appears unresolvable, or in the event of any problem with the course or instructor, please feel free to see Dr. Michelle Driessen (General Chemistry Director - 113 Smith Hall; 612-624-0062; mdd@umn.edu).

### Missed Exams:

**No exam, including the final exam, may be taken at any time other than that which has been scheduled. If you have conflicts with any of the scheduled times, please resolve them now.**

Students are expected to be present and prepared to take all four in-class examinations and the final. An **unexcused** absence from any of these four examinations will result in a score of zero being entered in the course record.

That said, emergencies happen. In the case of a true emergency, a student may be excused from **one** hour examination and have a substitute score recorded for the missed exam at the end of the semester. If circumstances arise such that more than one hour exam is missed, please consult with me. If a substitute score needs to be used, it will be done as follows: The final exam will be partitioned according to the content of the hour exams. In the case of an excused absence from any hour exam, the score on the section of the final corresponding to the missed exam will be used.

**→ALSO... Once you come to an exam and start it, you cannot get an excused absence, even if you were sick during the test. If you are sick on an exam day, don't take the test and contact me for an excused absence!**

If you need to get an excused absence, note two things:

- (i) Please contact me the day of the exam or as soon as circumstances allow.
- (ii) You need not provide a doctor's note for one-time illnesses for which you would not ordinarily be seen by a doctor. If you experience health problems which cause multiple absences, please speak with me.

## COURSE GRADES

### A-F Grading:

Based on feedback from students in past years, it appears that some students really like ALEKS and others really DISLIKE ALEKS, with no sweeping majority viewpoint. Thus, in an effort to accommodate as many learning styles as possible, I will compute your score at the end of the semester in **two ways** and then **take the better of the two**:

#### First Way:

Weighted Average of 4 Hour Exams (Lowest exam counts 2/3 of the other three)	75%
Final exam	25%

#### Second Way:

Weighted Average of 4 Hour Exams (Lowest exam counts 2/3 of the other three)	70%
ALEKS Homework	5%
Final	25%

**Note that, in order to provide a bit of slack for a bad day, the lowest hour exam score is weighted only (2/3) of the others.**

So, in other words, the scores are determined as follows:

$$(\text{Score})_1 = (0.75) * (\text{HE})_{\text{ave}} + (0.25) * (\text{FE})$$

$$(\text{Score})_2 = (0.70) * (\text{HE})_{\text{ave}} + (0.05) * (\text{ALEKS}) + (0.25) * (\text{FE})$$

where

$$HE_{ave} = [HE1\% + HE2\% + HE3\% + HE4\% - (1/3)(HE_{min}\%)]/3.6667$$

FE = score on the final exam, quoted as a percentage of 200 pts,

ALEKS = percentage of the total number of ALEKS topics successfully completed

Here, HE1% means your percent score on HE1, i.e.,  $(100) \times (\# \text{Questions Right}) / (\text{Total } \# \text{ of Questions})$ .

The correspondence between your overall score and your letter grade will be determined in accord with the following historical grade ranges:

### Guaranteed Letter Grades Corresponding to Average Scores at the End of the Semester

87 – 100	A
83 – 87	A–
79 – 83	B+
74 – 79	B
70 – 74	B–
66 – 70	C+
57 – 66	C
48 – 57	C–
43 – 48	D



Note that at the end, I may opt to adjust these cutoffs such that it will be possible to get a particular letter grade with a score that is lower than the range indicated above. But in no case will this adjustment hurt your grade. **That is to say, any adjustments, if applied, will only be used to improve your grade, not lower it.** In extremely borderline cases, I may also use a strong showing in the final exam to tilt a grade above the border.

Note that the basic letter grades are defined by the University Senate as follows:

- A: Represents achievement that significantly exceeds expectations in the course.
- B: Represents achievement that is above the minimum expectations in the course.
- C: Represents achievement that meets the minimum expectations in the course.
- D: Represents achievement that partially meets the minimum expectations in the course. Credit is earned but it may not fulfill major or program requirements.
- F: Represents failure in the course and no credit is earned.

#### S/N Grading:

For those in a college outside of CSE, if you are registered for this course on an S/N basis, a grade equivalent to "C-" on the A-F scale will be required to receive an "S".

#### Incompletes:

A student who is otherwise doing satisfactory work but must miss the final exam for a **valid** reason can obtain a grade of I (incomplete). Arrangements to receive this grade must be made with me prior to the last week of class and provisions for making up the final exam will be arranged on a case by case basis. A **signed contract** is required. It is expected that this option will rarely if ever be exercised.

#### Withdrawals:

It is hoped that every student will successfully complete this course. If, however, it becomes necessary to drop the course, you must officially withdraw following the rules for your college. Please check the current academic calendar for deadlines: <https://onestop.umn.edu/dates-and-deadlines>.

#### Retakes:

Students who have completed the lab (CHEM 1066 or the lab portion of CHEM 1022) and wish to retake CHEM 1062 should speak with the staff in Smith 115.

### **Credits and Workload Expectations:**

One credit is defined as equivalent to an average (over a full semester) of three hours of learning effort per week necessary for an average student to achieve an average grade in the course. For example, a student taking a three credit course that meets for three hours per week should expect to spend an additional six hours per week on coursework outside the classroom in order to achieve an average grade.

### **Policy on Scholastic Dishonesty:**

Scholastic dishonesty is any conduct described as follows (from the "CLA Classroom Grading and Examinations Procedures"):

"Scholastic dishonesty is any act that violates the rights of another student with respect to academic work or that involves misrepresentation of a student's own work. Scholastic dishonesty includes (but is not limited to) cheating on assignments or examinations; plagiarizing (misrepresenting as one's own anything done by another); submitting the same or substantially similar papers for more than one course without consent of all instructors concerned; depriving another of necessary course materials; sabotaging another's work."

If a student is guilty of scholastic dishonesty, the instructor will at least assign a grade of zero on the work involved and will report the matter to the student's college Scholastic Conduct Committee. An F in the course may also result.

For more information on scholastic dishonesty, see information in the Student Conduct Code:

[http://regents.umn.edu/sites/default/files/policies/Student\\_Conduct\\_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf)

### **Students with Disabilities:**

Students with disabilities that affect their ability to participate fully in class or to meet all course requirements are encouraged to bring this to the attention of the instructor so that appropriate arrangements can be made. You will need a letter from the Disability Resource Center (612-626-1333). If special accommodations are needed for examinations, please make these arrangements at least one week prior to *each* exam. Also, please feel free to talk with me at any time regarding your accommodations.

### **A Note About Student Mental Health:**

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website at <http://www.mentalhealth.umn.edu>

### **Additional Policies Pertinent to Classes at the U of M (and this Course as Well):**

Student Conduct Code: [http://regents.umn.edu/sites/default/files/policies/Student\\_Conduct\\_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf)

Sexual Harassment: <http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf>

Equity, Diversity, Equal Opportunity and Affirmative Action:  
[http://regents.umn.edu/sites/default/files/policies/Equity\\_Diversity\\_EO\\_AA.pdf](http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf)

Makeup Work for Legitimate Absences: <https://policy.umn.edu/education/makeupwork>

Grading and Transcripts: <https://policy.umn.edu/education/gradingtranscripts>

Academic Freedom and Responsibility:

[https://regents.umn.edu/sites/regents.umn.edu/files/policies/Academic\\_Freedom.pdf](https://regents.umn.edu/sites/regents.umn.edu/files/policies/Academic_Freedom.pdf)

Disability Accommodations: <https://regents.umn.edu/sites/regents.umn.edu/files/policies/DisabilityServices.pdf>

Equity, Diversity, Equal Employment Opportunity, and Affirmative Action:

[https://regents.umn.edu/sites/regents.umn.edu/files/policies/Equity\\_Diversity\\_EO\\_AA.pdf](https://regents.umn.edu/sites/regents.umn.edu/files/policies/Equity_Diversity_EO_AA.pdf)

Use of Personal Electronic Devices in the Classroom: <https://policy.umn.edu/education/studentresp>

The schedule below will be followed to as closely as possible, but some changes may be necessary. Remember, you are responsible for any announcements made in class. Specific information for each exam will be announced in class.

Week	Dates	Monday	Wednesday	Friday
1	1/23 – 1/25		Course Overview; Start Chapter 16	More Chapter 16
2	1/28 – 2/1	More Chapter 16	More Chapter 16	More Chapter 16
3	2/4 – 2/8	Finish Chapter 16	Start Chapter 17	More Chapter 17
4	2/11 – 2/15	HE 1 Review Session	HE 1 – 2/13/19	More Chapter 17
5	2/18 – 2/22	Start Chapter 18	More Chapter 18	More Chapter 18
6	2/25 – 3/1	More Chapter 18	More Chapter 18	Start Chapter 19
7	3/4 - 3/8	More Chapter 19	More Chapter 19	More Chapter 19
8	3/11 – 3/15	HE 2 Review Session	HE 2 – 3/13/19	More Chapter 19
<b>SPRING BREAK – 3/18 – 3/22 – NO CLASS!</b>				
9	3/25 – 3/29	Start Chapter 20	More Chapter 20	More Chapter 20
10	4/1 – 4/5	More Chapter 20	More Chapter 20	Start Chapter 21
11	4/8 – 4/12	HE3 Review Session	HE 3 – 4/10/19	More Chapter 21
12	4/15 – 4/19	More Chapter 21	More Chapter 21	Start Chapter 23
13	4/22 – 4/26	More Chapter 23	More Chapter 23	More Chapter 23
14	4/29 – 5/3	HE 4 Review Session	HE 4 – 5/1/19	Start Chapter 14
15	5/6	More Chapter 14	More Chapter 14; Course Wrap-Up	
<b>***The Final Exam Will Be on Saturday, May 11 from 8:00 – 10:00 AM ***</b>				

### Reading and End-of-Chapter Problem Assignments

**Reading assignments and end-of-chapter problem assignments are on the following pages. Note that you should do at least the suggested problems and more if you need more practice.**

Problem numbers correspond to the 8<sup>th</sup> edition of the textbook. Problem assignments corresponding to the 7<sup>th</sup> edition may be found on the lecture Canvas site.

**Note:** Silberberg has “**red problems**” and “**black problems**” at the end of each chapter (designated by the color of the problem number). Answers to the red problems are in the back of the book. The problems assigned here are a mix of red and black problems. If, after doing all the problems, you are still unclear on a particular topic, feel free to pick some others and try them out!

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### Chapter 16 (Kinetics: Rates and Mechanisms of Chemical Reactions)

**Read Sections:** 16. 1-7 and 24.2 (Radioisotope Dating, pp.1087-1089)  
**Problems:** 16. 7,12,14,17,18,21,25,26,28,32,34,35,37,45,46,53,61,62,63,65,70,71,  
75a-c,79,86,96,97,101,105(a and c only),108,117,125,126  
24. 41,44

**Chemical Content:** Why study kinetics? Topics include reaction rates, rate laws, determining the form of the rate law, method of initial rates, reaction order, integrated rate laws, first order kinetics and exponential decay, examples of first order kinetics,  $^{14}\text{C}$  dating, second order kinetics, reaction mechanisms, collision model, temperature dependence of reaction rates, catalysis, enzymes, free radical reactions and ozone depletion

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### Chapter 17 (Equilibrium: The Extent of Chemical Reactions)

**Read Sections:** 17. 1-6 (Omit van't Hoff equation on p. 776 for now. We'll do it in Chapter 20.)  
**Problems:** 17. 1,6,10,12,15,16,19,27,30,31,32,35,42,43,45,48,50,51,54,56,66,67,68,70,84,87a,88,90

**Chemical Content:** The equilibrium condition, reaction quotient and  $K_{\text{eq}}$ , expressions involving pressures, heterogeneous equilibria, applications of the equilibrium constant, solving equilibrium problems. Le Chatelier's Principle, effect of temperature on the equilibrium constant.

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### Chapter 18 (Acid-Base Equilibria)

**Read Sections:** 18. 1-4, 6,7, 9 (i.e., skip sections 5 and 8)  
**Problems:** 18. 5,9,11,13,16acd,21,22,23,25,27,29,31,42,43,45,47,48,65,66,69,100,  
103,105,107,110,111a,112b,142,149,167,168



**Chemical Content:** Nature of acids and bases, household acids and bases, conjugate acid-base pairs, Arrhenius and Bronsted-Lowry definitions, strong acids vs. weak acids, acid dissociation constant, ion product of water, pH and pOH of strong and weak acids and bases. Percent dissociation, acid-base properties of salts, Lewis acids and bases, molecular properties and acid strength.

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### Chapter 19 (Ionic Equilibria in Aqueous Systems)

**Read Sections:** 19. 1-3 (Omit "Effect of pH on Solubility", pp.. 869-870, and section 4.)  
**Problems:** 19. 1,2,14,20,22,25,27,28,31,32,49,50abeg,51aefg,53,55,67,71,74,75,77,80,113,  
126,133a-d,140a

**Chemical Content:** Common Ion Acid-Base Equilibria, Buffered Solutions, Henderson-Hasselbalch Equation, Titration and pH Curves, Indicators, Solubility Equilibria, Common Ion Effect.

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**SPRING BREAK 3/18 – 3/22: NO CLASSES**



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### Chapter 20 (Thermodynamics: Entropy, Free Energy, and the Direction of Chemical Reactions)

**Read Sections:** 20.1-4  
**Problems:** 20.3,5,10,12,16,20,24,25ab,33,38,41,47,51,53,55,57,60,69,71,  
74,77,79,83,84, 85,88,104,  
17.74, 97c



**Chemical Content:** Spontaneous processes and entropy, entropy and the 2<sup>nd</sup> Law of Thermodynamics, effect of temperature on spontaneity, free energy, entropy changes in chemical reactions. 3<sup>rd</sup> Law of Thermodynamics, standard free energies, predicting the sign of  $\Delta S^\circ$ . Relationship between free energy and equilibrium, temperature dependence of equilibrium constant, free energy and work.

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### Chapter 21 (Electrochemistry: Chemical Change and Electrical Work)

**Read Sections:** 21. 1-4,7 (omit pp. 940-943 on balancing redox rxns and pp. 977-979)  
**Problems:** 21. 9,10,11a-e,22,27 (ignore part "i"),28 (ignore part "i"),29,34a,40,42,54b-d,58,62,64,65,70(Assume equal volumes for part b), 73, 82,87,101,104,105,111,113

**Chemical Content:** Basic Definitions, Galvanic Cells, Half Cells, Cell Potential, Standard Reduction Potentials, Nernst Equation, Dependence on Concentration, Concentration Cells, Electrical Work, Electrolysis

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### Chapter 23 (The Transition Elements and Their Coordination Compounds)

**Read Sections:** 23. 1-4 (omit pp. 1055-1056 on valence bond theory)  
**Problems:** 23.  
4,9,14,16,35,37,39,42,45,47,50ac,52,53,55,58,62,66,74,80,82,86,92,95,97,98,114

**Chemical Content:** Survey of Transition Metals, Electron Configurations and Oxidation States, Coordination Compounds, Isomerism, Bonding in Complex Ions, Crystal Field Theory, Octahedral Complexes and Other Geometries

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### Chapter 14 (Periodic Patterns in the Main-Group Elements, as time permits)

**Read Sections:** 14.1-10 (see lecture notes for topics to be emphasized)  
**Problems:** 14. 13, 18, 28b, 34, 40bcd, 48, 50, 54, 64b, 67, 69, 77c, 84a-c, 87, 93ad, 100, 103, 125

**Chemical Content:** The Compounds and Chemistry of Elements in Groups 1A - 7A of the Periodic Table, Physical Properties, Chemical Reactions, Energetics, Common and Not-So-Common Inorganic Compounds, Uses and Chemical Reactions in Nature. Patterns of behavior within groups.

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**THE FINAL EXAM WILL BE ON  
SATURDAY, MAY 11  
8:00 – 10:00 AM**

**THE ROOM(S) WILL BE ANNOUNCED IN CLASS.**

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