Instructor Information

Prof. Doreen Geller Leopold
211 Smith Hall  dleopold@umn.edu  626-2047
Office hours:  Mondays 10:30 - 11:30 AM & Fridays 3:30 - 4:30 PM in Smith 211
and other times by appointment

General Course Information

Chemistry 1061 and 1062 are introductory lecture courses (each 3 credits), accompanied by a separate lab course (Chem 1065, 1066, each 1 credit). These courses are designed to help prepare students for science and engineering majors, including chemistry. Each lecture/lab pair also fulfills the U of M's Diversified Core requirement in Physical Science. (For more information on this aspect of Chem 1061/1065, see p. 11.)

Quiz and final exam dates:  see the top of p. 2
Course contents:  See pp. 15 -16 for a list of chapters and topics to be covered.
Calendar:  See the last page (p. 17) for an approximate lecture schedule, and a summary of quiz and final exam dates and due dates for ALEKS problem sets.

Prerequisites  To register/remain registered in 1061, you must fulfill 2 criteria:
•  You have passed the chemistry placement exam (and been advised to take this course) OR you have passed Chem 1015 or an equivalent course with a grade of C- or better.
•  You are also registered in the lab, Chem 1065, this semester.
If you do not meet these requirements, you should report your situation to the staff in Smith 115 (624-0026) immediately. They handle all registration issues pertaining to this course. They must also be informed if you are retaking this course without the lab (having passed it previously).

For $187.50, a new hard-cover text can be purchased at the Bookstore, packaged with the "ALEKS-360" two-semester access card and the interactive eBook.
(Use of ALEKS is not required in our class, but many students find it helpful.
See pages 4 - 5 for more information.)
Quizzes and Final Exam

- There will be 5 Quizzes on Wednesdays at our usual class time on Feb. 13, Feb. 27, Mar. 13, Apr. 10, May 1
  (We will have Bruininks 220 as our 2nd exam room for the larger, 12:20 class.)

- Final Exam dates: (See the schedule on the last page for rooms.)
  For the MWF 12:20 class: Sat. May 11, 2019 at 1:30 - 3:30 PM.
  For the MWF 2:30 class: Sat. May 11, 2019 at 10:30 AM - 12:30 PM.

The final exam will be cumulative over the whole course.
Quizzes and the final exam will only be given during the regularly scheduled times.

Calculators

Calculators will be allowed on all of our quizzes and on the final exam.
A general policy for the general chemistry courses is that programmable or graphing calculators may not be used on quizzes or exams. The presence or use of an unacceptable calculator will be considered to be scholastic dishonesty, even if the calculator is not actually programmed.

It is necessary for the calculator to have exponential functions and to be able to display numbers in scientific notation (e.g., 6.02 x 10^{23}). One good model (shown above) is the two-line display TI-30X IIS, which costs $13 at the U of M Bookstore. (Many other two-line calculators are programmable so would not be acceptable.) Another popular calculator is the one-line TI-30Xa, which costs $10.

Some other acceptable calculators are listed here. If you have a different non-programmable, non-graphing calculator you would like to use, please obtain the instructor's approval prior to the exam.
Study Guides and Useful Websites

Study Guides
On our class Moodle site, ay17.moodle.umn.edu, a Study Guide will be posted for each of the 10 chapters we will cover. These will provide recommendations for readings in the text and associated end-of-chapter problems. Doing these problems is very useful to help learn the material and prepare for our quizzes and the final exam.

For the recommended end-of-chapter problems having red numbers in the text, answers are listed in Appendix E and also right below that problem in the interactive eBook version. Fully worked-out solutions to the red-numbered problems are also available in the Student Solutions Manual. The TAs in Smith 124 can borrow this Manual from Smith 115 for use during tutor hours, and copies are also available in the Reserve Room of Walter Library. They can be borrowed for 3 hours, or overnight if borrowed after 9 PM. For more information, contact librarian Tiffany Reichard (624-3897, treichar@umn.edu).

Useful Web Sites

There are 4 websites associated with this course that you will find useful.

1. Lecture Moodle Site ay17.moodle.umn.edu
CHEM 1061 Chemical Principles I (sec 002, 003) Spring 2019
This site has various resources, including:
• PowerPoint lecture slides (with some portions omitted - to be filled out in class)
• Study Guides including reading and end-of-chapter problems (as noted above)
• Your quiz and final exam grades
• Answer keys for our quizzes and the final exam
• Previous 1061 exams and detailed keys with worked problems

2. Lab Information http://genchem.chem.umn.edu/
Chem 1065 lab is a separately graded course that must be taken during the same semester that you take Chem 1061.
There are no lab meetings during the first week of classes (Jan. 22 - 25).

3. General Chemistry Web Site http://genchem.chem.umn.edu/
This site also has general information about Chem 1061 and other general chemistry courses, including walk-in tutor hours in Smith124.

4. ALEKS online learning system - described on the next page
**ALEKS Problem Sets**

**Online Learning (ALEKS):** For more information, see page 5 of this syllabus and the section about ALEKS on our class Moodle site.

**ALEKS** stands for Assessment and LEarning in Knowledge Spaces. It is a novel, "artificially intelligent" system that uses a method called "adaptive questioning". Five problem sets ("objectives") are available for our class. See the calendar on the last page of this syllabus for their due dates. Together, the 5 ALEKS problem sets can count as 2.5 % of the course grade. The ALEKS grade will be calculated out of a maximum of 10 points total, with full credit given for 100 topics (0.1 point per topic) completed by their due dates, out of 140 topics total for the 5 ALEKS problem sets.

**Accessing ALEKS:**

1. **Go to www.aleks.com** Enter our class code: **THHXR-VWQPV**
   
   This is a unique code for our class. Check that you're in the right class: "Chemical Principles I, Spring 2019, Leopold".

   See the document titled "Getting Started with ALEKS" on our class Moodle website for detailed instructions on how to register, to purchase access to ALEKS for one or two semesters, or to get free 2-week access to try it out, using the code **3C2CE-7D2E9-72874-BBFE0**.

2. **Take the Initial Knowledge Check (IKC)**

   Its purpose is for ALEKS to figure out the best questions to ask you later. You can log out and log back in, and it will keep your place. This assessment includes material selected from the whole semester - you are not expected to have already learned this material. It will be administered whenever you start using ALEKS for this class, before you start the Prerequisite Review and subsequent objectives. Topics we will cover in this class that you answer correctly in the IKC will be categorized as having already been "mastered".

3. **Learning Mode** After the IKC, you enter "learning mode" and can do the Prerequisite Review, due Wed., Jan. 30. This includes 30 topics from high-school level algebra and simple chemistry. (These 30 topics do not earn points.) After that, there are 5 "objectives" (problem sets) due (at 11:59 PM) usually on the week after the quiz covering some or all of the same chapters. The 5 ALEKS problem sets have a total of 140 topics, each worth 0.1 point up to a maximum of 10 points. That is, the full credit of 10 points is earned for 100 out of 140 topics completed by their respective problem set due dates.
Grading Methods

For each student, we will either drop the lowest absolute (not curved) score out of the 5 quizzes (each worth up to 65 points), or keep all 5 quiz scores and weight by final exam score by half (so it counts up to 65 points instead of 130). Either method gives a total test score of up to $6 \times 65 = 390$ points.

Course grades will then be determined based on quiz, final exam* and (optionally) ALEKS scores** according to the following breakdown.

<table>
<thead>
<tr>
<th>Points</th>
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<tbody>
<tr>
<td>Quizzes (5)</td>
</tr>
<tr>
<td>(65 points each, 13 questions, 5 points each)</td>
</tr>
<tr>
<td>Final Exam</td>
</tr>
<tr>
<td>(130 points, 33 questions)</td>
</tr>
<tr>
<td>ALEKS - 5 problem sets (up to 10 points total)**</td>
</tr>
<tr>
<td>Total Possible</td>
</tr>
<tr>
<td>400</td>
</tr>
</tbody>
</table>

Example: if a student gets 275 points out of 400 total* on the quizzes and final exam and 8 points out of 10 on the 5 ALEKS objectives (i.e., 80 topics out of 140 completed by their respective due dates),** the cumulative % would be:

\[
\frac{275 + 8}{400} = \frac{283}{400} = 70.8 \%
\]

According to the grading information on the next page, this percentage would correspond to a course grade of at least B-.

* Best 4 out of 5 quizzes and full weight of final (4 x 65 + 130 = 390 points) or count all 5 quiz scores and multiply the final exam score by half (5 x 65 + 65 = 390 points), whichever is higher.

** Regarding ALEKS: If a student chooses not to do the ALEKS problem sets, or if the percentage including ALEKS (out of 400 points) is lower than the percentage calculated without ALEKS (out of 390 points), then the latter (higher) percentage will be used.

Students who choose not to do the ALEKS problem sets are, of course, strongly encouraged to do the suggested end-of-chapter problems in the Study Guides to learn the material and prepare for the quizzes and final exam.
Grading Methods, continued

As noted on page 5, for each student, either the lowest of the 5 quiz scores will be dropped, or all 5 quiz scores will be included and the final exam score will be weighted by half. In either case, the maximum number of test points is 390. ALEKS scores can (optionally) add another 10 points,* giving a total of 400.

Course grades will be determined by a method that combines the absolute grading scale shown below with an adjustment applied at the end of the semester (if needed) to lower some of the thresholds. That is, if you get the following total scores on the quizzes, final exam and (optionally) ALEKS, then your course grade will be at least as high as is listed below. Grades may be curved in a favorable direction at the end of the semester (for example, a B- might become a B), if needed to adjust the course grades up to the usual department-wide distribution for introductory chemistry classes (in which about half of the students earn course grades in the A or B ranges).

### Points (or Percentages) Required for Course Grades

out of 400 points, including ALEKS*

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 90%</td>
<td>360</td>
</tr>
<tr>
<td>A- 85%</td>
<td>340</td>
</tr>
<tr>
<td>B+ 80%</td>
<td>320</td>
</tr>
<tr>
<td>B 75%</td>
<td>300</td>
</tr>
<tr>
<td>B- 70%</td>
<td>280</td>
</tr>
<tr>
<td>C+ 65%</td>
<td>260</td>
</tr>
<tr>
<td>C 55%</td>
<td>220</td>
</tr>
<tr>
<td>C- 45%</td>
<td>180</td>
</tr>
<tr>
<td>D+ 40%</td>
<td>160</td>
</tr>
<tr>
<td>D 35%</td>
<td>140</td>
</tr>
</tbody>
</table>

* As described at the bottom of page 5, use of ALEKS is optional in this class.

**S/N Grading** (for students not in CSE or CBS): If you are registered for this course on an S/N basis, a grade equivalent to C- or above on the A-F scale will be required to receive an “S”. A grade of D+ or below will receive an “N”.

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* As described at the bottom of page 5, use of ALEKS is optional in this class.
Exam Formats and Procedures, Regrades

Quiz and Final Exam Formats and Procedures

The 5 quizzes will each have 13 multiple choice questions worth 5 points each, and the final will have 33 multiple choice questions (32 questions worth 4 points and one 2-point question). Only one answer should be selected per question (no credit will be given if 2 or more answers are bubbled in). There is no penalty for incorrect answers, so you should answer every question. Only the answers recorded on the bubble sheet will be graded; work on the question portion of the exam will not be graded. Students should check they have accurately recorded their answers in the correct spaces on the bubble sheet and have completely erased answers which were changed.

An equation sheet and periodic table will be provided as the last page of each of our quizzes and the final, and this can be torn off for use during the exam.

Notes: No notes are allowed.

Pencils: Be sure to bring a couple of sharpened #2 pencils with good erasers to each test. Since the quizzes and final will be automatically graded, answers must be given by filling in the appropriate spots in #2 pencil on the "bubble" sheets (scantrons).

ID Cards (U Cards): Students must bring their I.D. card (U Card) to each quiz and to the final, since the proctors will check or spot-check these.

Cell phones or other electronic communication devices may not be used during quizzes or on the final exam.

Calculators: Calculators may not be shared with another student during tests. If you are concerned about battery failure, it is a good idea to bring a second calculator and/or extra batteries with you.

Collecting exams: For the quizzes, for the (earlier) 12:20 class, we will collect both the bubble sheets and the question portions of the exams. Please write your name on the first page of your exam so you can easily retrieve it later. For the final exams (both on Saturday May 11), which the 2:30 class will take earlier, we will collect both the bubble sheets and the question portions of that class' exams. They will be available to be picked up later that afternoon.

Regrades

Quiz and final exam regrades should be requested as soon as possible following the posting of those grades. Fortunately, it is very unusual for the bubble sheets to be misread by the scanner. If there is a discrepancy between the posted score (which will be posted as points earned, not as a percentage) and the score you expected based on the posted answer key and the work you recorded on your exam, we can look at your bubble sheet and see what the problem was.
Excused Absences, Incompletes, Withdrawals, Retakes

Excused Absences from Quizzes
Students who are unable to take one quiz (worth 65 points) due to illness, a family emergency, university-sponsored activity, etc., can obtain an excused absence from the instructor. In this case, the student can still drop the lowest of the other 4 quiz scores or reduce the weight of the final exam by half. The overall percentage will then be calculated at the end of the semester out of 390 - 65 = 325 points (or 335 points including ALEKS), rather than out of the usual 390 (or 400) points.

A student requesting an excused absence should contact the instructor before the start of the exam to make this request, if possible. It is not necessary to provide a doctor's note for one-time illnesses for which you would not ordinarily be seen by a doctor.

If circumstances require a student to request an excused absence from more than one of our 5 quizzes, they should meet with the instructor to discuss the available options.

Excused Absences from the Final Exam
If the final exam is not taken at the scheduled time, a score of zero will be given, unless the student has obtained an excused absence (see "Incompletes" below) or has previously arranged with the instructor to take the final with another class.

Incompletes
Students who have an excused absence from the final exam, and are passing the course based on their quiz scores, may be eligible to receive a grade of "I" (incomplete). The instructor should be notified before the final exam begins, if possible. (This option is rarely exercised.)

An "Incomplete" form signed by the student (when they are able to do so) and by the instructor is required. This form will describe the arrangements to make up the Incomplete, which must be done by the end of the following semester.

Withdrawals
If you are considering withdrawing from the class for academic reasons, it is a good idea to discuss this first with your instructor. Your situation may not be as bad as you think it is. If you do decide to drop the class, you should officially withdraw following the rules for your college. Students who withdraw will not have any records retained for use upon retaking the class.

As noted on onestop, "Students who drop CHEM 1061 (lecture) before Monday, Apr. 1, 2019 are REQUIRED to drop CHEM 1065 (lab). No Exceptions!"

Retaking the Course To retake Chem 1061 after you have already passed the Chem 1065 lab, see the staff in Smith 115.
Help is Available

Asking questions during office hours, in the tutor room, in study groups, etc., can help students overcome conceptual or quantitative problems with the material. It is a good idea to identify and clarify possible points of confusion as soon as possible to more effectively keep up with the material and avoid falling behind.

Instructor's Office Hours
There will be regular, drop-in office hours every week (see times on page 1), for which no appointments are needed. Students can also make appointments for meetings at other times. Students are also welcome to send emails to dleopold@umn.edu to ask questions, make suggestions, etc.

Drop-In Tutorial Hours  http://genchem.chem.umn.edu/
Smith 124 is the site of regular Chem 1061 drop-in tutorial sessions conducted by general chemistry TAs. Typical hours are Mondays through Fridays, 10 AM through 6 or 7 PM.

ChemFoundations
For students who feel they are struggling with the class and are worried about passing, a weekly discussion and problem-solving session will be offered on Fridays at 3:35 - 4:25 in Kolthoff 137, starting Feb. 1. This group is led by Levi Palmer, a senior chemistry major. A commitment to weekly attendance is required. If you are available at this time and are interested in participating, please email Doreen with the subject line, "ChemFoundations". The first 25 students whose emails are received will be admitted, and others will be added to a waiting list. Admitted students who miss two consecutive meetings will be asked to release their spot to a student on the waiting list.

Smart Learning Commons  http://smart.umn.edu/
This resource, in Walter Library, also provides tutorials, peer-assisted learning sessions, study space, and help with exam preparation.

PAL (Peer Assisted Learning)  https://www.lib.umn.edu/smart/about-pal
These meetings are led by trained, experienced undergraduate PAL facilitators. They are intended to reinforce lecture and text material through small group work, with a focus on course concepts and practice solving problems.

Student Solutions Manuals
The Student Solutions Manual for the Silberberg and Amateis text (8th Ed.) is available in the Reserve room in the basement of Walter Library. There are also copies in Smith 115 that TAs can borrow for use during tutor hours in Smith 124.
## Miscellaneous

### Access and Disability Accommodations (DRC)

In this course, we support anyone requiring accommodations for access to class activities and materials. Please contact the instructor and/or the Disability Resource Center (DRC) at 626-1333, [https://diversity.umn.edu/disability/](https://diversity.umn.edu/disability/) which will provide a letter to share with the instructor on how to facilitate an inclusive learning environment.

If the DRC recommends that extended quiz and final exam times (and/or a private room) are required, students are responsible for making arrangements with the DRC to take these under their supervision at the McNamara Alumni Center. They need to be taken at times that overlap the usual times that the other students in the same class will be taking that quiz or exam. The DRC requests that arrangements be made at least one week prior to each quiz or the final exam. Students can also make all of their reservations for the 5 quizzes and the final exam early (e.g., when they make their reservation for the first quiz).

### Issues with Your Instructor

On occasion you may have a concern or problem regarding this course. You will find your instructor quite willing to discuss this with you. If, however, you wish to discuss it with someone else, please contact Prof. Michelle Driessen, Director of General Chemistry (113 Smith Hall, 624-0062, mdd@umn.edu). She will serve as a mediator in helping to resolve the issue.

### 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 with an average level of preparation who is taking a 3 cr., 3 lecture-per-week course (like Chem 1061) should expect to spend a total of 3 cr. x 3 hours/cr. = 9 hours per week on the class. Subtracting 3 hours for lectures, this corresponds to an additional 6 hours every week on reading and doing problems in the Study Guides and/or the ALEKS problem sets to achieve an average grade (which is typically a B- in our large, introductory-level chemistry classes).
Chem 1061, combined with the lab course, Chem 1065, satisfies the U of M's Liberal Education Physical Science Core requirement. 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 importantly, 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 as 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 a life-long learner.

In Chem 1061, we learn to understand chemical bonding and its basis in quantum mechanics, thermochemistry and bond strengths, the behaviors of gases, and the attractions among molecules that affect the properties of pure liquids and solutions. We describe how these topics fit together to form a 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 validities by applying them to new situations. Moreover, using the language of math, we translate these ideas into quantitatively testable predictions. We will pose and solve many problems in this course and, by working through them, you are, in effect, doing what scientists do – you are taking concepts and their mathematical expressions and using them to enhance your understanding and to make predictions. You are doing the work of the field.

This aspect of Chem 1061 is particularly emphasized in the co-requisite laboratory course (Chem 1065). In the lab, you do experiments, test hypotheses, and record data. You manipulate the 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 how scientists and engineers approach the world and, in following suit, you experience the core of these important aspects of human endeavor.
Succeeding in Chem 1061 and 1065 will help students come closer to achieving 6 of the 7 Student Learning Outcomes that together describe the anticipated capabilities of students who have earned their bachelor's degrees at the U of M:

• **Can identify, define, and solve problems**
  These courses provide a vehicle for practicing quantitative problem solving and for learning to transcend merely algorithmic thinking. Many of the problems we will encounter require the synthesis of both mathematical and conceptual modes of understanding.

• **Can locate and critically evaluate information**
  With the abundant new chemical information introduced in these courses, much of the challenge in solving a particular problem is often figuring out what information is most pertinent. These skills will be further exercised in the lab, where students will work together on extended, open-ended assignments.

• **Have mastered a body of knowledge and a mode of inquiry**
  We will cover many useful principles of chemistry which are tied together by common threads, and together form part of a “body of knowledge”. Learning how to approach and apply this knowledge involves practicing some of the “modes of inquiry” used routinely by chemists and, indeed, by all scientists and engineers.

• **Can communicate effectively**
  In the Chem 1065 lab, students will develop their scientific writing skills through keeping laboratory notebooks and writing formal lab reports. Students will also hone their oral communication skills through interactions with their lab team members, and by presenting reports on their experimental results.

• **Understand the role of creativity, innovation, discovery, and expression across disciplines**
  Scientists’ efforts to explain the world in new ways often require real creativity, and the discipline to pursue and effectively communicate original ideas despite their initial derision by others. We will see how physics and math blend seamlessly with chemistry, and how chemistry permeates many other disciplines.

• **Have acquired skills for effective citizenship and life-long learning.**
  Chemistry plays a central role in many societal issues. The knowledge and critical thinking skills developed in these courses can help form a foundation for informed decision making and effective citizenship.
1. Academic freedom and responsibility: Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. For more on academic freedom, see: http://regents.umn.edu/sites/default/files/policies/Academic_Freedom.pdf


   https://communitystandards.umn.edu/avoid-violations/avoiding-scholastic-dishonesty

   Scholastic Dishonesty is discussed under CSE’s scholastic policies and is defined in the University Student Conduct Code as follows:

   "Scholastic Dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis."

   Academic dishonesty in any portion of the academic work for a course shall be grounds for assigning the student a grade of F (or N) for the entire course.

   In general chemistry classes, the presence or use of an unacceptable calculator will be considered to be scholastic dishonesty, even if the calculator is not actually programmed. See page 2 for more information.


5. Appropriate use of class notes and materials: Disseminating class notes, videos, exams, etc. beyond the classroom community or accepting compensation for these materials violate shared norms and standards of the academic community. For additional information, see: http://policy.umn.edu/education/studentresp
Additional Links to Policy Statements (continued)

6. Grading: (also see pages 5 - 6 of this syllabus)
   http://policy.umn.edu/education/gradingtranscripts

7. Makeup work for legitimate absences: (also see page 8 of this syllabus)
   http://policy.umn.edu/education/makeupwork

8. Access and disability accommodations (see page 10 of this syllabus)

9. Student mental health and stress management:
   To learn more about the range of confidential mental health services
   available on campus, see:
   http://www.mentalhealth.umn.edu/

10. Sexual harassment and related topics:
    In this course, we strive to provide a safe and positive environment for
    everyone. Please review the policies regarding sexual harassment and
    related topics:

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

    For support and help please contact the Aurora Center:
    http://aurora.umn.edu

11. Equity, diversity, equal opportunity, and affirmative action:
    We welcome individuals of all ages, backgrounds, beliefs, ethnicities,
    genders, gender identities, gender expressions, national origins, religious
    affiliations, sexual orientations, ability, and other visible and nonvisible
    differences to this course. Instructors, teaching assistants, and peer
    students are expected to contribute to a respectful, welcoming and
    inclusive environment for every other member of the class. This is in
    agreement with university policy:

    http://regents.umn.edu/sites/regents.umn.edu/files/policies/Equity_Divers
    ity_EO_AA.pdf

12. Department of Chemistry Diversity and Inclusion Committee:
    Collaboration among people of all cultures and backgrounds enhances our
    experiences and contributes to excellence in teaching, learning, and
    research. We strive for a climate that celebrates our differences and
    strengthens our department by embracing and working to increase
    diversity, equity, and inclusion. For more information about our
    departmental efforts and upcoming activities, see:
    http://z.umn.edu/ChemDiversity
    For a list of diversity-related resources, see:
    http://z.umn.edu/DiversityandInclusionResources
Topics to be Covered in Chem 1061

Chapter headings are from Silberberg & Amateis’ "Chemistry," 8th Ed., 2018. See our Study Guides (one for each chapter), posted on our class Moodle site, for recommended end-of-chapter problems.

On average, we will spend about three class meetings on each chapter, so some of the important material for each topic may not be explicitly covered in class. To do well on quizzes and on the final exam, students should supplement the lectures by reading the text and doing the ALEKS problem sets and/or the end-of-chapter problems recommended in the Study Guides.

(The contents of Ch, 1 - 4 are considered to be prerequisite knowledge and will not be covered in this course: Students are encouraged to review as needed.)

Chapter 1, "Keys to Studying Chemistry: Definitions, Units and Problem Solving"
Chapter 2, "The Components of Matter"
Chapter 3, "Stoichiometry of Formulas and Equations"
Chapter 4, "Three Major Classes of Chemical Reactions"  
(Precipitation, Acid-Base, and Oxidation-Reduction Reactions)

Chapter 5, "Gases and the Kinetic-Molecular Theory"
5.2 Gas pressure and measurement  
5.3 Gas laws and their experimental foundations  
5.4 Rearrangements of the Ideal Gas Law  
5.5 Kinetic Molecular Theory: a model for gas behavior  
5.6 Real Gases: deviations from ideal behavior (to the middle of p. 243 only)

(As listed in the Study Guide for Chapter 5 on our Moodle site, the following 26 (red-numbered) end-of-chapter problems are recommended. Answers are listed in Appendix E. See our Moodle site for suggested problems for other chapters.)
1, 8, 10, 20, 22, 24, 30, 36, 41, 45, 47, 51, 53, 57, 71, 74, 75, 77, 79, 84, 86, 96, 106, 126, 136, 152.)

Chapter 6, "Thermochemistry: Energy Flow and Chemical Change"
6.1 Forms of energy and their interconversion  
6.2 Enthalpy: changes at constant pressure  
6.3 Calorimetry: measuring the heat of a chemical or physical change  
6.4 Stoichiometry of chemical equations  
6.5 Hess’ Law: finding ΔH of any reaction  
6.6 Standard enthalpies of reaction: ΔH°rxn

Chapter 7, "Quantum Theory and Atomic Structure"
7.1 Nature of light  
7.2 Atomic spectra  
7.3 Wave-particle duality of matter and energy  
7.4 Quantum-mechanical model of the atom
Topics to be covered, continued

Chapter 8, "Electron Configuration and Chemical Periodicity"
8.1 Characteristics of many-electron atoms
8.2 Quantum-mechanical model and the periodic table
8.3 Trends in 3 atomic properties (size, ionization energy, electron affinity)
8.4 Atomic properties and chemical reactivity

Chapter 9, "Models of Chemical Bonding"
9.1 Atomic properties and chemical bonds
9.2 Ionic bonding model
9.3 Covalent bonding model
9.4 Bond energy and chemical change
9.5 Between the extremes: electronegativity and bond polarity

Chapter 10, "The Shapes of Molecules"
10.1 Depicting molecules and ions with Lewis structures
10.2 Valence-shell electron-pair repulsion theory (VSEPR)
10.3 Molecular shape and molecular polarity

Chapter 11, "Theories of Covalent Bonding"
11.1 Valence-bond (VB) theory and orbital hybridization
11.2 Modes of orbital overlap and the types of covalent bonds
11.3 Molecular orbital (MO) theory and electron delocalization

Chapter 12, "Intermolecular Forces: Liquids, Solids, and Phase Changes"
12.1 Overview of physical states and phase changes
12.2 Quantitative aspects of phase changes
12.3 Types of intermolecular forces
12.4 Properties of liquids
12.5 Uniqueness of water
12.6 Solid state: structure, properties and bonding (pp. 495 - 496, 503 - 506)
12.7 Advanced materials (pp. 521 - 522 on nanotechnology)

Chapter 13, "The Properties of Mixtures: Solutions and Colloids"
13.1 Types of solutions: intermolecular forces and solubility
13.3 Why substances dissolve: breaking down the solution process
13.4 Solubility as an equilibrium process
13.5 Concentration terms
13.6 Colligative properties of solutions
13.7 Structure and properties of colloids

Chapter 15, "Organic Compounds and the Atomic Properties of Carbon"
15.1 Special nature of carbon and the characteristics of organic molecules
15.2 Structures and classes of hydrocarbons
15.4 Properties and reactivities of common functional groups
15.5 Synthetic Macromolecules (pp. 669-670, condensation polymers, nylon)
See the preceding two pages of this syllabus for information about the contents of each chapter.

Study Guides 1 - 10 on our Moodle site will list pages to read in our text, Silberberg & Amateis' "Chemistry" (8th Ed.), and suggested end-of-chapter problems for each chapter.

For students using ALEKS, problem sets will be due at 11:59 PM on the dates indicated.

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<td>Chap. 5 Gases and the Kinetic Molecular Theory (Study Guide 1)</td>
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<td>M 1/28 Chap. 5</td>
<td>W 1/30 Chap. 5 (ALEKS Prerequisite Review due, 30 topics, mostly math)</td>
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<td>F 5/3 Review</td>
<td>M 5/6 LAST DAY OF CLASS (ALEKS 5 due, 28 topics Ch. 12 &amp; 13) (ALEKS &quot;open pie&quot; 5/7 - 5/11 for reviewing)</td>
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Final Exams

For the MWF 12:20 class: Sat. May. 11, 2019 1:30 - 3:30 PM
Last names beginning A - K Smith 100, L - Z Willey 125

For the MWF 2:30 class: Sat. May. 11, 2019 10:30 AM - 12:30 PM
Last names beginning A - S Smith 100, T - Z Smith 331