CHEMISTRY 109

Lecture 1, Fall 2014

Read This Syllabus Today. Keep It for Future Reference.

Advanced General Chemistry:	5 credit hours
Lecture:	12:05 109-1 MWF 1351 Chemistry
Instructor Information:	Professor Frank N. Keutsch 4355 Chemistry (262-7904) chem109fk@chem.wisc.edu
Office Hours:	M, W 3:30-4:30 PM 4355 Chemistry or email for an appointment

Chemistry 109 is a one-semester, accelerated, first-year college course in chemistry. The goals of this course are: 1) to build your skills in problem solving, mathematical and analytical reasoning, and laboratory manipulation, and 2) to build your knowledge of the fundamental chemical principles of atomic and molecular structure, kinetics, and thermodynamics. In this class we will apply these principles to condensation-hydrolysis reactions, acid-base reactions, and oxidation-reduction reactions. We will emphasize applications in living organisms (for example in drug design), and in the industrial world (for example in fuel production and utilization).

Is Chemistry 109 the right course for me? It is, provided you can answer yes to all of these questions. 1) Does your potential major require chemistry beyond General Chemistry, or are you considering a major that would require more chemistry? 2) Did you qualify for placement into Calculus (Math 221) or a higher math course? 3) Have you taken one year of high school chemistry with a grade of A- or better and scored at least 29 on the ACT or at least 650 on the SAT math test, or have you taken two years of high school chemistry (AP is good) and scored at least 27 on the ACT or 620 on the SAT math test? 4) Do you enjoy science, feel reasonably well prepared, and have a strong work ethic?

Course Organization and Expectations

This course is designed to help you to learn chemistry. Prof. Keutsch and your TA will do their best to guide you in mastering the material, but no course or instructor can learn for you. You will need to devote considerable outside-of-class time to studying chemistry. A good rule of thumb is that you should be spending approximately three hours outside of class for each hour you are in class. A recommended study strategy for this course is this: 1) read the assigned material in the textbook before each class session, 2) attend class and take your own notes, 3) as soon as possible after class, begin to work homework problems. When you encounter problems that you cannot solve, refer to the textbook, your notes, a tutorial, or your fellow students. Forming a study group to work through problems is an excellent way to learn chemistry.

Throughout this course emphasis will be placed on understanding chemistry and learning to think effectively in solving problems. Successful problem solving requires a basic knowledge of principles, facts, and terms: a vocabulary of chemistry. Some of this background and vocabulary should have been obtained from your high school chemistry course. From time to time you may need to review material you studied in high school in order to understand the new material presented in this course. To help you review there are three Review Homework assignments. The first of these must be completed Sunday, Sept. 7, and the second two weeks later. The third comes in early November. Chemistry is a cumulative subject; what you learn this semester will build upon background material that you learned earlier.

To help you to master the new material presented in this course, specific learning objectives are provided for each exam. These objectives will be available under the Exam Preparation Materials headings in Moodle (see below). Use the learning objectives to guide your work on the homework sets and to review for the exams. Study questions keyed to the learning objectives are also available in the same location to give you more problem-solving practice. Practice exams, and fully worked out answers, will be available for you to use in preparing for each exam. Some additional objectives will become available from time to time to cover material introduced for the first time this year.

Required Texts & Materials

You will need to purchase each item listed below. These are the only required items for this course.

Textbook: *Chemistry: The Molecular Science* 5th ed. Moore, Stanitski.

Lab Manual: *Chemistry 109 Laboratory Manual, Fall 2014,* Chemistry Department, University of Wisconsin-Madison: available from Alpha Chi Sigma (the co-ed chemistry fraternity) in chemistry building lobby the first week of classes.

Lab Notebook: Carbonless laboratory notebook with duplicate pages: available from Alpha Chi Sigma or local bookstores (where it is more expensive).

Safety Goggles: Industrial quality eye protection—goggles that completely seal around the eyes and fit over regular glasses— is required at all times when you are in the lab. Purchase from Alpha Chi Sigma or local bookstores (~$10).

Calculator: An inexpensive calculator is required. It should have capabilities for square roots, logarithms and exponentiation (antilogarithms), and exponential (scientific) notation operations. The calculator will be used on homework assignments, pre-lab quizzes, exams, and in the lab. You may use programmable calculators in this course.

Web-Based Course Materials and Class Emails

To access Web-based materials, you must activate your UW-Madison NetID so you have an ID and password. You probably did this at SOAR during the summer. If not, activate your NetID by going to http://my.wisc.edu, clicking on Activate your NetID, and following the directions. You may also change your NetID password at this same Web site.

Much information about this course will be transmitted via email, using an automated email list based on registration in the course. An email was sent to everyone on this list on August 26. If you did not receive such an email, either you were not yet enrolled or you are not reading your @wisc.edu emails. It is best to use your @wisc.edu email for UW-Madison communications. You can tell your other email accounts to forward to your @wisc.edu email account, or *vice versa*.

Technology Enhanced Learning: Moodle Web Site; Online Textbook

Much of Chem 109 is only available via a course management system called **Moodle**. You automatically have access if you are enrolled in this course. You can use Moodle on your own computer, a friend's computer, or any other computer on campus. Direct your Web browser to https://ay14-15.moodle.wisc.edu. Click Login at the upper right on the screen; enter your NetID and Password. Choose Fall 2013 and click Chem 109-1/2 Advanced General Chemistry Fall 2014.

Please log in to Moodle as soon as possible. Using the link provided in the center panel, or on the Quizzes page (link to quizzes is in Activities panel on the left), work on the **Practice Quiz**, which is designed to check out your computer to make sure it will do everything you will need during the semester. Do the Practice Quiz on the computer you are most likely to use for online homework assignments and tutorials this semester. The **Practice Quiz is due at midnight, Sunday, September 7**, but don't wait until the last minute to do it. If you have trouble getting your own computer to do the Practice Quiz, then use a computer in the chemistry building to complete the assignment. If you change computers during the semester, do the Practice Quiz on the new computer to be sure everything works.

Also begin to work on **Review Homework 1**, which is **due at midnight Sunday, Sept. 7** and on **Homework 1**, which is **due at midnight on Sunday, Sept. 14**. All homeworks are accessed through OWL (see later).

Safety Quiz

Before your first lab period you must achieve a perfect score on a Safety Quiz and an Academic Honesty Quiz in Moodle. The quizzes are listed under the second week's assignment. *If you carefully read the safety pages (pp xix to xxii) in your lab manual before taking the Safety Quiz, you should have no difficulty getting a perfect score*.

Health or Disability Concerns

All students at UW are entitled to an accessible, accommodating, and supportive teaching and learning environment. The provision of reasonable accommodation for students with disabilities is a shared faculty and student responsibility. Students are expected to inform their professor of their need for accommodation; the professor and TA are expected to make the reasonable arrangements. If you have special needs, please contact Prof. Keutsch and your TA at your earliest convenience. If you have a condition that might result in a seizure, loss of consciousness, or other situation that might endanger your safety or the safety of others in the laboratory, please inform your TA.

The rest of this syllabus and the course schedule are in Moodle. Log in, go to Chem 109, and use the Course Info and other panels on the right to view and download the Syllabus, Assignment Schedule, and other resources. The full syllabus contains information about how your final grade will be calculated, among other things.

Learning Activities in Chemistry 109

Chemistry 109 has different learning activities to meet the needs of the many types of students in our class. You do not need to make use of every tutorial or do every study problem; rather, your job is to sample the different types of materials offered and to select those activities that most effectively support your learning. In the lecture, Prof. Keutsch will lecture, do demonstrations, or lead problem solving. In discussion section, your TA will engage a smaller group of students in problem solving, answer specific questions on the course material, and discuss the laboratory exercises. Finally, in lab you will explore chemical principles through hands-on experimentation. To supplement these activities, tutorials are provided to aid your mastery of the material. Attendance at the lectures and the discussion sections is strongly encouraged, but not required; students who consistently attend outperform those who do not. *Laboratory attendance is mandatory; students who do not attend will not pass this course*.

Lecture

In class Prof. Keutsch will provide an organizational framework, discuss principles, and present illustrations and demonstrations. He will not describe or explain everything you should learn; rather, he will indicate what topics you should study and provide insights into those topics. Lectures will also give you an opportunity to think about these topics and see whether you understand them. You should take notes during lecture; note taking should be an active, thinking process. Your notes should reflect your understanding of what you heard and saw. Prof. Keutsch will provide opportunities for you to test your understanding of particular concepts through in class questions. If there are particular concepts or ideas that are not clear to you feel free to ask Prof. Keutsch or your TA about them during class, after class, by email, or in office hours. Sample lecture notes taken by a Teaching Assistant (TA) will be posted in Moodle shortly after each lecture; don't rely on these notes in place of your own, but, if you need to miss a class, they are an acceptable substitute. Please do not expect to learn everything you need to know in the classroom; you will learn far better by working problems on your own or with a group of other students outside of class.

Textbook.

Using Your Textbook. We recommend that you read the assigned sections of the textbook prior to each lecture. For the printed textbook, the sections to read are listed in the course schedule for the date of each lecture. In the online textbook, each section is identified by the date of a lecture, so you would read the section "W Sep 4" before lecture the first week of classes. Take the time to carefully review the illustrations, equations, animations, videos, and graphs in the online textbook. Visualization is an important tool that chemists use to understand the world, especially when thinking about molecular structure. Try to make your reading an active process; keep track of those concepts that are confusing, so you will be able to pay especially close attention as those concepts are covered in class. As soon as possible after class, try to work the sample exercises without looking at the answers. When you understand the sample exercises, practice your problem solving skills by working the related online homework. Review the learning/exam objectives that relate to a given topic as you study.

Laboratory

Laboratory work is important to understanding and appreciating chemistry, and for those of us who love chemistry, lab work is really fun. The laboratory exercises are designed to illustrate the principles described in class, and the exams will include questions based upon the laboratory material. **To receive a passing grade in Chem 109, you must successfully complete *all* laboratory assignments and achieve an overall lab score of at least 60%**.

During the lab period you will carry out the experiment, take notes, and complete your data analysis. *All your work must be turned in at the end of your lab period, in the format specified in the lab manual or by your TA.* You will be evaluated on your pre-lab preparation, your in-lab experimental technique and data analysis, and on your ability to observe chemical phenomena and record your observations in your notebook. Each laboratory experiment will have its own criteria for grading and your TA will apply those criteria to evaluating your work.

ChemPages Laboratory Resource ChemPages is an interactive, Web-based encyclopedia of laboratory techniques. You will be able to access ChemPages from any computer on the campus network either from the General Chemistry web page, http://genchem.chem.wisc.edu/ under Materials for Lab, or from the Moodle course homepage under Lab Stuff. ChemPages contains multimedia demonstrations of the laboratory techniques that you will use in this course. For almost every laboratory one or two ChemPages sections will be assigned—see your lab manual to find out which they are. *You are required to view these pages before coming to lab.*

Discussion Section

Discussion sections are led by your Teaching Assistant for a group of 22 students. The discussion periods are for questions, help, review, and problem solving relevant to recent lectures, homework, laboratory experiments, computer exercises, and other assigned material. Discussion sections will be most helpful if you are prepared when you come to the class. You should have at least tried to work out the homework problems or the objective-keyed study questions from the text. Feel free to bring a printed copy of your homework with you, marked with areas where you need help; your TA has been instructed not to solve the specific problems that you have been assigned, but he or she will have a similar example for the class to solve together. Bring specific questions to ask; be sure you understand the questions asked by others and the answers given by your TA and fellow students. Your active participation in discussion will help you and your fellow students learn.

Exams

There will be three evening midterm exams of approximately 75 minutes each and a 2-hour final exam. Each midterm exam will cover the classroom, special assignment, and laboratory material up to that point in the course and since the previous exam. The final exam will be divided approximately equally between the material since the third exam and comprehensive coverage of the entire semester.

An early exam will be given before each midterm at 3:30 PM for students who have conflicts with the assigned time. Please note the exam dates on your calendar and avoid scheduling anything at those times. If you have an unavoidable conflict, contact your professor well in advance. (We are aware of a recurring conflict with certain sections of engineering courses: if you have this conflict, please notify your TA and professor.)

Midterm Exams:	Monday, Sept. 22	5:40 PM to 7:00 PM
	Monday, Oct. 20	5:40 PM to 7:00 PM
	Monday, Nov. 17	5:40 PM to 7:00 PM
Final Exam:	**Wednesday, Dec. 17**	**10:25 AM – 12:05 AM**

The room in which you will take each exam will be announced later. A review session will be held in lecture class before each exam. ***No make-up exams will be given, but appropriate accommodation will be made for all students to be fairly evaluated.*** **If you have any type of special need, options are available to take the exam at an alternate time or place; please contact Prof. Keutsch as soon as possible to make the arrangements.**

Learning Objectives, Study Questions and Practice Exams Learning objectives for each exam, and a selected set of study questions keyed to the learning objectives, can be found in the Exam Preparation Materials panel on the course homepage in Moodle. Exams given in Chemistry 109 in a prior year are available in the same location. The study questions are typical of those you should master and you should use them for extra practice in problem solving. In some cases your online homework will suggest that you work on specific study questions to make sure you understand a concept. If you do not understand how to solve one or more study questions, ask your TA in discussion section or during office hours.

How To Prepare For Exams A recommended strategy is: 1) review the learning objectives for the exam referring to your notes or the text if necessary, 2) work the study questions associated with each objective, spending more time on topics you find more challenging, 3) simulate the test taking situation by working the practice exam in 75 minutes in a quiet place, 4) have a partner "grade" your own test using the answer key as your guide while you "grade" the partner's work, 5) review those areas that you identify as weak, and then work the other questions on the practice test.

Online Homework

Each week you will have an online homework assignment in OWL. Each online homework assignment is worth 11 points. These assignments are available only in OWL; links to them appear under the week that they are due and they are also available through the Quizzes link. The Online Homework is due every Sunday at 11:55 PM; you can attempt **each question twice but submit the whole assignment only once. If you choose to use the second attempt at a question, you get the score you earn on the second attempt and forfeit any points earned on the first attempt**. Online homework can be done from any computer on the campus network. For online homework you are encouraged to form a study group and work with it to learn how to answer the questions; however, the work you submit must be your own.

To prevent loss of work, **it is wise to save your homework every 15 minutes or so**.

There are several useful things to know about online homework. 1) You will not get the same questions as other students do, although most of the questions on your homework will be on the same topics as those for other students. Each time you do the homework, you will get different questions, but similar to the first time, so you should read each question carefully and make certain you answer the questions you have the second time, not the ones you remember from the first time. 2) You can start a homework, print a copy of the questions, exit from OWL, answer the questions on paper, and go back at a later time to enter your answers into OWL. 3) You are strongly encouraged to ask other students, me, or your TA to help you to learn how to solve the types of problems found on the homework, but you must submit your own answers. 4) don't forget to submit! 5) Don't wait until the last minute before the deadline.

In order to for you to view tutorials and computer assignments (see next section), your computer must be configured appropriately. We have provided a **Practice Quiz** in Moodle that tests all the features you will need. In addition OWL has some introductory quizzes that make sure your computer is configured correctly for the OWL homework. You should do the practice quiz and OWL introductory quizzes on the computer you expect to use for online homework and pre-lab quizzes to make certain that on your computer you are able to view everything you need to see. If you cannot answer correctly, the Practice and OWL Quiz will tell you how to fix the problem.

There are also three Review Homework assignments to help you review material that will not be explicitly discussed in Chem 109 and should have been learned in your high school chemistry course. Two of them are due during the first and third weeks of classes; the third one is due in November.

Computer Assignments

Each of the three computer assignments (Excel Assignment; Window on the Solid State; four Biomolecules Tutorials, each with online quiz) has its own set of directions that will be mentioned in lecture and posted on the course Web site. It is your

responsibility to obtain the directions from the course Web site, follow them, and turn in each Computer Assignment on time. The Computer Assignments are to be turned in to your TA at the time indicated on the assignment and in the Course Schedule. The third Computer Assignment is a set of four Biomolecules Tutorials, each worth 5 points, that you will need to work through. Three Biomolecules Tutorials are due the same week and the fourth is due two weeks later; this is indicated in the course schedule. Each Biomolecules Tutorial has an accompanying quiz that you must complete successfully to receive credit for the tutorial. The score on the quiz is your score for the tutorial.

Student Board of Directors

The Student Board of Directors helps Prof. Keutsch to run the course and provides feedback from students on how the course is going. The Board consists of one representative from each discussion/lab section, chosen from the students in that section. The board will meet nearly every week at 4:35 PM on Mondays to discuss course policies, structure, and content. Meetings will take from half an hour to an hour depending on how much we have to discuss. Your TA will solicit volunteers for this role in your first discussion. If you are interested in serving as your class representative, send Prof. Keutsch an email (chem109fk@chem.wisc.edu) as soon as possible explaining why you would like to be a member of the board. Include your name, your email address, and your discussion section number (541, 542, 543, 544, 545, 546, etc.) in your message; if possible, include your TA's name.

Electronic Mail

All students at UW-Madison have access to free electronic mail through the university. We strongly recommend that while you are a student you use your @wisc.edu email address to send and receive email and forward your other email accounts to the @wisc.edu account. You are encouraged to contact Prof. Keutsch by email if you have questions about anything to do with the course. Electronic mail is available at all times of day and night, so you can send messages whenever something comes to mind. Do not, however, expect immediate responses in the middle of the night! Prof. Keutsch's email address is chem109fk@chem.wisc.edu. Whenever you send an email to Prof. Keutsch, please begin the subject line with "109". This can be followed by whatever the subject of the message is, such as "Homework 1, problem 4". Using 109 in the header will differentiate course emails from the many other emails that Prof. Keutsch receives.

What to Do If You Are Sick, Or Otherwise Unable to Attend an Exam or Lab

If you are unable to attend a specific lab session because of an unavoidable schedule conflict (such as a religious observance, an athletic activity, or a family obligation), contact your TA as soon as possible to reschedule. Make-up lab times can be accommodated only during the week when the entire class is doing a lab exercise, so planning ahead is important. If you find that you are unable to attend lab because you are ill, contact your TA as soon as possible. He or she will discuss your situation and decide what to do. **If circumstances arise unexpectedly that preclude your taking an exam, please contact your TA and professor before the scheduled exam time.** We recognize that in an emergency situation, you may not be able to contact us in a timely way.

Chemistry Resource Facilities: Computer Room, Study Room, Undergrad Chemistry Office

Computers are available for use in room 1375 Chemistry. Room 1371 is a study room for chemistry students. The staff in the Undergraduate Chemistry Office, room 1328, can assist you with enrollment, advising, and many other things.

Cell Phone Policy

If you bring a cell phone to class or lab, please turn it off for the duration of the class or lab period. If circumstances require that you be able to answer your cell phone during a class, please inform your instructor before the class.

Academic Misconduct

Academic misconduct includes and is not limited to acts in which a student seeks to claim credit for the work or efforts of another without authorization or citation, uses unauthorized materials or fabricated data in any academic exercise, forges or falsifies academic documents or records, intentionally impedes or damages the academic work of others, engages in conduct aimed at making false representation of a student's academic performance, or assists other students in any of these acts. Examples include but are not limited to: cutting and pasting text from the web without quotation marks or proper citation; paraphrasing from the web without crediting the source; using notes when such use is not allowed; using another person's ideas, words, or research and presenting it as one's own by not properly crediting the originator; stealing examinations or course materials; changing or creating data in a lab experiment; altering a transcript; hiding a book knowing that another student needs it to prepare an assignment; collaboration that is contrary to the stated rules of the course, or tampering with a lab experiment or computer program of another student (read the UW-Madison statement here). Each student in this course is expected to work entirely on her/his own while taking any exam, to complete assignments on her/his own effort without the assistance of others unless directed otherwise by the instructor or teaching assistant. If you have any questions about an assignment, please ask. Academic misconduct either in lab or lecture can result in assignment of "F" by the course instructors as the final grade for the student and any additional actions mandated by University policy.

Academic misconduct applies to laboratory work as well. In your lab manual, be sure to read pages xxiii-xxiv, which deal explicitly with situations you may encounter in laboratory. Before you can work in the laboratory you need to pass a quiz on academic honesty with a perfect score.

Grades

Your grade will be based on a maximum of 1000 points divided as follows:

Sixteen OWL Online Homeworks @ 11 points each *(see Course Assignment Schedule for due dates; includes both weekly and review homework assignments)*	176 points
Twelve Laboratories will make up 24% of the course grade* *(each week's experiment is listed in the schedule; point total includes Pre-Lab Quizzes in Moodle; you must score 60% in lab to pass the course.)*	240 points
Three Computer Assignments *(directions for each available in Moodle)* Window on the Solid State (5 points) Excel Assignment (5 points) Biomolecules Tutorials and Quizzes: (four @ 5 points each; total 20 points) *(due dates are listed in the schedule)*	30 points
Safety Quiz (*must be completed with a perfect score before your first lab*)	4 points
Academic Honesty Quiz (*must be completed with a perfect score before your first lab*)	4 points
Practice Quiz *(see course schedule for due date)*	4 points
End of Semester Survey *(see course schedule for due date)*	12 points
TA Personal Evaluation (*based on discussion and lab work*)	30 points
Three midterm exams @ 100 points each *(dates and times are listed in the course schedule)*	300 points
Final Exam *(date and time are listed in the course schedule)*	200 points
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Total	1000 points

*Each lab exercise will be graded as described in the laboratory manual. At the end of the semester we will scale the total number of lab points to obtain your final lab point total. If necessary, some grades may be normalized upward to a common scale at the end of the semester to minimize differences in grading practices among discussion/lab sections.

Letter Grades.

Final grades will be based upon the absolute scale shown below. If you score the number of points indicated, then you will receive the letter grade indicated, regardless of how many other students achieve the same grade. There is no curve. Therefore it is to your benefit (and to your friends' benefit) that you help other students learn and they help you learn. After each midterm exam you will be able to determine your probable grade by totaling your earned points, dividing by the total points possible at that time, multiplying by 1000, and comparing with this list.

A	900 points or more
AB	870 to 899 points
B	810 to 869 points
BC	780 to 809 points
C	650 to 779 points
D	600 to 649 points

If necessary some adjustments will be made at the end of the semester, but these adjustments will never lower your final letter grade, only raise it. Past experience in Chem 109 is that the class average is about 3.1 on a four-point scale—above a B average.

Class, Laboratory, and Examination Schedule, Fall 2014

Date	Subject	Reading (Moore)	Online Work / Moodle / OWL	Laboratory / Moodle Pre-Lab Quizzes
September				
W 3	Introduction; Relation of Chemistry and Biosciences	Review Ch. 1 Sec. 1-15 Ch. 2, Sec. 1-3, 7-8, 10-12, Ch. 3, App A, B	Begin working on Moodle Practice Quiz, Review Homeworks 1 and 2, and Homework 1 (see due dates below).	**No lab** this week. **Attend discussion section this week**. **Beginning assessment** in lab next week (5 pts)
F 5	Atomic Electronic Structure; Electron Configurations;	Ch. 5, Sec. 1-7 **Do reading before coming to lecture.**	**Moodle Practice Quiz and OWL Intro Assignments, Math Review and Review Homework 1** due **Sunday, Sep 7,** at 11:55 PM. Work on Moodle online quizzes: **Safety, Acad. Honesty**.	
M 8	Ion Electron Configs; Paramagnetism	Ch. 5, Sec. 8	**Online Homework 1** due Sunday night.	Citizenship in the Lab talk. Come to lab starting Tuesday, Sept. 9. Purchase lab manual, note-book, goggles; prepare for lab next week
W 10	Periodicity of Atomic Prop.; Ionic Bonding;	Ch. 5, Sec 9-13; Ch. 2, Sec. 4-6	Several tutorials are available via the Tutorials link in Moodle. These tutorials are optional but will be helpful for review of material you learned in high school. For this week, work on Fundamentals of Chemistry: Measurement Tutorials and Stoichiometry Tutorials.	
F 11	Solid-State Structures; Prop. Ionic Cpds.	Ch. 9, Sec. 4 (up to part c), 6-7;	**Online Homework 1** due **Sunday, Sep 14** at 11:55 PM	
			OWL Online Homework is *due Sunday by 11:55 PM each week.*.	
M 15	Covalent Bonding; Lewis Structures	Ch. 6, Sec. 1-5	Work on optional Chemical Reactions Tutorials this week. Work on **Homework 2** and **Review Homework 2** (due Sun.)	Check In; **Zinc and Iodine** experiment; complete **Safety, Acad. Honesty** quizzes before lab (2 quizzes; *perfect score required for* ***Safety, Acad. Hon.***)
W 17	Structures of Hydro-carbons; Isomerism	Ch.2, Sec. 9		
F 19	Review for Exam 1		**Online Homework 2** and **Review Homework 2** due **Sunday, Sep 21** at 11:55 PM	**Window on the Solid State, Parts 1-4** (access tutorial through Moodle); **due week of Sept. 22 at start of your lab**

M Sept. 22 **Exam 1 (5:40 – 7:00 PM, location to be announced); Ch. 2 (Sec. 2.9); Ch. 5 (all); Ch. 6 (Sec. 6.1-6.5); Ch. 9 (Sec. 9.4(up to part c), 9.6-9.7); Labs: Zn + I_2. Review material from two review homeworks and Ch. 1-3.**

Date	Subject	Reading	Online Work / Moodle / OWL	Laboratory
September				
M 22	Covalent Bonding; Bond Properties	Ch.6, Sec. 6-7	Work on **Online Homework 3 (**due Sun); Start working on Excel Assignment (directions in Moodle) due next week.	**Modeling Solid Structures/Alum Crystals. (Window on Solid State** due at start of lab this week.)
W 24	Formal Charge; Resonance; Exceptions to Octet Rule; Aromatic Compounds	Ch. 6, Sec. 8-11		
F 26	Molecular Shapes; VSEPR, Hybridization	Ch.7, Sec. 1-3	**Online Homework 3** due **Sunday** at 11:55 PM	
M 29	Structure and Polarity; Noncovalent Interactions	Ch. 7, Sec. 4-6	**Excel Assignment** due this week at start of discussion section; Work on **Online Homework 4 (**due Sun).	**Hydroxyapatite**
October				
W 1	Organic Chemistry; Fuels; Structure and Properties	Ch. 10, Sec. 1-3		
F 3	Functional Groups: Alcohols; Carboxylic Acids	Ch. 10, Sec. 4-5	**Online Homework 4** due **Sunday** at 11:55 PM	
M 6	Condensation reactions;	Ch. 10, Sec. 5	Work on **Online Homework 5 (**due Sunday)	**Molecular Structures**
W 8	Addition Polymers; Condensation Polymers	Ch. 10, Sec. 6,	Required biomolecules tutorials and quizzes Moodle) due at start of lab next week.	**Proteins 1, Proteins 2, DNA 1** (in Tutorials in
F 10	Structures of Biomolecules and Biopolymers	Ch. 1, Sec. 14; Ch.10, Sec. 7; Ch. 7, Sec. 7	**Online Homework 5** due **Sunday** at 11:55 PM	Biomolecules tutorials and quizzes **Proteins 1, Proteins 2, DNA 1** (in Tutorials in Moodle) due at start of lab next week.
M 13	Rates of Reactions Measuring Rates	Ch. 11, Sec. 1-2		**Biomolecules**
W 15	Rate Laws; Elementary Reactions	Ch. 11, Sec. 3-4		
F 17	Review for Exam 2		**Online Homework 6** due **Sunday** at 11:55 PM	

M Oct. 20 **Exam 2 (5:40 – 7:00 PM, location TBA); Covers Ch. 1 (Sec. 1.14), Ch. 6 (Sec. 6.6-6.11), Ch. 7 (all), Ch. 7 Sec. 7, Ch. 10 (all), Ch. 11 (Sec. 11.1-11.4). Labs: Solid Structures/Alum Crystals, Window on Solid State, Hydroxyapatite, Molecular Structures, Biomolecules**

Date	Subject	Reading	Online Work / Moodle / OWL	Laboratory
October				
M 20	Effect of Temperature	Ch. 11, Sec. 5	Work on **Online Homework 7 (**due Sunday)	**Prep. of Aspirin and Flavoring Esters**
W 22	Rate Laws for Elem. Reactions; Mechanisms of Reactions	Ch. 11, Sec. 6-7		
F 24	Multi-step mechanisms	Ch. 11, Sec. 8	**Online Homework 7** due **Sunday** at 11:55 PM	
M 27	Catalysis: Enzyme, Industrial	Ch. 11, Sec. 9-10	Work on **Online Homework 8 (**due Sunday)	**Kinetics of Crystal Violet**
W 29	Thermochemistry and calorimetry; Enthalpy and Hess's Law	Review Chapter 4		Biomolecules tutorial Enzymes and quiz due at start of lab next week.
F 31	Reactant/Product-Favored Processes	Ch. 16, Sec. 1-2	**Online Homework 8** due **Sunday** at 11:55 PM	
November				
M 3	Entropy	Ch. 16, Sec. 3	Biomolecules tutorial **Enzymes** and quiz due at start of lab this week. Work on optional Thermodynamics Tutorial	**Enzyme Kinetics**
W 5	Entropy and the Direction of Change	Ch. 16, Sec. 4-5		
F 7	Gibbs Free Energy	Ch. 16, Sec. 6	**Online Homework 9** and **Review Homework 3** due **Sunday** at 11:55 PM	
M 10	Chemical Equilibrium; Determining Equilib. Consts	Ch. 12, Sec.1-3		**Le Chatelier's Principle**
W 12	Using Equilibrium Constants; Le Chatelier's Principle	Ch. 12, Sec. 4-6, 8		
F 14	Review for Exam 3		**Online Homework 10** due **Sunday** at 11:55 PM	

M Nov. 17 **Exam 3 (5:40 – 7:00 PM; location to be announced); Covers Chapter 4 (review), Chapter 11 (Sec. 11.5-11.10), Chapter 12 (except Sec. 12.7) and Chapter 16 (Sec. 16.1-16.6); Lab: Aspirin, Iodine Clock, Enzyme Kinetics, Le Chatelier's Principle**

Date	Subject	Reading	Online Work / Moodle / OWL	Laboratory
November				
M 17	Gibbs Free Energy and K_{eq}	Ch. 16, Sec. 7-8	Work on **Online Homework 11** (due Sunday)	**Discovering Electrochemistry**
W 19	Gibbs Energy and Biological Systems; Thermodynamic and Kinetic Stability	Ch. 16, Sec. 9-11	Work on optional Acids and Bases Tutorials this week and next	
F 21	Acids and Bases	Ch. 14, Sec. 1-3	**Online Homework 11** due **Sunday** at 11:55 PM	
M 24	Acid-Base Equilibria	Ch. 14, Sec. 4-5, 7		Thanksgiving week—no lab
W 26	Acidity and Molecular Structure	Ch. 14, Sec. 6, 8		
F 28	Thanksgiving Break, Nov. 27-Nov. 30		Thanksgiving Break	Thanksgiving Break
December				
M 1	Lewis Acids and Bases; Buffer Solutions	Ch. 14, Sec. 9-10; Ch. 15, Sec. 1	Work on **Online Homework 12** (due Sunday)	**Chemical Equilibrium and Thermodynamics of a Ligand Substitution Reaction;**
W 3	Titration and Titration Curves	Ch. 15, Sec. 2		
F 5	Electrochemistry; Electrochemical Cells; Cell Voltage	Ch. 17, Sec. 1-4	**Online Homework 12** due **Sunday** at 11:55 PM	
M 8	Reduction Potentials; Reduction Potentials and ΔG	Ch. 17, Sec. 5-7	Work on **Online Homework 13 (**due **Friday—not Sunday**)	**Titrations;** Check out
W 10	Practical cells; Electrolysis	Ch. 17, Sec. 8-11	**End of Semester Survey** due Friday, Dec. 12, at 11:55 PM;	
F 12	**Special Summary Lecture**	Study for final exam	**Online Homework 13** due **TODAY** at 11:55 PM	

FINAL EXAM: Wednesday, Dec. 17, 10:05-12:05 PM. Rooms to be announced. Approximately half of the final covers all material in the course, and the other half covers material since the third midterm exam.