



CHEMICAL PRINCIPLES I

M,W,F 2:30 – 3:20, 3 Credits

Professor K. Leopold

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612 625-6072

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Office Hours* (Via Zoom):

M, 11:00 – 12:00

Th, 1:30 – 2:30

*On exam weeks, I will move my Thursday office hour to Tuesday (i.e., the day before the exam).

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; thao@umn.edu).

Note that the 1065 lab is a separate course and is not covered by this syllabus.

General Course Information:

Chemistry 1061/1065 is an introductory course (1061) accompanied by a lab course (1065). Together, they fulfill the Liberal Education Core Physical Science requirement (see below). They are designed to prepare students for science majors including chemistry, engineering, and the health sciences, and are the first half of a two-semester sequence.

Registration and Laboratory Assignments:

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

Required Textbook

- We will be using the **9th edition** of *Chemistry: The Molecular Nature of Matter & Change* (Silberberg/Amateis) with access to the "Connect" homework platform. You can access the e-text via the Connect link in our class Canvas site. You can also purchase a loose-leaf hard copy through the bookstore (\$26.75), should you want a paper version.

- We're making this material available because it is much more cost-effective than purchasing the physical book. Your student account will be charged \$63.75 before the beginning of the semester for access. Those wishing to opt-out and purchase their textbook elsewhere are refunded after the drop/add period. All students who drop the course in the first two weeks of the semester are automatically refunded. **NOTE: If you opt-out of this,, you will need to purchase your own access to Connect, which will likely be more than the \$63.75.**
- **IF YOU WISH TO OPT OUT** (e.g if you already have an earlier edition): An email will be sent to all students with opt-out instructions. The email will have the subject line "Important Course Materials Info: Charges to Your Student Account". The original email comes from no-reply@verbasoftware.com so it sometimes goes to spam. Please be on the lookout for this email! Students **have until January 28th to opt-out of the course material.** If you have additional questions contact the U of M Bookstores directly at inclusiveaccess@umn.edu

Also...you will need to register on the Connect system for access to materials pertinent to our section.

The Connect system has been linked to our Canvas site. You can find it on the left sidebar. The first time you access it, you will need to register, and the system should prompt you about the necessary steps.

Be sure to use your U of M email address. You will only receive credit if you use your U of M email address that ends with ...@umn.edu. DO NOT USE AN ALTERNATE EMAIL ACCOUNT.

Other Items Your Will Need

- Internet-capable tablet or laptop for access to the Connect homework. This is also advisable in case we have to return to virtual instruction.
- Non-programmable scientific calculator (see details below)

Laptop Recommendations:

In light of the online homework and our heavy use of technology, you may be interested in CSE's recommendations for laptops. A pdf file containing these recommendations is posted on the class Canvas site.

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 2 websites that are directly related to this course:

1. Lecture Canvas Site

This site 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. This site will also link you to the Canvas homework platform. You can go to canvas.umn.edu and locate our class (CHEM 1061 - 003) on your dashboard. Note that the lab course, CHEM 1065, has a separate website.

2. General Information WebSite

See <http://genchem.chem.umn.edu/> for general information about Chem 1061 (TAs, exams, lab schedules, etc.)

Office Hours: Regular office hours will be conducted virtually over zoom (M, 11-12 and Th 1:30 – 2:30). In addition to answering your questions, I will bring some sample problems to help get the conversation going so that we can run it largely as a problem solving and Q&A session. **Therefore, you do not need to come with specific questions. Just come (virtually).** These sessions are intended to be low-pressure and highly interactive. They will **NOT be recorded** so that people are not inhibited from asking questions.

Additional Scheduled Zoom Meetings: Sometimes, you may want to talk with me in a more private setting, e.g., about grades, or other factors that you feel may be influencing your work in the course. For this, I am happy to schedule individual Zoom meetings at mutually convenient times. Please note that FERPA (Family Educational Rights and Privacy Act) prohibits anyone other than you (even parents or friends) from participating in discussions about grades and course performance, at least without written permission. So please be sure that you're comfortable with your privacy settings and with the environment in which you join these meetings.

Students with Disabilities:

The University views disability as an important aspect of diversity, and is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

- If you have, or think you have, a disability in any area such as, mental health, attention, learning, chronic health, sensory, or physical, please contact the DRC office on your campus (UM Twin Cities - 626.1333) to arrange a confidential discussion regarding equitable access and reasonable accommodations.
- Students with short-term disabilities, such as a broken arm, can often work with instructors to **minimize** classroom barriers. In situations where additional assistance is needed, students should contact the DRC as noted above.
- If you are registered with the DRC and have a disability accommodation letter dated for this semester or this year, please contact your instructor early in the semester to review how the accommodations will be applied in the course.
- If you are registered with the DRC and have questions or concerns about your accommodations please contact your (access consultant/disability specialist).

Learning the Material and Preparing for Exams:

- **In addition to the suggestions below, please see the separate file called “How to Study for CHEM 1061”.** It is posted on Canvas.
- Reading assignments are taken from Amateis and Silberberg. I suggest reading through the assigned sections once and then starting to work on the suggested practice problems. Use the text (and the lecture notes) as resource material as you work on the problems. Many of these problems appear on the Connect homework platform and these will be required as part of your grade. **NOTE:** These are mostly quantitative problems, but be sure to look at all the problems listed at the end of this syllabus, as some also involve conceptual questions that do not lend themselves to online homework.
- **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!! Many (but not all) of them will be incorporated into the Connect homework and, therefore, those will end up being a part of your course grade (see below).

Please Remember: Although these problems are “assigned”, the point is not just to get the right answers in a computer system or 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 down the answers is not helpful. Please keep this in mind when studying for this course.

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. Only use the solutions manual as a last resort. 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 at the end of the chapters and on Canvas, while re-reading relevant parts of the text and lecture notes as needed to help with the problems.

MOST OF YOUR STUDY TIME IS BEST USED WORKING PROBLEMS AND STUDYING CONCEPTS.

EXAMS

Dates:

Midterm exams will be given **in class** on the following dates:

1. Wednesday, February 16, 2:30 – 3:20 PM (Central Time)
2. Wednesday, March 16, 2:30 – 3:20 PM (Central Time)
3. Wednesday, April 13, 2:30 – 3:20 PM (Central Time)

**THE FINAL EXAM WILL BE ON
SATURDAY, MAY 7 FROM
10:30 AM – 12:30 PM**

IF YOU ARE SICK, PLEASE STAY HOME AND DON'T TAKE THE EXAM. CONTACT ME FOR ALTERNATE ARRANGEMENTS!!

Content and Format:

Exams will cover the material discussed in class or assigned as homework. Material that is included in the text book but has not been touched on in class or in the assigned reading and problems will not be covered on the exams. Exams will be multiple choice. A periodic table and a number of important equations will be provided with each exam. A STUDY GUIDE will be posted on Canvas approximately one week before each exam and will provide specific information about what the exam will cover.

As noted above, exams **will be administered in class**. In the event that we need to return to virtual instruction, exams will be given remotely via Proctorio and appropriate instructions will be provided at that time.

In order to relieve some of the inevitable stress associated with these exams, the following policy will be implemented: Exams will consist of 20 questions, but you will only need to get 18 correct in order to achieve 100%. Therefore, in effect, you can choose to ignore two questions without penalty. Note that the maximum grade will still be 100%, even if you get 19 or 20 questions correct. So, in other words,

- If you get 20 questions correct, your grade will be 100%.
- If you get 19 questions correct, your grade will be 100%.
- If you get 18 questions correct, your grade will be 100%.
- If you get 17 questions correct, your grade will be $(17/18) \times 100\% = 94.4\%$.
- Etc.

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. 6.02×10^{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:

Students are expected to be present and prepared to take all three exams and the final. **Exams will ONLY be given on their regularly scheduled day.** An **unexcused** absence from any of these exams will result in a score of zero being entered in the course record.

In the case of illness or a true emergency, a student may be excused from one midterm exam 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 according to Chemistry Department policy which states,

“The unweighted average score of all the student’s other exams will replace the zero from the excused midterm exam”

This procedure will only be applied in special circumstances. If you need an excused absence, note two things:

- (i) Please contact me the day of the exam or as soon as circumstances allow.
- (ii) You don’t need 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 contact me.

PLEASE NOTE: This is not a procedure which is to be used to obtain a second chance on an exam, or to put off being tested on a particular subject. This is only to be used in the case of real, legitimate illness or emergencies. **Quarantining due to COVID is a legitimate excuse!**

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

COURSE GRADES

A-F Grading:

Midterm exams, the final, and the Connect homework will be counted with the following weights:

Average of the Midterm Exam Scores:	60%
Connect Homework:	15%
Final Exam:	25%

Thus, a final score for the course will be calculated according to the following formula:

$$\text{Final Average} = (0.60) * (\text{Midterm Average}) + (0.15) * (\text{Connect}) + (0.25) * (\text{Final Exam})$$

where “Connect” is the percent of Connect problems answered correctly over the semester and “Final Exam” is your score on the final, quoted as a percentage of the total number of possible points.

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

85 – 100	A
81 – 85	A–
77 – 81	B+
72 – 77	B
68 – 72	B–
64 – 68	C+
55 – 64	C
46 – 55	C–
41 – 46	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. However, don’t count on large adjustments. If you want benchmarks to aim for, these are them!

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".

Chemistry Department Policy on Incompletes:

Policy: It is Departmental Policy that **I** grades should, except in the most extraordinary circumstances,* be awarded only to students who have a documented, acceptable reason for missing a final exam and who are in good standing (**passing with a C-**) in the course up to that point.

In the event that these circumstances *are* met, a contract (available in the undergraduate office, 115 Smith) should be signed by the student and the instructor (and also the instructor of any future course that might be involved) detailing how the student will make up the missed final exam. If an instructor in a future term isn't known, the DUGS should sign the contract.

Policy on Incomplete (I) grades: The policy of the Chemistry Department is that a student may request an Incomplete grade only when (a) the student has a University sanctioned excuse for missing the final exam and (b) the student is passing the course based on all other graded components. Assignment of an **I** requires that the instructor and student sign a contract, available in the Departmental undergraduate office, stipulating the procedure by which the **I** grade will be made up (e.g., taking a final exam from another instructor in the next semester). Failure to successfully complete the procedure outlined in the contract will result in the **I** being administratively changed by the University Registrar to an **F** or **N** (depending on the grade base) one semester (excluding summer) from the end of the semester for which the **I** grade was granted.

If you need a blank copy of the form referred to above, you may get it from Nancy Thao in the General Chemistry office (thao@umn.edu).

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.

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. (Send an email to Nancy Thao: thao@umn.edu.)

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

The office of Community Standards has some good information for students about how to avoid falling into a situation related to scholastic dishonesty: <https://communitystandards.umn.edu/>

Policy on Appropriate Use of Course Materials:

Taking notes is a means of recording information and of personally absorbing and integrating the educational experience. However, broadly disseminating class notes or exams beyond the classroom community or accepting compensation for taking and distributing such items undermines instructor interests. Engaging in such actions violates shared norms and standards of the academic community. It is unethical, so please don't do it.

A Comment on 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, and 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

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

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

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

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

RECOMMENDED SCHEDULE FOR VIEWING LECTURES AND CONNECT DUE DATES*

Week	Date	Chapter	Watch These Videos This Week**
1	1/18-1/21	5 5 5	Intro to CHEM P,V, T Relationships Avogadro's Law and the Ideal Gas Equation Gas Density and Gas Mixtures
2	1/24-1/28	5 5 6	Kinetic Molecular Theory Graham's Law and Real Gases Energy, Enthalpy, and the First Law of Thermodynamics
3	1/31-2/4	6 6	Calorimetry ΔH°_f ; Hess's Law
4	2/7-2/11	7 7	Electromagnetic Radiation, Light and Matter Waves Atomic Emission, Bohr Model, Spectral Calculations
5	2/14-2/18	7	M, 2/14 – In Class Review Session W, 2/16 – HOUR EXAM 1 IN CLASS: 2:30 – 3:20 PM*** F, 2/18 – Modern Quantum Mechanics, H-Atom Quantum Numbers, Orbitals
6	2/21-2/25	8 8	Multi-Electron Atoms, Electron Configurations, and the Periodic Table Trends in Atomic Properties: Z_{eff} , IE, EA, Atomic Radius
7	2/28-3/4	9 9 9 9	Ionic and Covalent Bonding Using Bond Energies to Estimate ΔH for a Reaction Polar Covalent Bonds and the Electronegativity Scale Chemical Bonds, Molecular Vibrations, the Greenhouse Effect & Metallic Bonding
SPRING BREAK – 3/7 – 3/11			
8	3/14-3/18	10	M, 3/14 – In Class Review Session W, 3/16 – HOUR EXAM 2 IN CLASS: 2:30 – 3:20 PM*** F, 3/18 – Introduction to Lewis Dot Structures for Molecules
9	3/21-3/25	10 10 10	Resonance Structures Formal Charge Exceptions to the Octet Rule
10	3/28-4/1	10 10 11	VSEPR Theory VSEPR Theory for Polyatomic Molecules and Molecular Polarity sp^3 Hybridization
11	4/4-4/8	11 15 15 15	sp^2 , sp Hybridization, Sigma and Pi Bonds Hydrocarbons Functional Groups Polymers
12	4/11-4/15	12	M, 4/11 – In Class Review Session W, 4/13 – HOUR EXAM 3 IN CLASS: 2:30 – 3:20 PM*** F, 4/15 – Gases, Liquids, Solids, and Equilibrium Vapor Pressure
13	4/18 – 4/22	12 12 13	Intermolecular Forces Consequences of Intermolecular Forces Introduction to Solutions
14	4/25 – 4/29	13 13	Units of Concentration and Raoult's Law Boiling Point Elevation, and Freezing Point Depression
15	5/2	13	Osmotic Pressure and Henry's Law
Final Exam – Saturday, 5/7 from 10:30 AM – 12:30 PM			

* This schedule is only approximate. Please keep tabs on the lecture to better inform you as to where we are in the course.

** Some of these videos will be split into parts to keep them from being too long. Videos are located in the playlists found in the Media Gallery (left side bar on the course Canvas site).

*** Exam details and coverage will be given in the Study Guides, to be posted separately on Canvas about a week before each exam.

CONNECT DUE DATES*			
Chapters 1-4	F, 1/28	ChemDraw Intro. Video**	
Chapter 5	F, 2/4	Chapter 10	W, 4/6
Chapter 6	F, 2/11	Chapter 11	M, 4/11
Chapter 7	F, 2/25	Chapter 15	M, 4/18
Chapter 8	F, 3/4	Chapter 12	W, 4/27
Chapter 9	F, 3/18	Chapter 13	S, 5/7
There are no extensions on these due dates.			

*The homework problems or chapters 1-4 are made available to help you review. They will not be counted as part of your homework grade. For CHEM 1061, it is particularly important that you are familiar with unit conversions, rounding numbers, significant figures, all aspects of stoichiometry.

Assignments for chapters 5 and beyond must be completed by 11:59 PM on the due date in order to receive full credit. (The only exception is Chapter 13, which will be due at 10:30 AM, i.e., the time that the final exam begins.)

You do not need to complete all the problems in a chapter to receive credit. Partial credit will be awarded based on the number of questions correctly answered. Note, however, that assignments submitted after the indicated due date will incur a 25% per day point penalty. After the due date, assignments will remain open after the due to date and for the rest of the semester so that you can still use them to practice. No homework assignments will be open after the final exam.

** Don't forget to watch the ChemDraw Introduction Video after Chapter 9. There is no due date, and it doesn't count for homework points, but you'll find it useful for some of the problems in subsequent chapters.

Reading and End-of-Chapter Problem Assignments

Reading assignments and End-of-Chapter Problem assignments are on the following pages. Note that many of these are included in the assigned Connect homework. You should do at least the suggested homework problems and more if you need more practice.

Problem numbers correspond to the 9th edition of the textbook. Problem assignments corresponding to the 8th 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!

NOTE ABOUT CHAPTERS 1–4: This course begins with Chapter 5. 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. Many of these will be available on Connect.

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 answer to #4.30a in the back of the book 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. 241 only; you may skip the van der Waals equation on pp. 241-242)

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, 84,86,99

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: 7.2,7,9,13,20,22,23,7.24 (use Bohr's formula, eq. 7.5),29, 41 ("that of a photon of green light" refers to the ordinary wavelength since we normally don't speak of the de Broglie wavelength of light), 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)

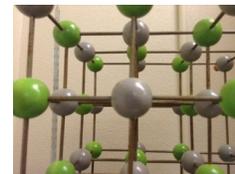
End-of-chapter problems: 8. 6,7,11,13,18,21 (omit c),23,25,31,33,35,44,50,53,55, 69,77,79,85,87,95

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, 47,49,53,60,66, 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)

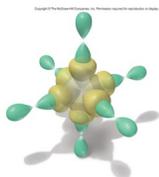
Read Sections: 10. 1-3

End-of-chapter problems: 10.1.5,7,11,13a,15,17,19,26,28,30,34,36,40ab,44,46,55, 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 sp^3 hybridization only, i.e., skip sp^3d and sp^3d^2 , but don't forget the last part of 11.1 on pp., "limitations of hybridization", pp.450-451), 11.2, skip 11.3

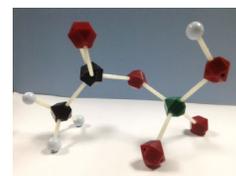
End-of-chapter problems: 11.1acd, 2ab, 7,13,20,21,23,40,42,56

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:: 15.3,7,9,17,29,57,59abde,61,63,69,79,83,84,86,87ab

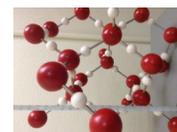


In this Chapter: The special nature of carbon; hydrocarbons: alkanes, alkenes, alkynes, cyclic and aromatic hydrocarbons; classes of organic compounds (functional groups); isomers and the structures of organic compounds; polymers, both synthetic and natural

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

Read Sections: 12.1 – 4 (Omit pp. 483-484 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,b,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.
