

Chemistry 104-5—Spring 2012

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| Course Credit: | 5 credit hours | Phone: | (608) 890-0794 |
| Lecture: | 3:30 – 4:20 p.m., MWF | E-mail: | szczech@chem.wisc.edu |
| Location: | 1351 Chemistry | | (Use subject line: Chem 104-5) |
| Lecturer: | Dr. Jeannine R. Szczech | Office Hours: | TBA (See Learn@UW Homepage) |
| Office: | Chemistry 4227 | Learn@UW: | http://learnuw.wisc.edu/ |

Chemistry 104 is the second semester course in the two-semester sequence. Chemistry 103 and 104, providing a general survey of chemical principles and facts, are prerequisites for advanced courses such as Organic Chemistry (341 or 343) and Analytical Chemistry (327 or 329).

The prerequisite for Chemistry 104 is Chemistry 103, and it is assumed that you took this course last semester. If your situation is different, you may need to put in extra effort at the beginning of the semester to gain the necessary background. Proficiency in manipulating equations, including the use of exponents, logarithms and antilogarithms is essential—if your math proficiency is not at a satisfactory level, you will find it difficult to solve many of the chemical problems you will encounter in this course.

REQUIRED MATERIALS

Textbook: *Chemistry: The Central Science with MasteringChemistry Technology Kit*, 12th Edition. This text book and technology kit is sold only at the University Bookstore, Underground Textbook Exchange and Beat the Bookstore.

Lab Manual: *Chemistry 104 Laboratory Manual*, Spring 2012, Department of Chemistry, UW-Madison, sold (for cash only, \$15) in Chemistry Building starting the first day of class.

Lab Notebook: 100 page carbonless lab notebook available at local bookstores and in the Chemistry Building. You may use the remaining pages in your Chemistry 103 lab notebook if you desire.

Safety Goggles: Industrial quality eye protection is required at all times when you are in the lab. Safety goggles that fit over regular glasses can be purchased at local bookstores. Contact lenses should not be worn in the laboratory because fumes or splashes may be caught between them and your eye. Safety rules are posted on your laboratory door.

Calculator: An inexpensive calculator having capabilities for square roots, logarithms and exponentiation (antilogarithms), and exponential (scientific) notation operations is required. It is advantageous to purchase a calculator that is capable of solving the quadratic formula, if possible. ***Programmable (graphing) calculators will not be allowed on exams.***

USB Drive: You should bring a USB drive with you to the laboratory so you can save your experimental data.

UW Copy Card: Printing lab reports, graphs, data, etc. in the Chemistry Library or the computer room requires a copy card. Copy cards can be purchased in any campus library, including the Chemistry Library (Room 2361).

i-Clickers: We will be using an i-Clicker in the lecture portion of this course. You can purchase an i-Clicker at the bookstore. You will need to register your i-Clicker, and we have placed a registration box on the course home page on Learn@UW. Click on the registration box and follow the instructions to register your i-Clicker. We will track individual student participation, so it's important to register you i-Clicker!

LEARN@UW

The Chemistry 104 Learn@UW web site contains a course schedule with assigned homework, lecture notes, supplementary reading, on-line quizzes and other material. YOU ARE RESPONSIBLE checking the site frequently throughout the semester, accessing the materials you need, and printing out anything you need in hard-copy form.

Practice Quiz: Much of the material for this course is ONLY AVAILABLE via Learn@UW. For this reason, it is imperative that you have access to a computer (yours, a friend's, or one in a computer lab) that is correctly set up to interface with Learn@UW. Login to Learn@UW from the computer you intend to use to access the site and take the Practice Quiz. The questions are not intended to test your knowledge of any subject, only to verify that the computer you are using is set up correctly. If you have trouble getting your own computer to do the Practice Quiz, use a computer in the chemistry building's computer lab (Room 1375). The Practice Quiz will be available to you throughout the semester, should you change computers and need to ensure all the functions work.

LECTURE AND DISCUSSION

Lecture. Lectures organize the material, outline goals, cover the basic principles of each topic and present illustrations and demonstrations. The lecture is not intended to describe or explain everything you will learn in the course; rather, it will indicate important topics to study and will give you an opportunity to think about these topics and see if you understand them. You should take notes during lecture that reflect your understanding of what you heard and saw. My lecture notes will be posted online at the course homepage after each lecture.

Lecture Etiquette. Given the size of our lecture, it's important that we all follow some basic etiquette rules. Do not engage in other activities (such as texting, talking, surfing the web, watching videos on your computer, reading the newspaper, etc.) during lecture or discussion, as these activities are disruptive and distracting to those around you. **The use of laptops, cell phones, and other electronic devices is strictly prohibited in the lecture hall.** If you need to make a phone call, check your email, etc., please exit the lecture hall quietly to do so. If you bring a cell phone to class or lab, turn it off for the duration of the class or lab period. If your phone rings during lecture, discussion, or lab, you may be asked to leave. Students who demonstrate a disregard for other students' right to learn during lecture will be asked to leave, and Dr. Szczech may request a meeting to discuss poor lecture behavior. **Lecture ends at 4:20 p.m.;** do not pack up early, as it creates a lot of noise and can prevent your classmates from hearing the lecture.

Demonstrations. The UW-Madison Chemistry Department has a longstanding tradition of using lecture demonstrations to help students understand chemistry. When a demonstration is done in class, observe what happens and make certain that you understand the principles the demonstration is designed to illustrate. If you do not, ask questions, either in lecture or in your discussion section. All demonstrations are important and questions about demonstrations may appear on exams.

Discussion Section. A group of about 24 students constitutes a discussion and laboratory section supervised by a teaching assistant. Discussion sections are for discussion, review, problem solving relevant to recent lectures, and preparation and review of laboratory experiments. **Be prepared** when you come to the discussion class. You should work out the homework problems for a given week, and you should expect to be called upon by your TA to discuss solutions to these problems. Do not expect your TA to lecture, but rather to lead discussion and encourage interaction among all students present.

On-Line Quizzes. Quizzes will be given online at the Learn@UW website. They will cover the material presented in lecture since the previous quiz. There are a total of 14 quizzes, of which the 12 highest scores will count towards your course grade. See the course schedule at the end of the syllabus for the quiz schedule. Quizzes must be completed by Tuesday evenings no later than 6:00 p.m. on the week they are due, and they will be available on Learn@UW at 12:00 p.m. on the Sunday before the due time. You may take each quiz up to two times, and the **average** of your two scores will be the score recorded. All quiz questions are chosen at random—if you choose to take a quiz the second time, it is likely that you will not be given the same questions. **YOU MUST WORK ALONE ON QUIZZES,** and you may not ask for help from your friends or your TA. You may use your

notes and textbook if you wish. The quizzes have a 30 minute time limit, so you must be fully prepared and confident with the material before beginning the quiz. Both the "Time Limit" and "Time Left" are displayed in the upper left corner of your web browser during the quiz—you must submit the quiz before the "Time Left" reaches 0:00:00. **Please note:** you are responsible for double-checking that you have entered the correct answers before submitting your quiz—grades will not be changed if you accidentally submit an incorrect answer. If you forget to take a quiz, a score of zero will be recorded for that quiz.

On-Line Homework. There will be online “Mastering Chemistry” homework sets due once each week during the semester—see pages 7 – 8 of the syllabus for a complete schedule. These homework problems are accessed through the website www.masteringchemistry.com, or linked to from Learn@UW. If you did not register with MateringChemistry for Chemistry 103, you will need to register for the website using the access code included with your textbook. If you registered for Chemistry 103, you will just need to join our course using the course code provided in lecture. Scores greater to or equal to 80% will get full credit of 6 points. Scores lower than 80% will be adjusted to a 6 point scale. For example, a score of 75% will be entered as 4.56 in Learn@UW. Homework scores will be imported into Learn@UW, typically within one week of the homework deadline. You are highly encouraged to begin working on the homework problems early—do not wait until the last minute to begin your homework. On-line homework must be completed by Saturday evenings no later than 6:00 p.m. on the week they are due.

Participation Points. History shows that attendance and participation are highly correlated with material comprehension and good grades. At the end of the semester, your TA will assign up to 20 participation points, which will consider both your attendance and quality of participation during discussion. Thus, it behooves you to attend and actively participate in discussion and lab session, and to seek help from your TA when you have questions. **Students who attend fewer than half of all discussion sessions will receive a score of zero for their participation points.** See the “Participation Points Evaluation Criteria” document in the "Course Information and Policies" section of Learn@UW for more information.

Exams. There will be three 50-minute exams given during the lecture period, and a two hour final exam. Exam rooms will be announced one week before each exam—due to room scheduling constraints, the midterm exams are limited to 50 minutes in length. **No make-up exams will be given. If you are facing a medical emergency, you must contact Dr. Szczech as soon as possible—see the Absence Policy document posted under the Content tab on Learn@UW for more information.** Exams will include questions on material covered in the lectures, discussion, laboratory, and the assigned reading. The final exam will cover topics from the entire semester, but it will be weighted more heavily toward material covered in the final segment of the course. A sheet of equations and constants will be provided with each exam, and this sheet will be available on Learn@UW before the exam. You are encouraged to download the equation sheet and verify that you understand how to use each equation and what each constant or variable in the equation represents.

The exam schedule is:

| | | |
|------------|------------------------|------------------|
| Exam 1 | Wednesday, February 22 | 3:30 – 4:20 p.m. |
| Exam 2 | Wednesday, March 21 | 3:30 – 4:20 p.m. |
| Exam 3 | Wednesday, April 25 | 3:30 – 4:20 p.m. |
| Final Exam | Saturday, May 19 | 7:45 – 9:45 a.m. |

Students must take all exams with the lecture section they are enrolled in. Exams taken with another section **will not be accepted for credit** in this course.

LABORATORY

The laboratory is a vital part of this course. In the laboratory, you will develop skills that are not easily learned or demonstrated in lecture and discussion. These skills include:

- Designing experiments
- Learning proper laboratory techniques
- Using laboratory equipment properly

- Developing methods for interpreting and analyzing data
- Communicating your ideas about an experiment, through discussion and writing

Safety Quiz. The safety quiz on Learn@UW must be completed **no later than Friday, January 27, by 5:00 p.m.** There is no limit on how many quiz attempts a student may make, and a score of 5/5 is required to pass the quiz. Any student who does not pass the safety quiz by January 27 at 5:00 p.m. ***will not be permitted to participate in any of the laboratory exercises.***

Academic Honesty Assignment. This assignment is found in the Quiz section on Learn@UW. It must be completed **no later than Friday, January 27, by 5:00 p.m.** Before taking the quiz, you should read “Academic Integrity in the Sciences”. In addition to the online component, you must also read the pages xxiii-xxiv in the lab manual, sign the tan form, and submit this to your TA at the beginning of the first lab period (lab check-in). ***You will not be permitted to participate in any of the laboratory exercises until both portions of this assignment have been completed.***

Laboratory Assignments. There are eleven in-lab assignments. The lab schedule can be found below and on page 5 in this syllabus. Instructions for these labs and a description of the grading rubric are described in the lab manual. Please note: **THE USE OF CELL PHONES IN THE LAB IS STRICTLY PROHIBITED.**

Before the Laboratory Period. In the lab manual, read the section entitled “Preparing Yourself for this Experiment” and carry out the directions given. Notice that this section directs you to additional sources of information (“In the Textbook”, “On the Web” and “In the Manual”) that should be read.

Lab Notebook Preparation. In addition to reading the experiment and understanding the material, you must prepare your laboratory notebook before coming to the laboratory. Notebook preparation includes writing a purpose statement, procedure, relevant equations, all data tables required for the experiment, and marking areas to take experimental observations during the lab. All pre-lab calculations and questions must also be answered in your lab notebook. An example of a prepared notebook is provided in the lab manual on pages xxxvii – xxxviii. Your notebook **MUST BE PREPARED** when you arrive to lab. Your TA will check your notebook at the beginning of the lab session to make sure these requirements are met. If you arrive without a properly prepared notebook, ***you will be asked to leave the lab*** to correct this. Points will be deducted from your lab score for that assignment in accordance with the percentage of the procedure you were unable to participate in while preparing your lab notebook, **and you may not be permitted to perform the lab.**

Safety in the Laboratory. Read the ‘For Your Safety’ section in the lab manual before you come to lab. It describes safety information specific to that experiment. **SAFETY GOGGLES, LONG PANTS, AND STURDY SHOES ARE REQUIRED FOR EVERY EXPERIMENT.** No contact lenses! No sandals! No moccasins! Failure to wear safety goggles in the laboratory is grounds for dismissal from lab, with no provision to make up the work you miss. If you arrive to laboratory in inappropriate attire, you will be sent home to change.

Attendance and Punctuality. Unless you are formally excused, you must attend all laboratory sessions. There are no procedures to make-up laboratories you miss, and a grade of zero will be recorded for all unexcused absences. If you have an extenuating circumstance that will require you to miss lab, notify your TA as soon as possible *before* the lab period, and receive confirmation from your TA that your absence meets the requirements for being excused. More details may be found in the "Absence Policy" document on Learn@UW. ***You must earn at least 60% of the possible lab points AND complete a minimum of 9 regular labs (plus the LabQuest Exercise) to pass this course.*** You are required to arrive to lab on time. Your TA will review safety information and any modifications to the experiment at the start of the lab period. If you are late and miss part/all of their discussion, you ***may not be allowed to enter the laboratory to perform the experiment.***

Reports. Most lab reports are due at the end of the lab session; your TA will specify when lab reports are due. A late penalty will be assessed against late lab reports; the late penalty schedule is detailed in the "Late Assignment Policy" document in the "Course Information and Policies" section of Learn@UW. If you place a lab report in your TA's mailbox, it is ***your responsibility*** to send your TA an email notifying them—lab reports turned in without email notification may not be accepted for credit.

Mailboxes. All TAs have a mailbox in the Shain Tower. Any assignments submitted to your TA via the mailboxes must be accompanied by an email notifying them. The student is responsible for ensuring that the TA has been notified—any assignment submitted to a TA mailbox without email notification *may not be accepted for credit*. Be sure you place your assignment in the correct mailbox—assignments placed in another TA's mailbox are not counted as having been submitted to your TA.

LABORATORY ASSIGNMENTS

| Lab Assignment | Week | Lab Chapter |
|---|-------------|-------------|
| LabQuest Introduction & Check In | January 23 | Handouts |
| Molecular Structures | January 30 | 1 |
| Preparation of Aspirin and Some Flavoring Esters* | February 6 | 2 |
| Synthesis of Biodiesel | February 13 | 3 |
| No Lab | February 20 | — |
| Iodine Clock | February 27 | 6 |
| Kinetics of Crystal Violet | March 5 | 5 |
| Chemical Equilibrium & Le Châtelier's Principle* | March 12 | 8 |
| No Lab | March 19 | — |
| Chemical Equilibrium & Thermodynamics | March 26 | 7 |
| No Lab | April 2 | — |
| Acid & Base Solutions | April 9 | 9 |
| Copper Ammine Compounds | April 16 | 10 |
| No Lab | April 23 | — |
| Redox Titration | April 30 | 11 |
| Electrochemical Cells & Check-Out | May 7 | 12 |

* Lab report will be a full, type-written lab report.

RESOURCES

Electronic Mail (e-mail). I am a resource! Contact me via e-mail if you have questions or comments about the course, concerns about your performance, or the work you are doing. I will try to respond to all messages, either directly via e-mail or, when appropriate, in the next lecture. I usually answer messages within 24 hours. My email address is: szczech@chem.wisc.edu **Include “Chem 104-5, Section #___” in your subject line to guarantee that your email will be read/replied to.**

Chemistry 104 Homepage on Learn@UW. Resource material for this lecture section is available at Learn@UW. The homepage for my lecture section includes: the course syllabus, overheads used for each lecture, quizzes, and copies of handouts. We will also use Learn@UW for educational quizzes and surveys, and to keep track of course grades.

General Chemistry Website (<http://genchem.chem.wisc.edu/>). Resource materials for general chemistry students are available on the General Chemistry website.

Study Groups. You are strongly encouraged to collaborate with other students on homework assignments and laboratory discussion questions. For many students, study groups are very helpful. **Unless informed to the contrary, you must turn in your own write-up using your own words (not a copy of the study group's work) for all these assignments.**

Advising and Counseling Services. (University Health Services) College life can be stressful. If you are struggling with your academic course load or other academic issues, your advisor is a good resource. If you are experiencing anxiety, depression, or other health issues, individual counseling is available at University Counseling and Consultation Services, For more information or to schedule an appointment, call 265-5600. Crisis intervention services are also available 24 hours a day by dialing this same phone number and pressing option 9.

Students with Disabilities. Appropriate accommodations for lecture, laboratory, discussion, and/or exams can be arranged for students with disabilities. The McBurney Disability Resource Center can provide assistance (<http://www.mcburney.wisc.edu/>). Students needing special accommodations for this class should schedule a confidential meeting with Dr. Szczech during the first week of class to discuss arrangements.

GRADES

Your grade will be based on a maximum of 1019 points divided as follows:

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|---|------------|
| Midterm exams (3 @ 100 pts.): | 300 points |
| Quizzes (best 12 of 14 quizzes × 10 pts): | 120 points |
| Homework (best 13 of 15 HWs × 6 pts): | 78 points |
| Miscellaneous Assignments: | 31 points |
| Participation Points (TA Eval): | 20 points |
| Laboratory: | 220 points |
| Final exam: | 250 points |

Letter grades will be assigned at the end of the semester, based upon the following scale:

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|----|--------------|--------------|
| A | Superior | 90.0 – 100% |
| AB | Excellent | 88.0 – 89.9% |
| B | Proficient | 80.0 – 87.9% |
| BC | Good | 78.0 – 79.9% |
| C | Acceptable | 70.0 – 77.9% |
| D | Mediocre | 60.0 – 69.9% |
| F | Unacceptable | < 60.0% |

If you earn 917 points (90%), you are guaranteed an A; likewise for the other point totals. I reserve the right to lower the cut-offs, but the cut-offs will not be raised higher. There is no extra credit in this course, and assignments cannot be re-submitted to improve your grade. *Lab grades will be normalized to a common scale before final grades are determined, to minimize differences in grading practices between lab sections.* The final grading scale and grade statistics (averages and standard deviations) will not be released.

Academic Misconduct. It is expected that all students will conduct themselves with honesty, integrity, and professionalism. The minimum penalty for any student caught cheating on a homework assignment, a quiz, or a lab (for instance, plagiarism, copying another person's work, bringing lab notebook pages from another student to the lab or fabricating data) will be a score of zero for that assignment. Students who are caught cheating on an exam, or who commit a serious first infraction or second infraction will result in an F for the course grade. More information on what constitutes academic misconduct and UW policies on handling misconduct can be found at: <http://www.wisc.edu/students/saja/misconduct/UWS14.html>

You are responsible for understanding what constitutes academic misconduct—if you do not understand, you should consult the hyperlink above, or discuss this further with Dr. Szczech. NOTE: If an assignment is completed as a group (for example, a group lab report or research paper), **all group members are responsible for ensuring that the assignment meets the standards for academic conduct.** All group members who contributed to an assignment that is found to violate the standards for academic honesty will be held equally responsible—if you are placing your name on an assignment, it is **your responsibility** to ensure that assignment was completed with integrity. If you believe that a member of your lab group is committing academic misconduct, you should notify your TA of Dr. Szczech—students who assist other students in committing academic misconduct are also in violation of UWS 14.

Review Your Grades. All grades will be entered electronically in Learn@UW. **You are responsible** for verifying your grades in a timely manner. Any discrepancies should be brought to your TAs attention via e-mail only—verification of the correct score may be required. You should retain graded assignments until your final grade has been issued. **Any discrepancies must be brought to your TA's attention before the final exam; after final grades have been released to the registrar, no additional changes will be made to the grades.**

| Week | Date | Lecture Topic | Reading | HW Due | Quiz Due | Lab |
|------|---------|--|---|--------|----------|--|
| 1 | Jan. 23 | VSEPR and Bonding | Ch. 8.1 - 8.7 Ch. 9.1 - 9.6 Ch. 24.1 - 24.2 | HW 1 | No Quiz | LabQuest Exercises and Check-In |
| | Jan. 25 | VSEPR and Bonding, Organic Chemistry (Hydrocarbons) | | | | |
| | Jan. 27 | Organic Chemistry (Hydrocarbons) | | | | |
| 2 | Jan. 30 | Organic Chemistry (Hydrocarbons, Aromatics) | Ch. 24.2 - 24.5 | HW 2 | Quiz 1 | Molecular Structures |
| | Feb. 1 | Organic Chemistry (Aromatics, Oxygen Functional Groups) | | | | |
| | Feb. 3 | Organic Chemistry (Oxygen Functional Groups) | | | | |
| 3 | Feb. 6 | Organic Chemistry (Oxygen Functional Groups) | Ch. 24.4 | HW 3 | Quiz 2 | Aspirin and Esters* |
| | Feb. 8 | Organic Chemistry (Nitrogen Functional Groups) | | | | |
| | Feb. 10 | Organic Chemistry (Nitrogen Functional Groups, Polymers) | | | | |
| 4 | Feb. 13 | Organic Chemistry (Polymers, Biomolecules) | Ch. 24.6 - 24.7 Ch. 12.8 Ch. 23.1 - 23.3, Ch. 23.5 | HW 4 | Quiz 3 | Synthesis of Biodiesel |
| | Feb. 15 | Organic Chemistry (Polymers, Biomolecules), Coordination Compounds | | | | |
| | Feb. 17 | Coordination Compounds, Wrap-Up | | | | |
| 5 | Feb. 20 | Kinetics (Relative Rates, Average Rates) | Ch. 14.1 - 14.3 | HW 5 | Quiz 4 | No Lab |
| | Feb. 22 | Exam 1 | | | | |
| | Feb. 24 | Kinetics (Initial Rates, Integrated Rate Laws) | | | | |
| 6 | Feb. 27 | Kinetics (Integrated Rate Laws) | Ch. 14.3 - 14.6 | HW 6 | Quiz 5 | Iodine Clock |
| | Feb. 29 | Kinetics (Collision Theory, Arrhenius Equation) | | | | |
| | Mar. 2 | Kinetics (Mechanisms) | | | | |
| 7 | Mar. 5 | Kinetics (Mechanisms, Catalysts) | Ch. 14.6 - 14.7, Ch. 15.1 - 15.6 | HW 7 | Quiz 6 | Kinetics of Crystal Violet |
| | Mar. 7 | Chemical Equilibrium (K_{eq} , Equilibrium Expressions) | | | | |
| | Mar. 9 | Chemical Equilibrium (Reaction Quotient, Equilibrium Problems) | | | | |
| 8 | Mar. 12 | Chemical Equilibrium (Le Chatelier's Principle) | Ch. 15.7 Ch. 19.1 - 19.7 | HW 8 | Quiz 7 | Chemical Equilibrium & Le Chatelier's Principle* |
| | Mar. 14 | Thermodynamics (Spontaneous Processes, Enthalpy, Entropy) | | | | |
| | Mar. 16 | Thermodynamics (Gibb's Free Energy, K_{eq}) | | | | |

| Week | Date | Lecture Topic | Reading | HW Due | Quiz Due | Lab |
|------|---------|---|-----------------------------|--------|----------|---|
| 9 | Mar. 19 | Thermodynamics (Van't Hoff Plots), Acids and Bases | Ch. 16.1 - 16.7 | HW 9 | Quiz 8 | No Lab |
| | Mar. 21 | Exam 2 | | | | |
| | Mar. 23 | Acids and Bases (Monoprotic Acids and Bases, pH) | | | | |
| 10 | Mar. 26 | Acids and Bases (Polyprotic Acids and Bases, Relating K_a and K_b) | Ch. 16.7 - 16.9 Ch. 17.1 | HW 10 | Quiz 9 | Chemical Equilibrium & Thermodynamics |
| | Mar. 28 | Acids and Bases (Acid/Base Properties of Salts, Equimolar Acid/Base Reactions) | | | | |
| | Mar. 30 | Acids and Bases (Equimolar Acid/Base Reactions), Aqueous Equilibria (Common Ions) | | | | |
| 11 | Apr. 2 | Spring Break | | | | |
| | Apr. 4 | | | | | |
| | Apr. 6 | | | | | |
| 12 | Apr. 9 | Aqueous Equilibria (Buffers) | Ch. 17.2 - 17.3 | HW 11 | Quiz 10 | Acid and Base Solutions |
| | Apr. 11 | Aqueous Equilibria (Buffers, Acid/Base Indicators, Titrations) | | | | |
| | Apr. 13 | Aqueous Equilibria (Titrations) | | | | |
| 13 | Apr. 16 | Aqueous Equilibria (Titrations) | Ch. 17.3 - 17.5 | HW 12 | Quiz 11 | Copper Ammine Compounds |
| | Apr. 18 | Aqueous Equilibria (Solubility) | | | | |
| | Apr. 20 | Aqueous Equilibria (Solubility, Complexation) | | | | |
| 14 | Apr. 23 | Electrochemistry (Redox Reactions, Balancing Redox Equations) | Ch. 4.4, Ch. 20.1 - 20.3 | HW 13 | Quiz 12 | No lab |
| | Apr. 25 | Exam 3 | | | | |
| | Apr. 27 | Electrochemistry (Balancing Redox Equations, Simple Voltaic Cells) | | | | |
| 15 | Apr. 30 | Electrochemistry (Standard Reduction Potentials, Nernst Equation) | Ch. 20.4 - 20.7 | HW 14 | Quiz 13 | Redox Titration |
| | May 2 | Electrochemistry (Nernst Equation, Gibb's Free Energy) | | | | |
| | May 4 | Electrochemistry (K_{eq} , Commercial Cells) | | | | |
| 16 | May 7 | Electrochemistry (Electrolysis) | Ch. 20.9 | HW 15 | Quiz 14 | Electrochemical Cells & Check-Out |
| | May 9 | Electrochemistry (Electrolysis, Quantitative Electrochemistry) | | | | |
| | May 11 | Wrap-Up | | | | |

* Lab report will be a full, type-written lab report. Each student must bring a typed, individually-prepared introduction (with three suitable references) to the lab.