CHEMISTRY 109

Fall 2016

Read This Syllabus Today. Keep It for Future Reference.

Chemistry 109 is a one-semester, accelerated, first-year college course in chemistry. The goals 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? If you answer "yes" to all of the following questions, Chemistry 109 is the right course for you. 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. Your professor and your graduate teaching assistant (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: 1) read the assigned material in the textbook before each whole class session, 2) attend class and take your own notes, 3) as soon as possible after class, begin to work relevant 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. As you read, make notes about questions you have or points you don't understand; such questions may be entered in Piazza (see below) so that an instructor or a fellow student can help you gain insight.

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 must be completed by Sun. Sept. 11 and the second by Sun. Sept. 18. The third is due in early November. (See the course schedule for details.) 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 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 Learn@UW 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, with fully worked out answers, will be available for you to use in preparing for each exam. This course is designed to help you to learn as much chemistry as possible and to perform at the highest possible level. The pace is fast; you should be prepared to work considerably harder than in high school.

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 + OWLv2 w/ 24 Months MindTap eReader (you may get either a hardbound book or 3-hole punched pages that you would put in a notebook)

Lab Manual: *Chemistry 109 Laboratory Manual, Fall 2016,* Chemistry Department, UW-Madison: available only from Alpha Chi Sigma (the co-ed chemistry fraternity). Lab manuals will be sold out of the undergraduate chemistry computer lab (1375 Chemistry) through Sept. 16 and afterwards out of the first floor laboratory stockroom (room 1334). Cost is $20, **payable only by Wiscard**.

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, exams, and in the lab. You may use programmable calculators in this course.

Web-Based Course Materials and Class Emails

To access Web-based course materials, you must activate your UW-Madison NetID. You probably did this already. To activate your NedID, go to https://www.mynetid.wisc.edu/activate and follow the directions.

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 before the first whole class meeting. If you did not receive such an email, you are not registered or you are not reading your @wisc.edu emails. We use your @wisc.edu email for UW-Madison communications. You may forward @wisc.edu email to another account, but you must receive and read it regularly.

Technology Enhanced Learning: Learn@UW Moodle and Cengage OWLv2 Web Sites

Much Chem 109 material is available only via a course management system called **Moodle**. You automatically have access if you are enrolled in this course. You may use Moodle on your own computer, a friend's computer, or any other computer on campus. You may access the Chem 109 Moodle site via the Learn@UW Course Dashboard. From the main http://wisc.edu page, use the MyUW dropdown menu to select Learn@UW and log in with your NetID and password. On your Dashboard, you should see Chem 109-X in your current course list.

Homework in this course is provided online via **OWLv2**, a system associated with your textbook for which an access code is usually purchased with your textbook. In Moodle you will find directions for registering for OWLv2. **When you register for the first time in OWLv2, use your @wisc email for your email address and use your NetID as your Student ID.**

Each week a set of OWLv2 problems will be assigned for homework. There will be ungraded assignments as well. Login to OWLv2 as soon as possible and complete the **Introduction to OWLv2** assignment to get to know the system. Then work on **Review Homework 1**. These two assignments are **due at 11:55 PM Sun. Sept. 11**.

Safety Quiz and Academic Honesty Quiz

You must achieve a perfect score on a **Safety Quiz** and an **Academic Honesty Quiz** in Moodle by **11:55 PM Sun. Sept. 11**. Quizzes are listed under the first week's assignment. *If you read the orange 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 necessary arrangements. If you have special needs, please make an appointment to speak to your professor 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 Learn@UW Moodle. From the main UW page (http://www.wisc.edu/) select Learn@UW from the MyUW menu, log in and find Chem 109 in your current courses, and use the Course Info panel 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 important 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 attend every class, 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 whole class meetings, your professor will present information, do demonstrations, and lead problem solving. In discussion section, your TA will engage small groups of students in problem solving, and will answer specific questions on the course material. 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 whole class meetings and 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 fail this course.

Whole Class Meetings

In class your professor will provide an organizational framework, discuss principles, and present illustrations and demonstrations. Your professor will not describe or explain everything you should learn; rather, s/he will indicate what topics you should study and provide insights into those topics. You should take notes during class; note taking should be an active, thinking process. Your notes should reflect your understanding of what you heard and saw. Your professor 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, you may ask your professor or your TA about them during class, after class using Piazza, or in office hours. Soon after each class, working the related homework questions to build your problem solving skills. 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.

How to Use Your Textbook Read the assigned sections of the textbook prior to each whole class session. Take the time to carefully review the illustrations, equations and graphs in your 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, work the sample exercises without looking at the answers (which are at the end of the book in an appendix). When you understand the sample exercises, practice your problem solving skills by working the related study questions and online homework problems for that material. Review the learning/exam objectives that relate to a given topic as you study. At the end of each chapter you will also find a summary of important facts, concepts and operational skills that you should have mastered as you studied that chapter.

OWLv2 Homework

Each week you will have a homework assignment in OWLv2. Homework is due every Sunday at 11:55 PM; you may attempt each question up to three times and your highest score will count. 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 covered in your high school chemistry course. Homework may be done on any computer with Internet access. You are encouraged to form a study group and work with the group to learn the principles needed to answer the questions; however, the work you submit must be your own. If you have technical problems please email Dr. Rachel Bain at rbain@chem.wisc.edu. Include your name, this course number (Chem 109), and a description of the problem. Please post your chemistry content questions to Piazza.

There are several useful things to know about the 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. The second time you do the homework, you almost certainly will get different questions, but they will be similar to the first time. Be sure read each question carefully and make certain you answer the questions you get the second time, not the ones you remember from the first time. 2) You are strongly encouraged to ask other students, your professor, 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 to your specific questions. 3) Things that puzzle you about the homework may be entered as Piazza questions at any time. 4) It is possible to save your homework assignment and come back to it later. Use the “Save and Exit” button to do this. If you are interrupted and can’t finish an assignment, be sure to save it so as not to lose your work. 4) Each question in an assignment has a “Submit Answer” button. You have not completed a question until you click “Submit Answer”. 5) Until you click “Finish Assignment” you have not completed an assignment; don’t forget to click “Finish Assignment” before you close your browser. 6) **Don’t wait until the last minute before the deadline to do your homework!**

Biomolecules Tutorials and Quizzes

There are four Biomolecules Tutorials and four Biomolecules Quizzes, each worth 5 points, which you will need to complete. Links to the Biomolecules Tutorials and Quizzes will appear in Learn@UW Moodle for the week in which they are due. 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.

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%**. Coming to laboratory well prepared and strictly following all safety instructions given by your TA is essential. When in the laboratory you must act in a safe and professional manner. During the lab period you will carry out the experiment, take notes, and complete your data analysis. 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.

ChemPages Laboratory Resource ChemPages is a Web-based encyclopedia of laboratory techniques. You may access ChemPages from the Learn@UW Moodle course page under Lab Stuff. ChemPages contains multimedia demonstrations of laboratory techniques. One or two ChemPages sections will be assigned for most lab exercises (see your lab manual). (If you are off campus, you must use a VPN, a campus network emulator, to access the ChemPages. You may obtain the VPN software from DoIT.)

Discussion Section

Your TA will lead discussions for a group of 22 students. For each discussion (except the first week of classes and Thanksgiving week) there will be a **Pre-Discussion Worksheet** posted in Learn@UW Moodle. **You must turn in your completed worksheet at the beginning of your discussion class period.** After evaluating the pre-class worksheets with the class, your TA will guide you in structured problem solving activities. Discussions will be most valuable if you are prepared when you come to the class. You should have at least tried to work the online homework problems or the objective-keyed study questions from the text. 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 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. A review session will be held before each exam. **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 and Oct. 24 is a Jewish holiday: if you have either of these conflicts, please notify your TA and professor.)

Midterm Exams:	Mon. Sept. 26	5:40 PM to 7:00 PM
	Mon. Oct. 24	5:40 PM to 7:00 PM
	Mon. Nov. 21	5:40 PM to 7:00 PM
Final Exam:	**Fri. Dec. 23**	**2:45 PM – 4:45 PM**

***No make-up exams will be given, but appropriate accommodation will be made for all students to be fairly evaluated.* If you have special needs, options are available to take the exam at an alternate time or place; please contact your professor or follow his/her instruction prior to the first exam to make the arrangements.** Exam rooms will be assigned later.

Learning Objectives, Study Questions and Practice Exams Learning objectives for each exam, and a selected set of study questions keyed to the learning objectives, may be found in the Exam Preparation Materials panel on the Learn@UW Moodle page. Two practice exams 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. If you do not understand how to solve these problems, ask your TA in discussion 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 as necessary, 2) work the study questions associated with each objective, spending more time on topics that you find 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 test using the answer key as your guide while you “grade” the partner’s work, 5) review those areas that you identify as weak.

Student Advisory Board

The Student Advisory Board helps your professor 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 to discuss course policies, structure, and content. Meetings will typically be 30 minutes long. Your professor will announce the meeting time and your TA will solicit two volunteers for this role, one representative and one alternate, in your first discussion.

Communicating with Your Professor

There are two types of communications: individual questions/comments that are intended to be seen only by you and your instructor (such as the reason you need to miss a class) and questions about chemistry content where the responses will be useful to everyone in the class.

Individual Questions about Course Organization. For the first type of communication we strongly recommend that 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 your professor by email if you have questions about anything to do with the operation of the course. As a reminder, a professional email contains a proper salutation, a concise description of the background and a well-articulated question. Emails that do not follow these criteria may not be answered. Professors Burstyn and Garand use specific email addresses to communicate with students in this class; please use those addresses if you expect to get an answer (emails to their other addresses may get buried). Professor Hermans requests that you begin your subject line with "109" when you send email so that he may locate class messages.

Questions about Chemistry. For questions about course content, please use Piazza. To access Piazza, use the link in Learn@UW Moodle. Piazza is a wiki-like question-and-answer system in which you may enter your chemistry question and it may be answered by another student in the class, by a TA, or by your professor. In Piazza you will find a set of categories. Choose the one that best fits your question and enter your question there. The Piazza system makes it possible for anyone in the course to answer your question, so you may expect a response fairly soon no matter when you enter your question. Most importantly, everyone in the class benefits from seeing the answers to all questions. **Please use Piazza for all chemistry questions.**

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. Notify your professor and TA of unavoidable exam conflicts as soon as possible. **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 or silence it 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 sit in the back of the room near the exit and put your phone to vibrate. Leave the room before answering your phone.

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

academic misconduct 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 professor or TA. If you have any questions about an assignment, please ask. Academic misconduct either in lab or lecture may result in a penalty consistent with university policy.

Grades

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

Introduction to OWLv2 Assignment	5 points
Safety Quiz and **Academic Honesty Quiz** (2 @ 6 points each)	12 points
Best 15 of 16 OWLv2 Homeworks (15 @ 10 points each)	150 points
13 Pre-Discussion Worksheets (13 @ 5 points each)	65 points
12 Laboratory Exercises* (12 @ 20 points each)	240 points
4 Biomolecules Tutorials and **Quizzes** (4 @ 7 points each)	28 points
3 midterm exams @ 100 points each	300 points
Final Exam	200 points
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Total	1000 points**

* Laboratory work will make up 24% of the course grade. The lab exercises will be worth 20 points each. 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 lab sections.

** We will be piloting a Learning Analytics tool called Pattern this semester. Pattern is an app in which you can track your study habits whose purpose is to help you to improve your learning outcomes. If you consistently log your studying and complete a survey at the end of the semester, you will be eligible for 5 extra credit points.

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 (forced grading distribution); 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. If necessary minor 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—slightly above a B average.

A	900 - 1000 points	(90%)
AB	870 - 899 points	(87%)
B	830 - 869 points	(83%)
BC	780 - 829 points	(78%)
C	680 - 779 points	(68%)
D	550 - 679 points	(55%)
F	<550 points	(<55%)

Unit I Schedule: Chemistry 109-1 & 2, Fall 2016, Prof. Ive Hermans, Prof. Judith Burstyn

Week	*Class/Date*	*Subject*	*Reading**	*Assignments and Quizzes*	*Laboratory*
1	**1/** W Sept 7	Introduction and Review	Ch.1 Sec. 1-15 Ch. 2 Sec. 1-8, 10-12 Ch. 3: Sec. 1-12 Appendix A Appendix B	**Academic Honesty & Safety Moodle Quizzes completed with a perfect score by Sun. Sept. 11, 11:55 pm** **Introduction to OWL due Sun. Sept. 11, 11:55 PM** **Review Homework 1 due Sun. Sept. 11, 11:55 PM**	Check In Citizenship in the Lab
	2/ F Sept 9	Atomic Structure, Electron Configurations	Ch. 5: Sec. 1-6		
2	**3/** M Sept 12	Atomic Structure, Electron Configurations	Ch. 5: Sec. 7-8	**Pre-Discussion Worksheet 1 due in discussion** **Homework 1 due Sun. Sept. 18, 11:55 PM** **Review Homework 2 due Sun. Sept. 18, 11:55 PM**	Zinc & Iodine
	4/ W Sept 14	Periodic Properties, Ionic Bonding	Ch. 5: Sec. 9-12 Ch. 2: Sec. 4-6		
	5/ F Sept 16	Periodic Properties, Ionic Bonding	Ch. 5: Sec. 9-13 Ch. 2: Sec. 4-6		
3	**6/** M Sept 19	Covalent Bonding; Lewis Structures	Ch. 6: Sec. 1-5	**Memorize names of first 10 alkanes**, Table E.1, Appendix E, p A.25 **Pre-Discussion Worksheet 2 due in discussion** **Homework 2 due Sun. Sept. 25, 11:55 PM**	Investigation of Hydroxyapatite
	7/ W Sept 21	Covalent Bonding: Structures of Hydrocarbons	Ch. 2: Sec. 7 & 9 Appendix E		
	8/ F Sept 23	Catch up & Review: Exam I			
	Mon. Sept. 26 Exam I 5:40-7:00 pm Location to be determined. Individual section assignments will be provided.				

*Readings are from the specified chapter in the textbook unless otherwise noted. Other material is posted in Moodle. Please complete all readings before the whole class meeting.

Unit II Schedule: Chemistry 109-1 & 2, Fall 2016, Prof. Ive Hermans, Prof. Judith Burstyn

Week	*Class/Date*	*Subject*	*Reading**	*Assignments and Quizzes*	*Laboratory*
4	**9/** M Sept 26	Covalent Bonding: Bond Properties	Ch. 6: Sec. 6-7	**Memorize class names, general formulas**, Table E.2, Appendix E, p. A28 **Pre-Discussion Worksheet 3 due in discussion** **Homework 3 due Sun. Oct. 2, 11:55 PM**	Molecular Structures
	10/ W Sept 28	Covalent Bonding: Applications in Organic and Inorganic Molecules	Ch. 6: Sec. 8-11		
	11/ F Sept 30	Covalent Bonding: Molecular Shape	Ch. 7: Sec. 1-4		
5	**12/** M Oct 3	Intermolecular Interactions	Ch. 7: Sec 5-6	**Pre-Discussion Worksheet 4 due in discussion** **Homework 4 due Sun. Oct. 9, 11:55 PM**	Esters and Amides: Preparation of Tylenol and Select Flavoring Agents
	13/ W Oct 5	Organic Chemistry: Properties of Fuel Hydrocarbons	Ch. 9: Sec. 1 Ch. 10: Sec. 1-3		
	14/ F Oct 7	Organic Chemistry: Functional Groups	Ch. 10: Sec. 4-5		
6	**15/** M Oct 10	Organic Chemistry: Condensation & Addition Reactions, Polymers	Ch. 10: Sec. 6	**Biomolecules Tutorial: Proteins 1 & Proteins 2** (including debriefing) **Proteins 1 & 2 Moodle quiz due Sun. Oct. 16, 11:55 PM** **Biomolecules Tutorial: Lipids & Carbohydrates** (including debriefing) **Lipids & carbohydrates Moodle quiz due Sun. Oct. 16, 11:55 PM** **Pre-Discussion Worksheet 5 due in discussion** **Homework 5 due Sun. Oct. 16 11:55 PM**	Structures of Biomolecules
	16/ W Oct 12	Biomolecules: Proteins and Fats	Ch. 10: Sec. 5 & 7		
	17/ F Oct 14	Biomolecules: Starches and Nucleic Acids	Ch. 10: Sec. 7 Ch. 7: Sec. 7 Ch. 1: Sec. 14		
7	**18/** M Oct 17	Kinetics: Reaction Rates and Rate Laws	Ch. 11: Sec. 1-3	**Biomolecules Tutorials: DNA 1 & DNA 2** (including debriefing) **DNA 1 & 2 Moodle quiz due Sun. Oct. 23, 11:55 PM** **Pre-Discussion Worksheet 6 due in discussion** **Homework 6 due Sun. Oct. 23, 11:55 PM**	Neutron Activation of Silver
	19/ W Oct 19	Kinetics: Radioactive Decay	Ch. 18: Sec 1-5		
	20/ F Oct 21	Catch up & Review: Exam II			
	Mon. Oct 24 Exam II 5:40-7:00 pm Location to be determined. Individual section assignments same as for Exam 1.				

*Readings are from the specified chapter in the textbook unless otherwise noted. Other material is posted in Moodle. Please complete all readings before the whole class meeting.

Unit III Schedule: Chemistry 109-1 & 2, Fall 2016, Prof. Ive Hermans, Prof. Judith Burstyn

Week	*Class/Date*	*Subject*	*Reading (text)*	*Assignments and Quizzes*	*Laboratory*
8	**21/** M Oct 24	Kinetics: Concentration & Temperature	Ch. 11: Sec. 4-6	**Biomolecules Tutorial: Enzymes** (including debriefing) **Enzymes Moodle quiz due Sun. Oct. 30, 11:55 PM** **Pre-Discussion Worksheet 7 due in discussion** **Homework 7 due Sun. Oct. 30, 11:55 PM**	Kinetics of Crystal Violet
	22/ W Oct 26	Kinetics: Elementary Reactions	Ch. 11: Sec. 4-6		
	23/ F Oct 28	Kinetics: Reaction Mechanisms	Ch. 11: Sec. 7		
9	**24/** M Oct 31	Kinetics: Catalysis	Ch. 11: Sec. 8-10	**Review Homework 3 due Sun. Nov. 6, 11:55 PM** **Pre-Discussion Worksheet 8 due in discussion** **Homework 8 due Sun. Nov. 6, 11:55 PM**	Enzyme Kinetics
	25/ W Nov 2	Thermodynamics: Enthalpy	Ch. 4 Ch. 9: Sec. 2, 3 & 3a (only), 4, 5		
	26/ F Nov 4	Thermodynamics: Entropy	Ch. 16: Sec. 1-5		
10	**27/** M Nov 7	Thermodynamics: Reaction Spontaneity & Gibbs Free Energy	Ch. 16: Sec. 6	**Pre-Discussion Worksheet 9 due in discussion** **Homework 9 due Sun. Nov. 13, 11:55 PM**	Chemical Equilibrium and LeChatelier's Principle
	28/ W Nov 9	Chemical Equilibrium	Ch. 12: Sec. 1-4		
	29/ F Nov 11	Chemical Equilibrium	Ch. 12: Sec. 5-7		
11	**30/** M Nov 14	Chemical Equilibrium K_{eq} and Spontaneity	Ch. 12: Sec. 8 Ch. 16: Sec. 7	**Pre-Discussion Worksheet 10 due in discussion** **Homework 10 due Sun. Nov. 20, 11:55 PM**	Chemical Equilibrium and Thermodynamics
	31/ W Nov 16	Applications; Kinetic versus Thermodynamic Stability	Ch. 16: Sec. 8-11		
	32/ F Nov 18	Catch up & Review: Exam III			
	Mon. Nov 21 Exam III 5:40-7:00 pm Location to be determined. Individual section assignments same as for Exams 1 & 2.				

*Readings are from the specified chapter in the textbook unless otherwise noted. Other material is posted in Moodle. Please complete all readings before the whole class meeting.

Unit IV Schedule: Chemistry 109-1 & 2, Fall 2016, Prof. Ive Hermans, Prof. Judith Burstyn

Week	*Class/Date*	*Subject*	*Reading (text)*	*Assignments and Quizzes*	*Laboratory*
12	**33/** M Nov 21	Acids & Bases: Definitions, Acidity and Molecular Structure	Ch. 14: Sec. 1-6 Review Ch. 3: Sec. 4	No homework this week	No lab this week
	34/ W Nov 23	Acid/Base Equilibria: Strong and Weak Acids & Bases	Ch. 14: Sec. 7-8		
	F Thanksgiving Break				
13	**35/** M Nov 28	Acid/Base Equilibria: Strong and Weak Acids & Bases	Ch. 14: Sec. 9-10	**Pre-Discussion Worksheet 11 due in discussion** **Homework 11 due Sun. Dec. 4, 11:55 PM**	Electrochemical Cells – A Discovery Exercise
	36/ W Nov 30	Acids and Bases: Buffers and Titrations	Ch. 15: Sec. 1-3		
	37/ F Dec 2	Acids and Bases: Buffers and Titrations	Ch. 15: Sec. 1-3		
14	**38/** M Dec 5	Electrochemistry: Redox Reactions	Review Ch. 3: Sec. 5 Appendix F	**Pre-Discussion Worksheet 12 due in discussion** **Homework 12 due Sun. Dec 11, 11:55 PM**	Titrating to Establish an Unknown Molecular Weight Check Out
	39/ W Dec 7	Electrochemistry: Electrochemical Cells	Ch. 17: Sec. 1-4		
	40/ F Dec 9	Electrochemistry: Cell Potential and Gibbs Free Energy	Ch. 17: Sec. 5-7		
15	**41/** M Dec 12	Electrochemistry: Applications	Ch. 17: Sec. 8-12	**Pre-Discussion Worksheet 13 due in discussion** **Homework 13 due Thurs. Dec 15, 11:55 PM**	No lab this week
	42/ W Dec 14	Catch up & Review: Final Exam			
16	**Fri. Dec 23 FINAL EXAM 2:45-4:45 pm Location to be determined. Individual section assignments will be provided.**				

*Readings are from the specified chapter in the textbook unless otherwise noted. Other material is posted in Moodle. Please complete all readings before the whole class meeting.