PLEASE READ THIS HANDOUT CAREFULLY! DOING SO IS LIKELY TO HELP YOU AVOID PROBLEMS LATER IN THE SEMESTER!!!

GENERAL ITEMS

**Prerequisites:**

You should not be registered for CHEM 1062 unless you have passed CHEM 1061 or an equivalent course with a grade of C– or better. A C– grade in CHEM 1061 is a marginal pass and likely indicates that you will have to work extra hard in CHEM 1062. CHEM 1062 is a more difficult course than CHEM 1061. Chemistry 1061/1065 and 1062/1066 (previously numbered 1021 and 1022) are introductory courses accompanied by a lab course. The two courses, with the labs, together are designed to prepare students for science majors including chemistry, engineering, and the health sciences.

**Textbooks:**

*Chemistry: The Molecular Nature of Matter and Change*, by Martin Silberberg and Patricia Amateis (McGraw-Hill, 7th edition, 2015). As currently sold in the bookstore, the textbook is packaged with an access code to ALEKS, the publisher’s on-line homework system. If you purchased a textbook last semester, you should have access code that will let you in the system this semester (though you would still have to register at no cost for our current section.) If you do not have this code, one can be purchased on the ALEKS website for $60 or in the bookstore, packaged with the e-book for $90. It is on this page you can purchase access with a credit card. If you cannot purchase now, but want to get working in ALEKS immediately, you can use this temporary access code: 50916-34352-696AF-09576. It will give you access for 2 weeks.

**Registration and Laboratory Assignments:**

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

**Liberal Education Physical Science Core Requirement:**

CHEM 1062 satisfies the U of M Liberal Education Physical Science Core requirement. What does this mean? Core courses are intended to provide an in-depth look at how knowledge is created in a particular discipline. Naturally, they provide content knowledge but just as important, they teach “modes of inquiry”: How do workers in a particular field think? How do they collect and process information? How do they create new knowledge? By taking a distribution of core courses during your time at the U of M, you gain an appreciation for the similarities and differences among disciplines. Much like learning a foreign language helps you to better understand your own language, a distribution of core courses provides the perspective needed to understand a broad range of complex issues and can ultimately make you a better practitioner of your own chosen field. You learn different approaches to finding credible information, analyzing information, solving problems, and drawing reasonable conclusions based on facts. In doing so, you develop skills needed to be an informed citizen and life-long learner.
In CHEM 1062, we study chemistry, of course. For example, we learn to understand chemical reaction rates, equilibrium, thermodynamics, and electrochemistry. 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 several websites associated with this course that you must visit frequently to keep up with the material:

**Lecture Moodle Site:** This site, CHEM 1062 – 001 – Spring 2016, is where you will find any information associated with this course. It will contain this syllabus as well as many resources to help you succeed on our exams. Exam grades will also be posted on this site. Note that the lab is a separate course and has a separate moodle site.

**ALEKS:** This is the on-line homework system that will be available for your use. See information on p.7 as to how we will or won’t use ALEKS. See also the ALEKS description files posted on Moodle.

**General Information WebSite:** See also http://www.chem.umn.edu/ta/current/GeChCourses.html for general information about Chem 1062 (TAs, exams, lab schedules, review sessions, 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 ay15.umn.edu, login, and select the appropriate class link.

Accessing ALEKS

Refer to the Quick-Start Guide that is Posted on Moodle OR...

1. Go to www.aleks.com

2. Click on SIGN UP NOW!

3. Enter Course Code: HXATE-GYFHF  Note that this code is only for our section. If you have friends in other sections, they should not use this code. They should get an equivalent code from their instructor.

4. Confirm you’re in the right course (Chem 1062 – Spring 2016, 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.

6. 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. If you don't take the assessment seriously, you'll just end up wasting time on material you already know.
   - The assessment is over the entire first-year material, 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.

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. Also, it is YOUR RESPONSIBILITY to obtain missed lecture notes, copies of handouts, and announcements regarding changes in this syllabus. Please pay attention to this to avoid potential problems!
OFFICE HOURS AND GETTING HELP

Instructor: Office Hours: Monday 2:00 – 3:00
                      Thursday 1:00 – 2:00

→ On exam weeks, I will move my Thursday office hour to Tuesday, 1:00 – 2:00.

I will also be available after the lectures to answer questions and/or make appointments for other mutually convenient times. My office is 217 Smith. You can also call (612-625-6072) or e-mail me (kleopold@umn.edu).

Walk-In Tutorial:

Room 124 Smith is the site of the regular 1062 help sessions conducted by the CHEM 1062 TAs. A schedule may be found at http://www.chem.umn.edu/ta/current/1062tutor.htm. Additional tutoring services are available at the Smart Learning Commons in Walter Library (http://smart.umn.edu/index.html).

Please Note: The walk-in tutorial is not intended as a routine means of getting your homework problems solved. Many students fall into the trap of seeking help too soon, before they have put sufficient thought into a problem by themselves. The result is that they never learn to solve problems on their own, and the consequences are disastrous on exams. Thus, while you are not discouraged from using the tutor room, you are discouraged from over-using it. Tutors are instructed NOT to simply do problems for students, but rather to ask questions that will help them see how to do the problems themselves. They may also ask to see evidence that you have tried a particular problem yourself. Generally, then, it’s a good idea to bring along the work you have done on a problem. Seeing this will help the tutor figure out how best to help you. If you have any questions about this, please feel free to ask me.

Special Evening Problem Solving Sessions:

We will have an evening study session on the Monday evening prior to each midterm exam. These will be run by one of the TAs and are strongly recommended if you are having difficulty. A schedule may be found at http://www.chem.umn.edu/ta/current/1062review.htm. Times and locations will be announced in class.

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.

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 written out solutions (with some added commentary) and have posted them on Moodle for each chapter. The net result is that you will have complete solutions to some of the problems (black) and only answers to the rest of the problems. You should try the black problems on your own before consulting the solutions. Then, you can make sure you understand them by doing the red problems and checking the answers in the back of the book.

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.

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. 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, 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!!

EXAMS

Dates:  
As announced in the Spring 2016 Class Schedule, The CHEM 1062 midterm exams are given on three Wednesdays from 9:00 – 10:00 PM. The dates are

1. Wednesday, February 17  
2. Wednesday, March 23  
3. Wednesday, April 27

Exam rooms will be announced in class and on Moodle.

THE FINAL EXAM WILL BE ON:
SATURDAY, MAY 14 from 8:00 – 10:00 AM

FINAL EXAM ROOMS WILL BE ANNOUNCED IN CLASS.
Content and Format:

Exams will cover the material discussed in class or assigned as homework. At least 30% of each test will be very similar to the assigned homework. Material that is included in the textbook 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. Please bring a **CALCULATOR, SOME #2 PENCILS, and STUDENT ID** to the exam. A periodic table and a number of important equations will be provided with each exam.

**CALCULATOR POLICY**

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

Graphing and programmable calculators are **FORBIDDEN** on exams. The presence or use of a graphing or programmable calculator on an exam will be considered cheating. Only calculators that are **not programmable** will be allowed during exams.

The TI-30Xa (right) is the suggested calculator for this and all CHEM 1XXX courses, and 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>
</tr>
</thead>
<tbody>
<tr>
<td>Cascio /s-V.P M</td>
<td>Casio fx-300 MS</td>
<td>TI-30XS</td>
</tr>
<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>
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If you wish to use a calculator on exams which is not on this list, please have it approved by me first.

Calculators **may not be shared** on exams. Also, no cell phones or other electronic devices may be used during the 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.

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.
This procedure will only be applied in special circumstances. If you need to take advantage of this option, you must

(i) Contact me the day of the hour exam.
(ii) Provide some appropriate form of documentation (e.g., doctor's note, etc.) within one week of the exam.

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 emergencies.

→ 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!

*****HOW GRADES WILL BE DETERMINED*****

A-F Grading:

Based on feedback from students last semester, 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:
Hour exams (Weighted Average of 3 Hour Exams) 75%
Final exam 25%

Second Way:
Hour Exams (Weighted Average of 3 Hour Exams) 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 = the average of the three hour exam scores,
FE = score on the final exam, quoted as a percentage of 200 pts,
ALEKS = your final ALEKS score at the end of the semester

The higher of these two numbers will be your overall average for the semester.

Letter grades will then be assigned on the basis of this overall average. Course grades will use the +/- system. The basic letter grades are defined by the University Senate as follows:

A: Achievement that is outstanding relative to the level necessary to meet course requirements.
B: Achievement that is significantly above the level necessary to meet course requirements.
C: Achievement that meets the course requirements in every respect.
D: Achievement that is worthy of credit even though it fails to meet fully the course requirements.
F: Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (incomplete).
The correspondence between your average score and your letter grade will be determined roughly in accord with the following historical grade ranges:

88 – 100  A
85 – 88    A–
82 – 85    B+
78 – 82    B
75 – 78    B–
71 – 75    C+
65 – 71    C
55 – 65    C–
48 – 55    D

Note that at the end, I may opt to curve the course such that it will be possible to get a particular letter grade with a score that is lower than the range indicated above. This will depend, for the most part, on the class average and the distribution of final average scores. But in no case will this process hurt your grade. **That is to say, a curve, if applied, will only be used to improve your grade, not lower it.**

**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".

**One Other Important Note:**

If you choose to do the ALEKS problems, you should still do the assigned problems at the end of the chapter! Without them, you will still likely be unprepared for the exams! Please don’t ignore these assigned problems end-of-chapter problems!

**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.

**Incompletes:**

A student who is otherwise doing satisfactory work but must miss the final exam for a valid reason can obtain a course grade of I (incomplete). Arrangements must be made with me prior to the last day 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. Departmental policy on incompletes will be followed and reads as follows:

“The policy of the Chemistry Department is that a student may request an incomplete only when (a) he or she has a University sanctioned excuse for missing the final exam and (b) he or she 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 complete successfully 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 calendar year from the end of the semester for which the I grade was granted. Note that the
University has policies already in place to permit students called to military service, or unexpectedly disabled by major medical issues, to petition for withdrawal (and potential full or partial tuition remission) without prejudice.”

For more information on incompletes, see

Note: A “university sanctioned excuse” includes documented illness.

**Withdrawals:**

It is hoped that every student will successfully complete this course. If, however, it becomes necessary to drop, you must officially withdraw from the course following the rules for your college.

**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:

**Students with Disabilities:**

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

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

You should do at least the suggested homework problems and more if you need more practice. The homework will not be collected or graded but you will need to do it in order to succeed on the exams.

Problem numbers correspond to the 7th edition of Amateis and Silberberg. Problem assignments corresponding to the 6th edition of Silberberg 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 and my solutions to assigned black problems are posted on Moodle. A mix of red and black problems has been assigned. It is important that you be able to do both kinds. Don’t just read my solutions to the black problems and think you’re done. Doing the red problems provides a good way of testing your ability to answer questions and solve problems on your own.

Chapter 13 (Properties of Mixtures: Solutions and Colloids)

Dates: W 1/20 - F 1/29 (Lectures 1-5)
Read Sections: 13. 1, 3-6
3,9,11,12,14,26,32a,36,38c,39a,40,45a,46b,47,48,49,58,64b,67,71,76,88,91,94,96,98,99,100,103,
109a,122,131,133,149,158

Chemical Content: 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.

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

Dates: M 2/1 – F 2/12 (Lectures 6-11)
Read Sections: 16. 1-7 and 24.2 (Radioisotope Dating, pp.1067-1069)
Problems: 16. 7,12,14,17,18,21,25,26,28,32,34,35,37,43,44,51,59,60,61,63,68,69,
73a-c,77,84,94,95,99,103(a and c only),106,117,124,125
24. 41,44

Chemical Content: Why study kinetics? Topics include reaction rates, rate laws, determining the form of the rate law, method of initial rates, reaction order, integrated rate laws, first order kinetics and exponential decay, examples of first order kinetics, 14C dating, second order kinetics, reaction mechanisms, collision model, temperature dependence of reaction rates, catalysis, enzymes, free radical reactions and ozone depletion
Chapter 17 (Equilibrium: The Extent of Chemical Reactions)

Dates: M 2/15 (Lecture 12)

Wed. 2/17 - Hour Exam I (9:00 – 10:00 PM)
Review Session During Regular Lecture Time (Lecture 13)

Date: F 2/19 (Lecture 14)
Read Sections: 17. 1-6
Problems: 17. 1,6,10,12,15,16,19,27,30,31,33,35,42,45,47,50,51,54,56,66,67,69,71,84ab,86,88,90

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

Chapter 18 (Acid-Base Equilibria)

Dates: M 2/22 - W 3/2 (Lectures 15-19)
Read Sections: 18. 1-4, 6,7, 9 (i.e., skip sections 5 and 8)
Problems: 18. 5,9,11,13,16acd,21,22,23,25,27,29,31,42,43,45,47,48,65,66,69,100,103,105,107,110,111a,112b, 142,149,167,168

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

Chapter 19 ( Ionic Equilibria in Aqueous Systems)

Dates: F 3/4 – F 3/11 (Lectures 20-23)
Read Sections: 19. 1-3 (Omit “Effect of pH on Solubility”, p. 852.)
Problems: 19. 1,2,13,19,21,24,26,27,30,31,54,55abeg,56aefg,58,60,66,70,73,74,76,79,112,126,139a-d,141a


SPRING BREAK 3/14 – 3/18: NO CLASSES
Chapter 20 (Thermodynamics: Entropy, Free Energy, and the Direction of Chemical Reactions)

Dates: M 3/21 (Lecture 24)

Wed. 3/23 - Hour Exam II (9:00 – 10:00 PM)
Review Session During Regular Lecture Time (Lecture 25)

Dates: F 3/25 – F 4/1 (Lectures 26 - 29)
Read Sections: 20.1-4
17.74, 84c

Chemical Content: Spontaneous processes and entropy, entropy and the 2nd Law of Thermodynamics, effect of temperature on spontaneity, free energy, entropy changes in chemical reactions. 3rd Law of Thermodynamics, standard free energies, predicting the sign of ΔS°. Relationship between free energy and equilibrium, temperature dependence of equilibrium constant, free energy and work.

Chapter 21 (Electrochemistry: Chemical Change and Electrical Work)

Dates: M 4/4 – M 4/11 (Lectures 30-33)
Problems: 21. 9,10,11a-e,22,27 (ignore part “i”),28 (ignore part “i”),29,34a,40,42,54b-d,58,62,64,65,70(Assume equal volumes for part b), 73, 82,87,101,104,105,111,113

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

Chapter 23 (The Transition Elements and Their Coordination Compounds)

Dates: W 4/13 - W 4/20 (Lectures 34 - 37)
Read Sections: 23. 1-4 (omit pp. 1034-1036 on valence bond theory)
Problems: 23. 4,9,14,16,35,37,39,42,45,47,50ac,52,53,55,58,62,66,74,80,82,86,92,95,97,98,114

Chemical Content: Survey of Transition Metals, Electron Configurations and Oxidation States, Coordination Compounds, Isomerism, Bonding in Complex Ions, Crystal Field Theory, Octahedral Complexes and Other Geometries
Chapter 14 (Periodic Patterns in the Main-Group Elements)

Dates: F 4/22 - M 4/25 (Lectures 38,39)

Wed. 4/27 - Hour Exam III (9:00 – 10:00 PM)
Review Session During Regular Lecture Time (Lecture 40)

Dates: F 4/29 – M 5/2 (Lecture 41, 42)
Read Sections: 14.1-10 (see lecture notes for topics to be emphasized)
Problems: 14. 13, 18, 28b, 34, 40bcd, 48, 50, 54, 64b, 67, 69, 77c, 84a-c, 87, 93ad, 100, 103, 125

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

Chapter 22 (Elements in Nature and Industry)

Dates: W 5/4 - F 5/6 (Lectures 43, 44, …if time permits)
Read Sections: 22. 2,4
Problems: 22. 8, 9, 10, 12, 14, 15, 28, 70, 71

The C, N, and P cycles and the ways in which human activities interfere with the regenerative ability of these cycles. In the carbon cycle, we observe the effect of the biosphere on the element’s environmental cycles. The increase in atmospheric CO₂ resulting from human industry has the potentially dire environmental consequence of global warming through the greenhouse effect. Human activity also plays a major role in the nitrogen cycle through the Haber process of industrial nitrogen fixation. For aluminum, the electrolytic manufacturing method consumes more than 5% of total U.S. electrical usage, while recycling uses less than 1% as much energy as manufacturing.

THE FINAL EXAM WILL BE ON
SATURDAY, MAY 14
8:00 – 10:00 AM
THE ROOM(S) WILL BE ANNOUNCED IN CLASS.