CHEMICAL PRINCIPLES I
MWF, 12:20 – 1:10, Smith 100, 3 Credits
Professor K. Leopold
217 Smith Hall
612 625-6072
kleopold@umn.edu

Welcome to Chem 1061!

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:

You should not be registered for CHEM 1061 unless you have satisfied one of the following:

(a) Passed the chemistry placement test and been formally advised to take this course, or
(b) Completed 1011 or 1015 with a grade of C- or better.

Also… you must also be registered for CHEM 1065 (the Lab) to be in CHEM 1061.

If you do not meet one of these requirements, please contact the General Chemistry Office in 115 Smith Hall immediately (624-0026).

General Course Information:

Chemistry 1061/1065 and 1062/1066 are introductory courses accompanied by a lab course. Together, they fulfill the core physical science requirement. The two courses, with labs, together are designed to prepare students for science majors including chemistry, engineering, and the health sciences. Chem 1061 also satisfies the criteria for the core physical science Liberal Education requirement (see below).

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, 8th 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! You are responsible for all announcements and for all material covered in class, whether or not the topic is in your text. If you need to miss a lecture, please get the notes from someone else in the class. I have also placed a copy of my lecture notes from Spring, 2017 on reserve in Walter Library.
Liberal Education Physical Science Core Requirement:

CHEM 1061 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 1061, we study chemistry, of course. For example, we learn to thermochemistry, chemical bonding, and molecular structure. 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 skill 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 Moodle Site**
   This site CHEM 1061 – Lec 002 – Spring 2018 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 1065, 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 Moodle site.**

3. **General Information WebSite:** See [http://genchem.chem.umn.edu/](http://genchem.chem.umn.edu/) for general information about Chem 1061 (TAs, exams, lab schedules, etc.)

**Accessing Moodle**

1. Connect to myu.umn.edu, log in, and
   a. click on “My Courses” tab and select the appropriate class Moodle link
   OR…
   b. go directly to ay17.moodle.umn.edu, login, and select the appropriate class link.

**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)
2. Click on SIGN UP NOW!
3. Enter Course Code: **RHF6E-GL4VK**
4. Confirm you’re in the right course (Chem 1061 – Spring, 2018, 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 ALEKS 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: **6D455-AEC73-7D97E-7C2A0**.
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 the chem grad student to help you, or 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. \textbf{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.

\textbf{OFFICE HOURS AND GETTING HELP}

\textbf{Instructor:}

I will hold Office Hours:

\begin{tabular}{ll}
Monday & 1:30 – 2:30 \\
Thursday & 1:00 – 2:00 \\
\end{tabular}

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).

\textbf{Walk-In Tutorial:}

- Room 124 Smith is the site of the regular 1061 help sessions conducted by the CHEM 1061 TAs. A schedule is available at \url{http://genchem.chem.umn.edu/chem-10611065/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 \url{http://smart.umn.edu/} for more information.
- \textbf{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 \url{https://www.lib.umn.edu/smart/about-pal} for more information.

\textbf{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:

Reading assignments are taken from Amateis and Silberberg. I suggest reading through the assigned sections once and then starting to work on the homework 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 homework 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 Moodle 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 homework 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 in class on the following dates:

1. Saturday, February 10, 10:00 – 11:00 AM
2. Saturday, March 24, 10:00 – 11:00 AM
3. Saturday, April 21, 10:00 – 11:00 AM

Locations will be announced prior to the exams.

**Important Note: You must take the exam given to our section.**

| THE FINAL EXAM WILL BE ON Thursday, May 10 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 $6.02\text{E}+23$), 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:

<table>
<thead>
<tr>
<th>Bico 98</th>
<th>Casio fx-250HC</th>
<th>TI-30X IIS</th>
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<tbody>
<tr>
<td>Casio /s-V.P M</td>
<td>Casio fx-300 MS</td>
<td>TI-30XS</td>
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<tr>
<td>Casio fx 300W</td>
<td>Casio fx-82 MS</td>
<td>TI-30XS IIS</td>
</tr>
<tr>
<td>Casio fx-115 ES</td>
<td>Casio S-V.P. M</td>
<td>TI-34 II</td>
</tr>
<tr>
<td>Casio fx-115 MS</td>
<td>Sentry CA 656</td>
<td>TI-36X</td>
</tr>
<tr>
<td>Casio fx-180P Plus</td>
<td>Sharp EL501W</td>
<td>TI-36X-Solar</td>
</tr>
</tbody>
</table>
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, you should resolve them now.

Students are expected to be present and prepared to take all three 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 3 Hour Exams (Lowest exam counts ¾ of the other two) 75%
Final exam 25%

Second Way:
Weighted Average of 3 Hour Exams (Lowest exam counts ¾ of the other two) 70%
ALEKS Homework 5%
Final 25%

In other words,
(Score\_1) = (0.75)\*(HE)\_ave + (0.25)\*(FE)

(Score\_2) = (0.70)\*(HE)\_ave + (0.05)\*(ALEKS) + (0.25)\*(FE)

where

HE\_ave = \((HE\_max\ \text{score} + HE\_mid\ \text{score} + 0.75*HE\_low\ \text{score})/2.75\)

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

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

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

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Letter Grade</th>
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<tr>
<td>87 – 100</td>
<td>A</td>
</tr>
<tr>
<td>83 – 87</td>
<td>A–</td>
</tr>
<tr>
<td>79 – 83</td>
<td>B+</td>
</tr>
<tr>
<td>74 – 79</td>
<td>B</td>
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<tr>
<td>70 – 74</td>
<td>B–</td>
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<tr>
<td>66 – 70</td>
<td>C+</td>
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<tr>
<td>57 – 66</td>
<td>C</td>
</tr>
<tr>
<td>48 – 57</td>
<td>C–</td>
</tr>
<tr>
<td>43 – 48</td>
<td>D</td>
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</tbody>
</table>

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.

**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".

**Warning About the C- Grade:**

Although a grade of C- is considered passing, it represents a marginal performance and indicates that you will most likely experience difficulty in CHEM 1062, which is a more demanding course. You should seek advice from your instructor or advisor if you receive a C- and plan to go on to CHEM 1062.

**Incomplete:**

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, if it becomes necessary to drop the course, you must officially withdraw following the rules for your college. You must withdraw from both CHEM 1061 and 1065 if it's before 3/26 this semester. If it's after this date, you can withdraw from lecture and may complete the lab work that remains.

**Retakes:**

Students who have completed the lab (CHEM 1065 or the lab portion of CHEM 1021) and wish to retake CHEM 1061 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

University of Minnesota, Mental Health Services Syllabus Statement:

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):


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


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

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


Use of Personal Electronic Devices in the Classroom: https://policy.umn.edu/education/studentresp
The schedule below will be followed 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.

→ Please review Chapters 1-4 on your own, as needed. We will begin with Chapter 5.

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<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>1</td>
<td>1/17, 1/19</td>
<td></td>
<td>Course Overview; Start Chapter 5</td>
<td>More Chapter 5</td>
</tr>
<tr>
<td>2</td>
<td>1/22 – 1/26</td>
<td>More Chapter 5</td>
<td>More Chapter 5</td>
<td>More Chapter 5</td>
</tr>
<tr>
<td>3</td>
<td>1/29 – 2/2</td>
<td>Finish Chapter 5</td>
<td>Start Chapter 6</td>
<td>More Chapter 6</td>
</tr>
<tr>
<td>4</td>
<td>2/5 – 2/9</td>
<td>More Chapter 6</td>
<td>More Chapter 6</td>
<td>Optional Review Lecture</td>
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Hour Exam 1 – Saturday, February 10, 10:00 – 11:00 AM

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<th>Wednesday</th>
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<tbody>
<tr>
<td>5</td>
<td>2/12 – 2/16</td>
<td>More Chapter 6</td>
<td>More Chapter 6</td>
<td>Start Chapter 7</td>
</tr>
<tr>
<td>6</td>
<td>2/19 – 2/23</td>
<td>More Chapter 7</td>
<td>More Chapter 7</td>
<td>More Chapter 7</td>
</tr>
<tr>
<td>7</td>
<td>2/26 – 3/2</td>
<td>Finish Chapter 7</td>
<td>Start Chapter 8</td>
<td>More Chapter 8</td>
</tr>
<tr>
<td>8</td>
<td>3/5 – 3/9</td>
<td>Finish Chapter 8</td>
<td>Start Chapter 9</td>
<td>Optional Review Lecture</td>
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SPRING BREAK – NO CLASS!

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<th>Dates</th>
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<th>Friday</th>
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<tbody>
<tr>
<td>9</td>
<td>3/19 – 3/23</td>
<td>Finish Chapter 9</td>
<td>Start Chapter 10</td>
<td>More Chapter 10</td>
</tr>
</tbody>
</table>

Hour Exam 2 – Saturday, March 24, 10:00 – 11:00 AM

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<th>Dates</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>3/26 – 3/30</td>
<td>Finish Chapter 10</td>
<td>Start Chapter 11</td>
<td>Finish Chapter 11</td>
</tr>
<tr>
<td>11</td>
<td>4/2 – 4/6</td>
<td>Finish Chapter 15</td>
<td>More Chapter 15</td>
<td>More Chapter 15</td>
</tr>
<tr>
<td>12</td>
<td>4/9 – 4/13</td>
<td>Finish Chapter 15</td>
<td>Start Chapter 12</td>
<td>More Chapter 12</td>
</tr>
<tr>
<td>13</td>
<td>4/16 – 4/20</td>
<td>More Chapter 12</td>
<td>Finish Chapter 12</td>
<td>Optional Review Lecture</td>
</tr>
</tbody>
</table>

Hour Exam 3 – Saturday, April 21, 10:00 – 11:00 AM

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<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Monday</th>
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<td>4/30 – 5/4</td>
<td>More Chapter 13</td>
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***The Final Exam Will Be on Thursday, May 10 from 8:00 – 10:00 AM***

**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 homework problems and more if you need more practice.

Problem numbers correspond to the 8th edition of the textbook. Problem assignments corresponding to the 7th edition may be found on the lecture Moodle 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!
NOTE ABOUT CHAPTERS 1−4: Chapters 1-4 constitute important foundations for this course but are considered to be prerequisite knowledge. We want you to succeed in this course, so please be sure to review as needed. I will not be lecturing on this material, but don’t hesitate to ask if you have questions. As always, help is available, but keep in mind that it is never a substitute for coming to terms with the material in your own way. Listed below are end-of-chapter problems from the first four chapters that you should be able to do.

Chapter 1: Problems 1,6,20,30,34a,38,40,44,52,54,58,60,73,80a,84
Chapter 2: Problems 1,9, 20, 22, 23, 27, 37,39,41, 43, 47,50,55, 56, 58, 71,74,84,90bcd, 97, 127,134
Chapter 3: Problems 2, 7, 9c, 12, 14, 18, 20a, 27, 38, 40,58, 59,60, 62b, 71,77,79, 83,87,89,93,114
Chapter 4: Problems 3,6,16,20,22,23,24a,30*,33,37,39,41,43,47,53,55,63a,71,86,90,95,112ac,139

*Note: The book’s answer to #4.30a is wrong. The answer should be 987g, not 9.87g.

Given below is a more detailed account of the material we will be covering in lecture:

Chapter 5 (Gases and the Kinetic Molecular Theory)

Read Sections:  5. 1-6 (through p. 243 only; you may skip the van der Waals equation on pp. 243-244)
End-of-chapter problems:  5.2,8,10,20,22,24,30,41,45,47,51,58,61,68,71,74,75,77,78,79,82, 84,86
In this Chapter: Pressure; macroscopic description of gases P,V,T, and mass relations; density; gas mixtures; mole fraction and partial pressures; the ideal gas law and reaction stoichiometry; kinetic molecular theory; effusion and diffusion; real gases.

Chapter 6 (Thermochemistry: Energy Flow and Chemical Change)

Read Sections:  6. 1 - 6
End-of-chapter problems:  6.11,19, 21a,b,26,28,34,35,37,41,43,47,54,55,57,68,70,77, 79,82,84
In this Chapter: Kinetic, potential, and internal energy; heat and work; first law of thermodynamics; enthalpy; specific heat; calorimetry; state functions; Hess’ Law; reaction enthalpy; standard enthalpy of formation.

Chapter 7 (Quantum Theory and Atomic Structure)

Read Sections:  7. 1 - 4
End-of-chapter problems:  7.2,7,9,13,20,22,23,29,45,46,47,48,49,50,54a,57,59,64,92
In this Chapter: The nature of light - electromagnetic radiation; wave-particle duality; matter and energy; the photon theory of light; atomic spectra; quantum structure of the hydrogen atom; electron orbital shapes and energies.

Chapter 8 (Electron Configuration and Chemical Periodicity)

Read Sections:  8. 1 – 4 skip: pp. 354-355 (Acid-Base Behavior of Oxides)
Skip: p. 356-359 (Electron Configuration of Transition Metal Ions and Magnetic Properties of Transition Metal Ions)
End-of-chapter problems:  8. 6,7,11,13,18,21 (omit c),23,25,31,33,35,44,45,50,53,55, 69,77,79,85,87,95
In This Chapter: Multi-electron atoms; electron spin; electron configurations; quantum origins of the structure of the periodic table; groups and periods; trends in atomic properties and chemical reactivity.
Chapter 9 (Models of Chemical Bonding)

Read Sections: 9.1 - 6
End-of-chapter problems: 9.8, 10, 12, 16, 17, 20, 22, 24, 26, 30, 35, 39c, 40, 43, 47, 49, 53, 60, 68, 81, 89

In this Chapter: Atomic properties and chemical bonds; ionic bonds; lattice energy; properties of ionic compounds; covalent bonds; bond energy and bond length; properties of covalent substances; electronegativity and bond polarity; an introduction to metallic bonding.

Chapter 10 (The Shapes of Molecules)

Read Sections: 10.1 - 3
End-of-chapter problems: 10.1, 5, 7, 11, 13a, 15, 17, 19, 26, 28, 30, 34, 36, 40ab, 55, 57, 64a, 70a

In this Chapter: Lewis structures, resonance; free radicals; formal charge; exceptions to the octet rule; valence-shell electron-pair repulsion theory and molecular shape; bond polarity, bond angle, dipole moment and molecular polarity

Chapter 11 (Theories of Covalent Bonding)

Read Sections: 11.1 (through sp³ hybridization only, i.e., skip sp³d and sp³d², but don’t forget the last part of 11.1 on pp. 350-351), 11.2, skip 11.3
End-of-chapter problems: 11.1acd, 2ab, 7, 13, 20, 21, 23, 40, 56

In This Chapter: Valence bond theory; orbital hybridization; single, double and triple bonds; σ and π bonds; rotation around bond axis; theoretical basis for predicting the shapes of organic molecules.

Chapter 15 (Organic Compounds and the Atomic Properties of Carbon)

Read Sections: 15.1 - 5 Note: We will not cover everything in these sections. Pay close attention to which topics are emphasized in lecture and use the book as reference.
End-of-chapter problems: 15.3, 7, 9, 17, 23, 29, 32, 35, 37, 39, 41, 43a, 47ac, 49, 63

In this Chapter: The special nature of carbon; hydrocarbons: alkanes, alkenes, alkynes, cyclic and aromatic hydrocarbons; classes of organic compounds (functional groups); isomers and the structures of organic compounds; polymers, both synthetic and natural

Chapter 12 (Intermolecular Forces: Liquids, Solids, and Phase Changes)

Read Sections: 12.1 – 4 (Omit pp. 482-483 on phase diagrams.) Again, we will not cover every item in these sections. Pay close attention to which topics are emphasized in lecture.
End-of-chapter problems: 12.3, 12, 13, 18, 35, 36, 37, 39, 41, 43a, 47ac, 49, 63

In this Chapter: Physical states and phase changes; equilibrium and phase changes; the nature of solids and liquids; X-ray diffraction; types of intermolecular forces: ionic, dipole-dipole forces, hydrogen bonding, and dispersion forces; the unique properties of water.
Chapter 13 (Properties of Mixtures: Solutions and Colloids)

Read Sections: 13. 1, 3-6
Problems: 13. 3,9,11,12,14,26,32a,36,38c,39a,40,46b,47,48,49,58,64b,71, 76,88,94,96,98,99,103, 111a,124,133,135

In this Chapter: Concentration units, solution energetics, factors affecting solubility, colligative properties, solution composition, vapor pressure of a solution, Raoult’s Law, boiling point elevation, freezing point depression, gas solubility, Henry’s Law, osmotic pressure, colligative properties of electrolyte solutions, van’t Hoff i factor.