JOHN JAY COLLEGE OF CRIMINAL JUSTICE / CUNY

524 West 59th Street, New York, NY 10019

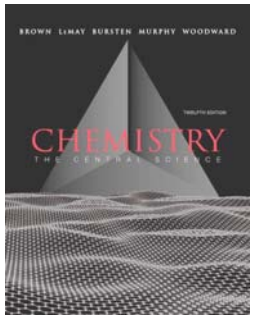
Revised: 01/28/13: subject to minor changes

GENERAL CHEMISTRY II (CHE 104) SPRING 2013 SYLLABUS

	Professor	*Office (NB)*	*Phone*	*E-mail*	*Office Hours*	*Room/Lab*	*-01 (0067)*	*-02 (2749)*	*-03 (2750)*	*-04 (2751)*
Lecture – 01-04	Francis X. Sheehan	05.66.16	212-237-8951	FSheehan@jjay.cuny.edu	Faculty are very	L2.85	M&W-2	M&W-2	M&W-2	M&W-2
Recitation – 01	Lauren Gunderson	04.70.07	212-237-8894	LGunderson@jjay.cuny.edu	accessible by email	L2.81	M-1			
Laboratory – 01	Lauren Gunderson	04.70.07	212-237-8894	LGunderson@jjay.cuny.edu	and in person, meeting	3.66	M-3/4			
Recitation – 02	Rosalie Lipovetsy	03.62	use email →	RLipovetsky@jjay.cuny.edu	with and without	L2.82		M-1		
Laboratory – 02	Pia Austria	04.70.07	212-237-8894	PAustria@jjay.cuny.edu	appointments on	3.70		M-3/4		
Recitation – 03	Pia Austria	04.70.07	212-237-8894	PAustria@jjay.cuny.edu	teaching days.	L2.81			M-1	
Laboratory – 03	Lauren Gunderson	04.70.07	212-237-8894	LGunderson@jjay.cuny.edu	See handout for more	3.66			W-3/4	
Recitation – 04	Christopher Kluge	03.62	646-781-5743	CKluge@jjay.cuny.edu	specific dates/times.	L2.82				M-1
Laboratory – 04	Pia Austria	04.70.07	212-237-8894	PAustria@jjay.cuny.edu		3.70				W-3/4

Period	***Time***
1	**8:00AM**
2	**9:25AM**
3	**10:50AM**
4	**12:15PM**
5	**2:50PM**
6	**4:15PM**
7	**5:40PM**
8	**7:05PM**
9	**8:30PM**

	Professor	*Office (NB)*	*Phone*	*E-mail*	*Office Hours*	*Room/Lab*	*-05 (2752)*
Lecture – 05	Francis X. Sheehan	05.66.16	212-237-8951	FSheehan@jjay.cuny.edu	See above	3.80	M&W-1
Recitation – 05	Rosalie Lipovetsy	03.62	use email →	RLipovetsky@jjay.cuny.edu		3.80	M-2
Laboratory – 05	Helen Chan	04.70.07	646-781-5686	HChan@jjay.cuny.edu		3.66	F-1/2



ISBN-10: 0-321-787560

COURSE DESCRIPTION AND OBJECTIVES: This is the second of a two-semester course primarily intended for Forensic Science and Fire Science majors, as well as others interested in developing a fundamental knowledge base of chemistry. It provides students with a better understanding of the chemical world around us and is a prerequisite for more advanced chemistry courses. The learning objectives of this course, as more fully described below, are to: (1) build on the basic properties and reactions of elements and compounds learned in the first semester, ending with two socially relevant topics, an introduction to nuclear chemistry, a topic with renewed interest following the March 2011 nuclear powerplant accident in Fukushima, Japan following an earthquake and tsunami and an introduction to the chemistry of the environment (going "green"); (2) stress principles of qualitative and semi-qualitative analysis through hands-on experimentation; and (3) foster competence and develop skills needed to safely and effectively work in a scientific laboratory. Students who successfully complete this course and maintain a math/science GPA of at least 2.0 will be eligible to take Organic Chemistry and advance as a forensic science major. 3 hours lecture,1.5 hours recitation, 3 hours laboratory. 4 credits.

Prerequisites

Mat 103, 104, 105 or equivalent, and Che 101/102 or Che 103 or equivalent.

REQUIRED LECTURE AND RECITATION READING/MISC MATERIAL:

Lecture Text Bundle (this loose-leaf version is less expensive than the hardcover book and comes bundled with the required online homework software. The textbook chapter under discussion must be brought to class: (It is important ordering is done by ISBN#. Order ISBN-10: 0-321-787560.)

Brown, LeMay, Bursten, Murphy & Woodward, Chemistry, The Central Science (12th ed.), Books a la carte Plus MasteringChemistry, New York: Prentice Hall, 2012

Scientific Calculator

One of the TI-30 scientific calculators shown in this syllabus, available at most electronic and department stores, is required to be brought to class each day. (TI-34 and TI-36 calculators are not TI-30 calculators and, therefore, are prohibited.) The calculator must be in the TI-30 group, such as TI-30XA, TI-30XS, TI-30X IIS.

Turning Technologies Response Card NXT (RCXR-03)

You need not purchase this "clicker." You may borrow one from the college through the Science Department at no charge provided you agree in writing to return it on or before Department Exam Day (or within 10 days of dropping the course, whichever occurs first) and agree to replace it with an identical model if it is lost, stolen or damaged. Its estimate cost is $40.00. Failure to timely return either the borrowed clicker in good condition or a purchased replacement clicker will result in an SC "Science Stop" on your registration, financial aid, ability to obtain a transcript, etc. The stop can be removed by returning the clicker to Chemistry Courses Coordinator Francis Sheehan (05.66.16) or his designee and having the Loan Agreement you signed to obtain the device canceled in your presence. Allow one week for stop to be removed.

LEARNING OUTCOMES – COURSE

Reasoning	• Apply critical thinking skills to more advanced problem solving exercises in chemistry. • Use analytical reasoning skills in course exercises of increasing complexity/difficulty. • Understand and employ the creative aspects of historical discoveries in chemistry to identify and solve chemical problems and explore new areas of research. • Perform basic statistical analysis and validate analyzed data. • Construct sound and accurate conclusions based on statistical analysis of data.
Knowledge	• Apply modern library searching and retrieval methods to obtain information about a topic, chemical, chemical technique, or an issue relating to chemistry. • Understand the history of scientific investigation related to core chemical concepts. • Demonstrate an understanding of chemical reactions including kinetics; equilibrium; and bonding theory.
Practical skills	• Illustrate an advanced understanding of laboratory safety; scientific measurement; chemical reactions and formulas; chemical identification; solutions and dilutions. • Manipulate modern instruments and techniques to conduct intermediate chemistry experiments. • Appreciate the basic safety rules that apply to work done in a chemistry laboratory. • Demonstrate scientific conduct reflecting ethical and moral principles consistent with professional integrity.
Communication	• Summarize scientific results and demonstrate competence with logic in written and oral formats.

LEARNING OUTCOMES – DETAILED BY CHAPTER

CHAPTER 13 Learning Outcomes: Students will be able to:

- identify the intermolecular attractive interactions that exist between atoms, molecules or ions based on the composition and molecular structure of a substance, and compare the relative strengths of these interactions.
- describe how enthalpy and entropy changes affect solution formation.
- describe the role of equilibria in the solution process and its relationship to the solubility of a solute.
- describe the relationship between intermolecular forces and solubility, including use of the “like dissolves like” rule.
- describe the effect of temperature on the solubility of solids and gases.
- describe the relationship between the partial pressure of a gas and its solubility.
- calculate the concentration of a solution in terms of molarity, molality, mole fraction, percent composition, and parts per million, and be able to interconvert between them.
- describe what a colligative property is and explain the difference between the effects of nonelectrolytes and electrolytes on colligative properties.
- calculate the vapor pressure of a solvent over a solution.
- calculate the boiling point elevation and freezing point depression of a solution.
- calculate the osmotic pressure of a solution.
- explain the difference between a solution and a colloid, and describe the action of a surfactant.

Impediments to avoid to achieve CHAPTER 13 Learning Outcomes:

- confusing dilute and concentrated, or confusing weak and strong.
- failing to appreciate the driving forces behind the formation of a solution.
- confusing dissolution with melting.
- not realizing that crystallization is the reverse of dissolution.
- thinking solutions can only be made either by mixing two liquids or dissolving a solid in a liquid.
- confusing solution with solvation.
- thinking that every mixture is a solution.
- not appreciating how unusual water is.
- forgetting that calculations of molality require the mass of solvent, not solution.
- not realizing that colloids, like solutions, can occur in all three states of matter.

CHAPTER 14 Learning Outcomes: Students will be able to:

- determine limiting reactants and/or calculate theoretical yields of reactions involving aqueous solutions. Use the results of a titration to determine the concentration of an unknown solution.
- understand the factors that affect the rate of chemical reactions.
- determine the rate of a reaction given time and concentration.
- relate the rate of formation of products and the rate of disappearance of reactants given the balanced chemical equation for the reaction.
- understand the form and meaning of a rate law including the ideas of reaction order and rate constant.
- determine the rate law and rate constant for a reaction from a series of experiments given the measured rates for various concentrations of reactants.
- use the integrated form of a rate law to determine the concentration of a reactant at a given time.
- explain how the activation energy affects a rate and be able to use the Arrhenius Equation.
- predict a rate law for a reaction having a multistep mechanism given the individual steps in the mechanism.
- explain how a catalyst works.
- recognize the difference between primary, secondary and tertiary structures of proteins.

Impediments to avoid to achieve CHAPTER 14 Learning Outcomes:

- assuming that reaction orders may be determined from stoichiometric coefficients regardless of the reaction mechanism.
- having difficulty comprehending zero-order processes.
- having difficulty understanding the relationship between various experimental results and the rate of reaction.
- confusing fast reactions with those with large reaction yields.
- having difficulty distinguishing between kinetic and thermodynamic control of reactions.
- confusing intermediates and transition states.
- confusing *ad*sorption and *ab*sorption.

CHAPTER 15 Learning Outcomes: Students will be able to:

- understand what is meant by chemical equilibrium and how it relates to reaction rates.
- write the equilibrium-constant expression for any reaction.
- relate K_c and K_p.
- relate the magnitude of an equilibrium constant to the relative amounts of reactants and products present in an equilibrium mixture.
- manipulate the equilibrium constant to reflect changes in the chemical equation.
- write the equilibrium-constant expression for a heterogeneous reaction.
- calculate an equilibrium constant from concentration measurements.
- predict the direction of a reaction, given the equilibrium constant and the concentrations of reactants and products.
- calculate equilibrium concentrations, given the equilibrium constant and all but one equilibrium concentration.
- calculate equilibrium concentrations, given the equilibrium constant and the starting concentrations.
- understand how changing the concentrations, volume, or temperature of a system at equilibrium affects the equilibrium position.

Impediments to avoid to achieve CHAPTER 15 Learning Outcomes:

- confusing the arrows used for resonance and equilibrium.
- incorrectly including concentrations of pure liquids and solids in equilibrium constant expressions.
- having problems distinguishing between *K* and *Q*.
- struggling with the idea that *K* and *Q* have no units.
- not knowing (or checking) whether an approximate equilibrium calculation is valid.

CHAPTER 16 Learning Outcomes: Students will be able to:

- define and identify acids and bases using the Arrhenius, Bronsted-Lowry and Lewis descriptions.
- identify conjugate acid-base pairs and relate the strength of an acid to the strength of its conjugate base.
- write the appropriate equilibrium constant and proton transfer reaction for acid-base reactions, and use this relationship to evaluate the strength of acids and bases.
- describe the autoionization of water and calculate pH from the concentration of H_3O^+ or the concentration of OH^-. Use the pH scale to identify acidic and basic solutions. Identify pH ranges from the color of indicator solutions.
- identify strong acids and bases. Calculate the pH of a strong acid or strong base from its empirical formula and concentration.
- identify weak acids and bases. For weak acids/bases: calculate the dissociation constant from solution concentration and pH; the solution pH from concentration and the dissociation constant; the percent ionization.
- calculate K_b for a weak base given K_a of its conjugate acid, and similarly calculate K_a for a weak acid given K_b of its conjugate base.
- predict whether an aqueous solution of a salt will be acidic, basic or neutral and calculate the pH of salt solutions.
- predict the relative strength of a series of acid and bases from their molecular structures.

Impediments to avoid to achieve CHAPTER 16 Learning Outcomes:

- confusing a weak acid with a dilute acid.
- having problems with the numerical parts of this chapter. They should be strongly encouraged to do many problems on their own.
- having difficulty using their calculators to take decimal logarithms and antilogarithms.
- confusing decimal (*log*) and natural (*ln*) logarithms.
- having a difficult time accepting that acids may be neutral as well as both positively and negatively charged species.
- forgetting that $[H_3O^+][OH^-]$ is equal to 1.0×10^{-14} only at 25 °C.
- wrestle with neutralization reactions producing solutions with pHs different from 7.

CHAPTER 17 Learning Outcomes: Students will be able to:

- describe the common-ion effect and use it to make qualitative predictions of how the presence of salts can alter pH or solubility equilibria.
- explain how a buffer functions and calculate the pH of a buffered solution, including its response to additions of acid or base.
- identify various types of acid-base titrations from their titration curves. Calculate the pH at any point in a titration, and determine the appropriate indicator for a given acid-base titration.
- given either K_{sp}, molar solubility, or mass solubility for a substance, calculate the other two quantities.
- calculate molar solubility in the presence of a common ion. Predict the effect of pH on solubility of an ionic compound. Explain the effect of complex-ion formation on solubility.
- use K_{sp} and the reaction quotient to predict the concentration of ions needed to form a precipitate, and use such calculations to predict the order of precipitation in a solution containing multiple ions.
- interpret the results of qualitative analysis schemes to determine the identity of cations in a sample of unknown composition.

Impediments to avoid to achieve CHAPTER 17 Learning Outcomes:

- believing that the pH at the equivalence point for any titration is 7.00; in other words, students often think that neutralization always results in the formation of a *neutral* solution.
- thinking that titration is a new type of a reaction, rather than an experimental technique.
- letting buffers become an albatross by not doing plenty of buffer-related exercises.
- forgetting to consider volume changes that occur when two solutions are mixed, since this will have an effect on the concentration of the species present.
- not appreciating the approximate nature of the Henderson-Hasselbalch equation in a majority of applications.
- tending to confuse K_{sp} and solubility.
- struggling with the concept of competing or subsequent equilibria when considering factors affecting solubility of ionic compounds.
- confusing amphiprotic and amphoteric substances.

CHAPTER 19 Learning Outcomes: Students will be able to:

- understand the meaning of spontaneous process, reversible process, irreversible process, and isothermal process.
- state the second law of thermodynamics and describe the notion of entropy.
- explain how the entropy of a system is related to the number of possible microstates.
- describe the kinds of molecular motion that a molecule can possess.
- predict the sign of ΔS for physical and chemical processes.
- state the third law of thermodynamics.
- calculate standard entropy changes for a system from standard molar entropies.
- calculate the Gibbs free energy from the enthalpy change and entropy change at a given temperature.
- use free energy changes to predict whether reactions are spontaneous.
- calculate standard free energy changes using standard free energies of formation.
- predict the effect of temperature on spontaneity given ΔH and ΔS.
- calculate ΔG under nonstandard conditions
- relate ΔG° and equilibrium constant.

Impediments to avoid to achieve CHAPTER 19 Learning Outcomes:

- believing that a spontaneous process should occur very quickly. They do not appreciate the difference between kinetics and thermodynamics.
- having a problem distinguishing between absolute thermodynamic quantities and the change in thermodynamic quantities.
- not telling the difference between heat and temperature.
- thinking that only exothermic reactions can be spontaneous.
- forgetting about the system's surroundings when evaluating changes in thermodynamic quantities, such as entropy.
- not paying attention to the states of matter (g, *l*, s) of substances in Appendix C.
- including the temperature of 298 K as part of the standard conditions.

CHAPTER 20 Learning Outcomes: Students will be able to:

- identify oxidation, reduction, oxidizing agent, and reducing agent in a chemical equation.
- complete and balance redox equations using the method of half-reactions.
- sketch a voltaic cell and identify its cathode, anode, and the directions that electrons and ions move.
- calculate standard emfs (cell potentials), E°_{cell}, $\mathcal{E}^\circ_{cell}$, from standard reduction potentials.
- use reduction potentials to predict whether a redox reaction is spontaneous and to determine the relative strengths of oxidizing and reducing agents.
- relate $\mathcal{E}^\circ_{cell}$ to E_{cell}, ΔG° and equilibrium constants.
- calculate emf under nonstandard conditions.
- describe the components of common batteries and fuel cells.
- explain how corrosion occurs and how it is prevented by cathodic protection.
- describe the reactions in electrolytic cells.
- relate amounts of products and reactants in redox reactions to electrical charge.

Impediments to avoid to achieve CHAPTER 20 Learning Outcomes:

- thinking that *oxidation* must necessarily mean *adding oxygen*.
- having trouble balancing redox equations.
- thinking that pure polar solvents, such as water, conduct electricity.
- thinking that electrons flow through the salt-bridge (or the porous barrier) and through solutions.
- not considering water as a participant in the redox reactions.
- thinking that, since individual electrode potentials cannot be measured, there are no processes taking place when a metal is immersed in an electrolyte.
- thinking that a measured potential for a galvanic cell cannot be negative; it can, in which case one can re-connect the leads of the voltmeter to the opposite electrodes and obtain a positive reading.
- thinking that cell potentials are independent of concentrations (and pressures) of ions (and gases) in the electrochemical reaction.
- having difficulty understanding that electrochemical potentials are relative in nature.
- not realizing that electrochemical processes can be viewed as reversible; this allows us to make a connection between E°_{cell}, ΔG°, and K.

CHAPTER 21 Learning Outcomes: Students will be able to:

- determine numbers of protons and neutrons in a nucleus, and write balanced nuclear equations for nuclear decay processes.
- predict nuclear stability and predict the expected type of nuclear decay for radioactive nuclei.
- write balanced equations for nuclear transmutations.
- use the half-life of an isotope to calculate the percent of a radionuclide that remains after a given time has passed and vice versa. Calculate the age of an object containing a radionuclide from its isotope ratio.
- calculate mass and energy changes for nuclear reactions and use these calculations to calculate binding energies for nuclei.
- describe the difference between nuclear fission and nuclear fusion. Write balanced nuclear equations for fission and fusion reactions.
- describe the basic principles involved in a nuclear power plant and describe the differences in various types of nuclear power plants.
- identify various types of ionizing radiation. Describe the biological effects associated with exposure to ionizing radiation and define the units used to measure exposure to radiation.

Impediments to avoid to achieve CHAPTER 21 Learning Outcomes:

- thinking that atoms of one element cannot be transformed into atoms of another element.
- thinking that all radiation is man-made and harmful.
- thinking that radioactivity is a man-made or woman-made phenomenon.
- thinking that the rate of radioactive decay depends on external conditions, such as T or p.
- thinking that all isotopes of uranium are radioactive.

CHAPTER 23 Learning Outcomes: Students will be able to:

- describe the periodic trends in radii and oxidation states of the transition metal ions, including the origin and effect of lanthanide contraction.
- determine the oxidation number and number of d electrons for metal ions in complexes.
- distinguish between chelating and nonchelating ligands.
- name coordination compounds given their formula and write their formula given their name.
- recognize and draw the geometric isomers of a complex.
- recognize and draw the optical isomers of a complex.
- use crystal-field theory to explain the colors and to determine the number of unpaired electrons in a complex.

Impediments to avoid to achieve CHAPTER 23 Learning Outcomes:

- having difficulty naming coordination complexes.
- thinking that chirality is only possible for organic compounds.
- thinking that metals ions, $M^{n+}(aq)$ and their aqueous complex ions should have similar physical and chemical properties.

CHAPTER 18 Learning Outcomes: Students will be able to:

- describe the regions of Earth's atmosphere in terms of how temperature varies with altitude.
- describe the composition of the atmosphere in terms of the major components in dry air at sea level.
- calculate concentrations of gases in parts per million (ppm) and convert between ppm and other concentration units.
- describe the processes of photodissociation and photoionization and their role in the upper atmosphere.
- use bond energies and ionization energies to calculate the minimum frequency or maximum wavelength needed to cause photodissociation or photoionization.
- explain the role of ozone in the upper atmosphere.
- explain how chlorofluorocarbons (CFCs) are involved in depleting the ozone layer.
- describe the origins and behavior of sulfur oxides and nitrogen oxides as air pollutants, including the generation of acid rain and photochemical smog.
- describe how water and carbon dioxide in the atmosphere affect atmospheric temperature via the greenhouse effect.
- describe the global water cycle.
- explain what is meant by the salinity of water and describe the process of reverse osmosis as a means of desalination.
- list the major cations, anions, and gases present in natural waters and describe the relationship between dissolved oxygen and water quality.
- list the main steps involved in treating water for domestic uses.
- describe the main goals of green chemistry.
- be able to compare reaction conditions and decide which process is greener.

Impediments to avoid to achieve CHAPTER 18 Learning Outcomes:

- confusing the toxicity of ozone in the troposphere and the beneficial effects of ozone in the stratosphere.
- thinking that ozone depletion causes global warming.
- equating greenhouse effect with global warming; they are linked, but not the same.

Prerequisites
Mat 103, 104, 105 or equivalent, and Che 102 or Che 103 or equivalent.

GRADING POLICY: This four credit course has three components-- lecture, recitation, and laboratory. Each component has a separate grading policy which contributes a percentage to the overall course grade. In general, the course grade is the sum of the grades earned in the lecture (70%), recitation (5%) and lab (25%) sessions, plus, if applicable, 10% of an American Chemical Society (ACS) exam grade. However, since the lab sessions are an integrated component of the course, where lab safety skills and dexterity are taught for use in subsequent science courses, for safety reasons, a minimum lab grade of 60.00% is required to pass the course. Unethical/unprofessional conduct will result in a failing course grade and referral for additional action. Deviation from this syllabus, which represents a contract, are not permitted except in extraordinary circumstances applicable to all sections. A TI-30 model calculator is required for this course. See calculator details in this syllabus. Students not seated along a wall may use a tablet or laptop in the classroom but only to view their e-book, class PowerPoints, or take notes. Students using a computer along a wall or viewing social media or non-chemistry related data during class time even for a short period of time will be marked absent and may be subject to other sanctions.

Lecture: Four lecture exams will be given. The lowest grade on the first three exams is dropped and each of the grades on the remaining two exams constitute 20% of the course grade (40% for both). There are no make-up exams. The policy of dropping one exam was instituted to accommodate absence and extraneous circumstances resulting in an uncharacteristically poor performance. During final exam week a fourth lecture exam is given that counts as 30% percent of the course grade. The grade on the fourth exam cannot be "dropped." Students may earn up to additional 2% toward the overall lecture grade by achieving an in lecture correct clicker response grade of at least 75% for the semester. After week one, students who do not bring the required clicker to a class and use it when requested will be marked absent.

Recitation: Recitation constitutes 5% of the course grade, based on successfully completing twelve of fourteen equally-weighted online homework assignments by their due dates, as well as attendance and meaningful participation in the recitation sessions. Active participation during recitation sessions by all students benefits all students, providing varying approaches to mastering the subject material, incentive for success, and progress evaluation. Consequently, attendance and participation are NOT optional. Each excessive absence (more than two) or failure to meaningfully participate in recitation sessions will result in a 10% reduction per occurrence of the grade total earned on the assigned online homeworks. After week 1, students who do not bring the required clicker to class and use it when requested will be marked absent.

Laboratory: The final lab grade is based on three factors: (1) the cumulative lab examination, (2) the five unknowns (labeled "U" on the lab syllabus), and (3) a "performance" factor (0.00 - 1.00). The overall lab grade (which is 25% of the course grade) is calculated by adding the lab exam score (0-80.00 points) to the four highest grades on the five unknowns (0-5.00 points each), and multiplying the sum by the performance factor. To be objective, the performance factor will be 1.00 unless a safety rule is violated, there are excessive absences (more than two), laboratory equipment is lost or broken, a completed ASA or other assignment is not submitted when requested, an unapproved calculator is used, or participation in lab is not meaningful. There is a severe (10%) performance factor penalty for each excessive absence, or for each Advance Study Assignment (ASA) or handout that is not satisfactorily completed on time. The clarity of any written explanations needed to answer questions on ASAs or handouts will be graded. Any lab keys issued must be personally returned to the Lab Technician by the last day of classes to avoid a significant performance factor penalty and "IN" grade. Before a letter grade is issued, missing, lost or stolen lab keys must be replaced. "IN" grades automatically convert permanently to "F" if not timely resolved.

Overall Grade: The lab grade (25.00 pts max) is added to the lecture (70.00 pts max) and recitation (5.00 pts max) grades. If the total is a passing grade, 10% of the ACS grade is added, producing the final course grade.

American Chemical Society (ACS) Exam: A national ACS exam will be administered on Department Exam Day only. There are no make-ups. 10% of the grade earned on the exam will be added to the course grade if it is a passing course grade. The ACS exam grade cannot be used to raise a failing course grade to a passing course grade, but it can be used to increase a passing grade to a higher passing grade. Letter grades for the course will then be assigned based on the letter grade criteria in JJ Policy Reg.008, modified 6/18/2012. The letter grade criteria is also posted on the course's Blackboard Web site.

ATTENDANCE POLICY: Students enrolled in this course are ***required*** to attend all lecture, recitation and laboratory sessions of the section for which they registered. In general, there are two one period lecture sessions, a one period recitation session and a two period laboratory session each week. (During summer session, two weeks of classes are covered each calendar week.) Excessive absences (defined above) will result in a reduction in the grade. Attendance is taken solely from roll sheets circulated at the beginning and/or end of each session. Lateness or early departure (resulting in missing no more than 15 minutes of a session) counts as ½ absence. Students missing more than 15 minutes of a session will be counted as absent. If the college is officially closed, thereby canceling all classes, an announcement will be found on 237-8000, and broadcast on AM stations WINS (1010), WOR (710), WCBS (880), WADD (1280), WMCA (570), WLIB (1190), and WFAS (1230), as well as FM stations WCBS (101.1) and WBLS (107.5). If a class will be cancelled for extraordinary circumstances, the instructor will email an announcement using Blackboard to enrolled students as soon as practicable. This has not happened in recent memory.

ACTIVE COLLEGE E-MAIL/BLACKBOARD ACCOUNT REQUIRED: Students are expected to maintain active and accessible college email and Blackboard accounts. Blackboard will be used to send emails and may be used to post announcements, handouts, additional study materials, text supplements, grades, etc. Use the CUNY Portal Login page help features for a forgotten username or password, or contact DoIT, 212-237-8200 for other help. Verify your CUNY email address is correctly listed on Blackboard and keep the mailbox from filling up and refusing delivery, because you will be responsible for the contents of any email sent to that account. When emailing instructors for this course, start the email's subject line with the course and section number (e.g., Che 104-01) followed by a brief description. Include your full name in the body of every email. Emails that do not contain these descriptive details may be considered spam, and remain unopened and unanswered. Students are expected to check email regularly.

TUTORING: Although a considerable amount of remediation is done during the course, when necessary students are encouraged to attend-- on a first come, first served basis—free tutoring offered to students requesting such help. Scheduled weekly or biweekly appointments are encouraged. "Crash" sessions immediately before an exam are discouraged. A student who fails an exam (less than 60.00%) is required to sign into and attend at least one hour of tutoring weekly until the next exam. An additional hour of tutoring is required for every seven days, or part thereof, homework is past due. (The homework must still be completed.) Failure to sign in and attend required tutoring and provide attendance documentation counts as a recitation absence per occurrence. Attendance at tutoring is automatically forwarded to the instructor by the Math and Science Resource Center.

HOMEWORK: Graded online MasteringChemistry® (**MC**) assignments must be successfully completed by their due dates to receive full credit. Some credit will be awarded for late assignments. Frankly, the knowledge you gain by doing the assignments, even if late, justifies the effort even if no credit were awarded. You will be emailed (using Blackboard) your MasteringChemistry course code which you will use to register for your specific course and section on MasteringChemistry. You may switch sections on MasteringChemistry later but all your homework data and grades up to that point will be lost, so register correctly the first time. Use your JJ email address as your Login ID. Although more information will be sent to you in an email, for now please do not use your SSN anywhere on the site. Homework is also shown on this syllabus. The exercises at the back of each chapter in the text are grouped by topic. Do as many red numbered textbook problems in each group as possible. The answers at the back of the book should only be used after a thorough attempt at answering each problem has been made. Much is learned from the struggle to derive the correct answer. Much is lost by simply seeing "how the book does it." You may do the MasteringChemistry problems before or after the textbook problems. Be prepared to provide answers in recitation to exercises similar to those listed as homework in this syllabus. We have made great effort to ensure that ample tools are available to help students succeed in this course, if the tools are used diligently.

WRITING ACROSS THE CURRICULUM (WATC): Reports written by Forensic Scientists must be clear, concise, and unambiguous. Consequently, where a homework assignment requires a written explanation, spelling, grammar, and clarity of expression will be considered in determining the "correctness" of the answer proffered. It is important that careful attention is directed to writing what you mean and meaning what you write.

STUDENTS WITH DISABILITIES: Qualified students with disabilities will be provided reasonable academic accommodations if determined appropriate by the Office of Accessibility Services (OAS), 212-237-8031, located in room L.66.00. Prior to granting disability accommodations, verification of a student's eligibility must be timely received from OAS by the chemistry course coordinator, Professor Francis Sheehan (FSheehan@jjay.cuny.edu), and the instructor, from the OAS. It is the student's responsibility to initiate contact with the OAS and to follow the established procedures for having the accommodation notice sent to both the course coordinator and the instructor.

ACADEMIC INTEGRITY: Students who succeed in this course and graduate with a degree in Forensic Science may be hired by government or private agencies to analyze evidence and testify in a court of law, placing in jeopardy another person's reputation and/or liberty. Dishonesty of any kind cannot and will not be tolerated. Students are expected to become thoroughly aware of the "John Jay College Policy on Academic Integrity" (and other college policies), available on the college's Web site. Sanctions to the extent permitted by the policy will be imposed and any written material submitted may be transmitted by the instructor to Turnitin.com (or equivalent service) to help analyze its originality. See the Undergraduate Bulletin for the College's Policy on Plagiarism and Cheating, which will be strictly enforced. Plagiarism includes copying ASA or homework answers from others. A handout will be provided you so that there will be no misunderstanding of what constitutes plagiarism. You are required to do your own work to avoid severe grade and disciplinary penalties. Use of a headset at any time is prohibited. The College subscribes to Turnitin.com and Blackboard has a similar module called SafeAssign. Any written assignments submitted may be subject to evaluation by these or similar programs.

Statement of the College Policy on Plagiarism

Plagiarism is the presentation of someone else's ideas, words, or artistic, scientific, or technical work as one's own creation. Using the ideas or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism. It is the student's responsibility to recognize the difference between statements that are common knowledge (which do not require documentation) and restatements of the ideas of others. Paraphrase, summary, and direct quotation are acceptable forms of restatement, as long as the source is cited. Students who are unsure how and when to provide documentation are advised to consult with their instructors. The Library has free guides designed to help students with problems of documentation. (John Jay College of Criminal Justice Undergraduate Bulletin, http://www.jjay.cuny.edu/academics/654.php, see Chapter IV Academic Standards.)

Note: You will be presented with a handout called "The Perils of Plagiarism" that you will be required to read and return signed to your professor on the next meeting date.

Extra Work:

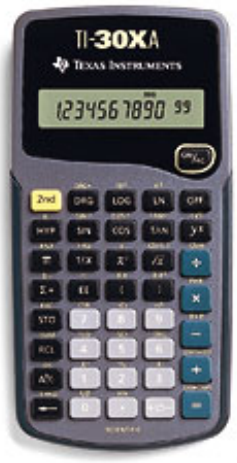
Extra work (more studying, more practice exercises) is encouraged to help you improve your performance on an *upcoming* exam or lab. The grade for the course is strictly computed as defined on the previous page. Students must focus on doing well on the standardized assessments (exams, online homework, lab work, class participation, attendance, etc.) on the assessment date stated on this syllabus. The time to do the extra work is before the exam is given and/or the lab is performed, as extra work after-the-fact is not provided. The grading policy stated herein sufficiently accommodates an unexpected absence and uncharacteristic poor performance during the semester.

Grade of Incomplete:

A grade of incomplete will only be issued if the student is absent from Exam 4 and/or the Lab Exam and the average of the best two of the first three exam grades applied to the missed Exam 4 and/or Lab Exam results in a passing grade, after performance factor and excessive absence penalities for the semester have been applied. If a grade of Incomplete is assigned, it is the student's responsibility to resolve it during the following semester on the specific date published on the Undergraduate Academic Calendar on www.jjay.cuny.edu. The exam(s) must be scheduled at least two weeks in advance via email with the Chemistry Courses Coordinator (FSheehan@jjay.cuny.edu), who will administer the exam(s). The exam(s) will only be administered on the published date, except in extraordinary documented circumstances . Incompletes must be avoided because they will prevent advancement to more advanced chemistry courses the following semester since successful completion of this course is a pre-requistite for more advanced chemistry courses. Incompletes that remain unresolved after the published make-up date are automatically changed to FIN.

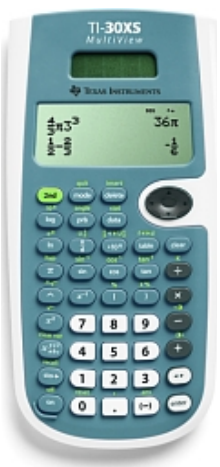
COME TO LECTURE/RECITATION PREPARED:

Do your homework. Stay up with the course material. Stay slightly ahead of the professor with your studying. You will need a blue or black ink pen to sign the attendance sheet, a TI-30 calculator, safety glasses on lab days, your notebook and any book/manual required. Although a TI-30XA is the preferred calculator for the course, any TI-30 calculator is acceptable (e.g., TI-30XA, TI-30XS, TI-30XIIS, etc.).



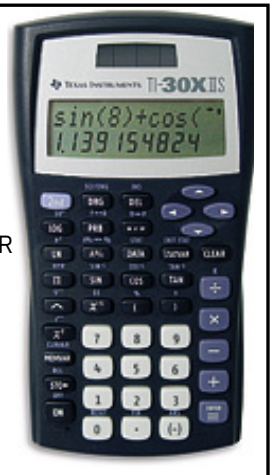
TI-30XA

OR



TI-30XS

OR

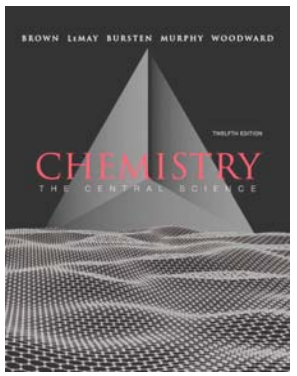


TI-30X IIS

AND

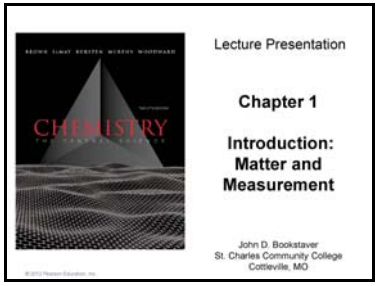
Turning Technologies NXT (RCXR-03)

AND



The chapter under discussion must be brought to class.

AND



If PowerPoint slides are used in class and posted in advance for you to download, print them and bring them to class so you may take notes on them.

COME TO LAB PREPARED:

Do the assigned Advance Study Assignment (ASA) before coming to class. Thoroughly read the lab exercise to be conducted and prepare questions to ask regarding anything you don't understand about the procedure. You will need a blue or black ink pen to sign the attendance sheet, a TI-30 calculator, safety glasses on lab days, your notebook and the lab manual. Dress appropriately for lab work, as described on the safety rules. Bring your Z87.1 approved splash resistant safety glasses or goggles. You will not be allowed to be in the lab (and will be marked absent) if you are not dressed appropriately for lab (as described on the safety rules) or if you do not have and wear Z87.1 splash approved safety glasses or goggles while in the lab.

PREPARE FOR EXAMS AND THEN COME TO EXAMS PREPARED:

Study, study and then study some more. The more you study the "luckier" you will be in earning a high grade. If you are ever unsure of what to do on an exam day, check the lab door, 3.66NB, for instructions.

Arrive early:

If you don't have a class immediately prior to the exam, please arrive approximately 15 minutes before your scheduled exam. The attendance sheet will be circulated in the hallway outside the classroom. Note your seat number as you sign the attendance sheet. The seat number will be the four digit number in the middle column, immediately to the left of your signature. It will likely not be your usual seat number. Remember or write down that number, as you will need to know it when you enter the classroom.

Sit in assigned seat:

When instructed to enter the classroom, enter and sit in the seat labeled with your exam seat number.

Follow the instructions of the proctors and hallway monitors:

The proctors assigned to your classroom will walk you through these instructions. It is important that you not try to anticipate what to do next and get ahead of the proctor. Doing so will not result in more exam time. Listen carefully to what they say and follow their instructions so the exam can be promptly started.

Put all materials, including electronic devices, under your seat:

Put all materials other than a pen, pencil and your TI-30 calculator (with its case removed) under your seat. Make sure all chemistry related books, manuals, and notes, as well as rubber bands, PDAs and cell phones,[1] are placed in a closed bag or other opaque covering under your seat and not visible to you or anyone else in the room. It is your responsibility to make sure no one can gain an unfair advantage from material(s) brought with you to the college on exam day. Please note: You are not permitted to have any non-medical electronic devices, notes or other chemistry-related material on your person at any time during exams. If you do not bring a bag or other opaque covering with you on exam day to store your materials under your seat, leave the material(s) at home.

Relax:

The exam will fairly assess the chapters/topics you were told would be on the exam.

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[1] Cell phones, PDAs, and similar devices, and their accessories, may not be accessible, accessed or used during the exam for any purpose. (If truly extraordinary circumstances, such as a seriously ill family member, requires the cell phone to be on vibrate, write your name and seat# on the envelope provided by the proctor, who will store the phone on the front desk and provide it to you should it vibrate.)

Che 104 Lecture Schedule

LECTURE	DATE*	TOPICS / Readings	TEXTBOOK EXERCISES (Also see MChomework note on right)
1	01/28	Course Intro; Ethics, Science and the Scientific Method; MC 13.1 The Solution Process 13.2 Saturated Solutions and Solubility 13.3 Factors affecting Solubility	 13.3, 15, 17, 21 13.23, 25 13.7, 29, 37
2	(01/30)	13.4 Expressing Solution Solubilities 13.5 Colligative Properties 13.6 Colloids	13.9, 47, 49, 53 13.65, 71, 77 13.87, 88
3	02/04	14.1 Factors that affect Reaction Rates 14.2 Reaction Rates 14.3 Concentration and Rate Laws	14.1, 17 14.3, 19, 21, 23c 14.27, 31, 37
4	(02/06)	14.4 The Change of Concentration with Time 14.5 Temperature and Rates 14.6 Reaction Mechanisms	14.43, 47, 51 14.9, 55, 63, 65 14.12, 73, 75, 77
5	02/11	14.7 Catalysis 15.1 The Concept of Equilibrium 15.2 The Equilibrium Constant	14.16, 85 15.1, 2 15.4, 21
6	(02/13)	15.3 Understanding and Working with Equilibrium Constants 15.4 Heterogeneous Equilibrium 15.5 Calculating Equilibrium Constants	15.7, 11, 13, 27 15.15, 29, 31 15.35, 37, 39
7	02/20◊	15.6 Applications of Equilibrium Constants 15.7 Le Châtelier's Principle 16.1 Acids and Bases: A Brief Review	15.45, 49, 53, 57 15.61, 63, 65 16.11, 12
8	02/25	16.2 Bronsted-Lowey Acids and Bases 16.3 The Autoionization of Water 16.4 The pH Scale 16.5 Strong Acids and Bases	16.1, 15, 17, 19 16.29, 30, 31 16.5, 33, 35, 39 16.43, 45, 48
9	(02/27)	16.6 Weak Acids 16.7 Weak Bases 16.8 Relationship between *K*a and *K*b.	16.51, 57, 61, 63 16.69, 71, 73 16.77, 79, 81
	03/04	**LECTURE EXAM 1**	**Chapters 13, 14 and 15**
10	(03/06)	16.9 Acid-Base Properties of Salt Solutions 16.10 Acid-Base Behavior and Chemical Structure 16.11 Lewis Acids and Bases	16.83, 85 16.9, 89, 91 16.95, 97
11	03/11	17.1 The Common-Ion Effect 17.2 Buffered Solutions 17.3 Acid-Base Titrations	17.13, 14, 15, 17 17.4, 19, 21, 23, 27, 31 17.7, 37, 41, 43, 45, 47
12	(03/13)	17.4 Solubility Equilibrium 17.5 Factors that affect Solubility 17.6 Precipitation and Separation of Ions 17.7 Qualitative Analysis for Metallic Elements	17.51, 53 17.55, 59, 61, 65 17.10, 67, 71, 73 17.75, 77, 79
13	03/18	19.1 Spontaneous Processes 19.2 Entropy and the Second Law of Thermodynamics 19.3 Molecular Interpretation of Entropy	19.14, 17 19.1, 25, 27, 29 19.4, 31, 33, 41, 43
14	(03/20)	19.4 Entropy Changes in Chemical Reactions 19.5 Gibbs Free Energy 19.6 Free Energy and Temperature 19.7 Free Energy and the Equilibrium Constant	19.47, 49, 53 19.57, 59 19.7, 65, 69, 71 19.79, 81, 83

Spring 2013 Semester Details

First day of clases: 1/28
No classes: 2/12, 2/18, 3/25-4/02
Last day of classes: 5/16
Reading Day: NONE
Department Exam Day: 5/17
Finals Week: 5/17 – 5/24

Occasionally due to classroom space limitations on Dept. Exam Day, another day, 5/17 – 5/24, is used to give General Chemistry Departmental Exams.

Do not make vacation or other plans for any part of 5/17-5/24 because exam dates are subject to change

SYMBOLS USED IN THIS SYLLABUS
S or s = Study. Each time you see the letter it should be a reminder to study. The more you study, the "luckier" you will be come exam time.

◊ Wednesday 02/20 is a JJ Monday. Monday classes meet. Wednesday classes do not meet.

† Last day to withdraw without academic penalty is Friday, 04/12

‡ Last Day of Classes, 05/16

MC = MasteringChemistry®
= required and graded online homework.
Go to http://MasteringChemistry.com

LOANED CLICKERS – AVOIDING THE STOP

Students who drop or withdraw have 10 days from the drop or withdrawal date to return the Loaned Clicker to avoid the "SC" Science Department stop. For all others, Clickers must be returned and Loan Agreement cancelled by 5/17 at 5pm to avoid an "SC" Science Dept. equipment registration stop being imposed.

Timely Return or Replace the Clicker

LECTURE	DATE*	TOPICS / Readings	TEXTBOOK EXERCISES (Also see Homework note on right)
15	(04/03)	20.1 Oxidation States and Oxidation-Reduction Reactions 20.2 Balancing Redox Reactions	20.15, 17 20.19, 21, 23
	04/08	**LECTURE EXAM 2**	**Chapters 16, 17 and 19**
16	(04/10)†	20.3 Voltaic Cells 20.4 Cell Potentials under Standard Conditions 20.5 Free Energy and Redox Reactions	20.25, 27 20.4, 37a-b, 39, 41, 45, 47, 49 20.7, 51, 53, 55a, 59
17	04/15	20.6 Cell Potentials undere Nonstandard Conditions 20.7 Batteries and Fuel Cells	20.8, 9, 65, 69, 71 20.75, 77
18	(04/17)	20.8 Corrosion 20.9 Electrolysis	20.83, 87 20.91, 93
19	04/22	21.1 Radioactivity 21.2 Patterns of Nuclear Stability 21.3 Nuclear Transmutations	21.11, 13, 15 21.1, 17, 19, 21 21.27, 29
20	(04/24)	21.4 Rates of Radioactive Decay 21.5 Detection of Radioactivity 21.6 Energy Changes in Nuclear Reactions	21.4, 31, 35, 41 21.5 21.43, 47, 49, 51
	04/29	**LECTURE EXAM 3**	**Chapters 19 and 20**
21	(05/01)	21.7 Nuclear Power: Fission 21.8 Nuclear Power: Fussion 21.9 Radiation in the Environment and Living Systems	21.55, 57, 60, 63 21.59a 21.66, 67
22	05/06	23.1 The Transition Metals 23.2 Transition Metal Complexes 23.3 Common Ligands in Coordination Chemistry	23.15, 17, 19 23.2, 23, 25a-c 23.29, 33
23	(05/08)	23.4 Nomenclature and Isomerism in Coordination Chemistry 23.5 Color and Magnetism in Coordination Chemistry	23.4, 35, 37, 41 23.45, 46
24	05/13	23.6 Crystal-Field Theory 18.1 Earth's Atmosphere 18.2 Human Activities and Earth's Atmosphere	23.8, 51, 59, 61 18.1, 13, 17 18.29, 31
25	(05/15)‡ 	18.3 Earth's Water 18.4 Human Activities and Earth's Water 18.5 Green Chemistry	18.6, 35, 37, 39 18.43, 47, 51 18.9, 61
	TBD	**LECTURE EXAM 4**	**Chapters 21, 23 and 18**

Note: Overlap of Chapter 19 on Exams 2 and 3 is intentional.

STOP THE STOP

RETURN THE LOANED CLICKER WITHIN TEN DAYS OF WITHDRAWING/ DROPPING THE COURSE OR BY DEPARTMENT EXAM DAY, 05/17/13, WHICHEVER OCCURS FIRST

Did you know that an "SC" Science Equipment/Key Stop (also known as Hold) restricts students from registering, receiving financial aid, requesting transcripts, receiving certification letter of attendance, receiving the diploma, etc. JJC Policy Reg.017 12/15/12

Email FSheehan@jjay.cuny.edu in advance of the deadline to make arrangements to return the Clicker or submit an identical replacement by the deadline, to cancel your Clicker Loan Agreement.

GOT THE MESSAGE?

We want the clickers back so other students may benefit from their use.

Che 104 Laboratory / Recitation* Schedule

SESSION	-01, -02	-03, -04	-05	LABORATORY SESSION	LAB MANUAL PGS****
1	01/28	01/30	02/01	Introduction; Grading; Safety Rules; Ethics, Science and the Scientific Method▲; Lab Equipment; Check-In **	
2	02/04	02/06	02/08	Concentration Unit Conversions, Textbook §13.4	
3	02/11	02/13	02/15	Rates of Chemical Reactions: Iodination of Acetone **	91 (99)
4	02/20◊	*05/15*	02/22	Determination of the Equilibrium Constant for a Chemical Reaction **	101 (109)
5	02/25	02/27	03/01	Review for March 04 Exam 1*****	
6	03/04	03/06	03/08	Properties of Systems in Equilibrium, Le Châtelier's Principle **	111 (121)
7	03/11	03/13	03/15	Standardization of a Basic Solution and Determination of Equivalent Mass (U) **	123 (129)
8	*05/13*	03/20	03/22	Determination of the Solubility Product of PbI_2 **	151 (157)
9	03/18	04/03	04/05	Review for April 08 Exam 2*****	
10	04/08†	04/10†	04/12†	Analysis of an Unknown Chloride (U) **	143 (149)
11	04/15	04/17	04/19	Determination of Iron By Reaction with Permanganate: A Redox Titration (U) **	159 (163)
12	04/22	04/24	04/26	Review for April 29 Exam 3*****	
13	04/29	05/01	05/03	Spot Tests for Some Common Anions (U) **	165 (171)
14	05/06	05/08	05/10	Qualitative Analysis of Group I Cations (U) ** / Lab check-out	173 (179)
	05/17***	05/17***	05/17***	*DEPARTMENTAL COMPREHENSIVE LAB EXAMINATION****	

* There is generally one recitation session per week in accordance with the boxed schedule on page one. ▲Reoccurring topic throughout semester **Must have/wear safety glasses

*** The Comprehensive Lab Examination will be held on Departmental Exam Day. The date, 5/17, is determined by the Registrar's Office and is subject to change, so plan to be present 5/17 – 5/24. The Advance Study Assignment (ASA) for each exercise may be found on the page indicated in ( ) and must be completed prior to the scheduled lab.

**** You must be prepared to hand in Advanced Study Assignments (ASA's) at the beginning of the laboratory session. Located at the end of each laboratory exercise in your lab manual, they are designed to assist you in understanding the theoretical principles and mathematical calculations required before you come to the laboratory so that you can work efficiently and-- more importantly-- safely. Failure to submit a completed ASA when requested will result in a severe performance factor penalty. In order to receive full credit on an ASA, you must show all work, including, when applicable, formulas, unit conversions required to use the formulas, significant digits, etc. Do not omit documenting any steps. Note: On Exam Days, scheduled labs will meet but Recitation Sessions will not since recitation classrooms will be used for exams.

***** The instructors will review the chapters which will be the subject of the next exam. It is not a review of the upcoming exam and they will not "teach to the test." Students prepare by learning the chapters' contents.

† Last day to withdraw without academic penalty is Friday, 04/12

General Chemistry lab technicians (responsible for all lab preparations, supplies and equipment):
Angela Vuong (Supervising CLT, 03.82.04NB); Mircea Comanescu (-01), Melodie Yu (-02), Angela Vuong (-03), Melodie Yu (-04), Maria Petela (-05)

Lab Manual: (The lab manual must be brought to each lab session. Any recent JJC General Chemstry custom 103/104 lab manual not written in is fine.)
JJC Science Dept. General Chemisty Che 103-104 Customized Laboratory Manual. Cengage Learning Inc. 2008. (ISBN 0-495-5423483)

Other required material (must be brought to each laboratory session):
--- Splash-resistant safety goggles or safety glasses meeting the ANSI Z87.1 standard. All students must wear safety glasses or goggles in lab. Students requiring corrective lenses must wear safety glasses or goggles over the lenses. (Two sizes of safety glasses and large goggles are available at the book store. Ask specifically for Che 103/104 safety glasses at the help desk.)
--- Chemical-resistant gloves.
--- An approved calculators specified in this syllabus. Course professors will use Texas Instruments TI-30XA.

A SIGNED COPY OF THE SAFETY RULES MUST BE TAPED TO THE INSIDE COVER OF YOUR LAB MANUAL