JOHN JAY COLLEGE OF CRIMINAL JUSTICE / CUNY

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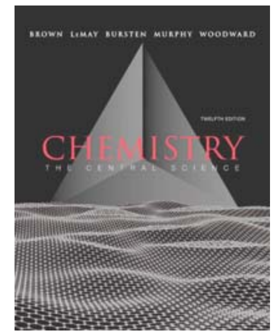
GENERAL CHEMISTRY I (CHE 103) FALL 2012 SYLLABUS

	Professor	*Office (NB)*	*Phone*	*E-mail*	*Office Hours*	*Room/Lab*	*-01 (0058)*	*-02 (0059)*	*-03 (2850)*	*-04 (2851)*
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	Helen Chan	04.70.07	646-781-5686	HChan@jjay.cuny.edu	with and without	L2.81		M-1		
Laboratory – 02	Rachel Boyll	03.61	use email →	RBoyll@jjay.cuny.edu	appointments on	3.70		M-3/4		
Recitation – 03	Yvette Rada	03.61	646-781-5740	YRada@jjay.cuny.edu	teaching days.	L2.82			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	Rosalie Lipovetsy	03.62	use email →	RLipovetsky@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
							-05 (0056)	-06 (0057)	-07 (1465)	-08 (2106)
Lecture– 05-08	Francis X. Sheehan	05.66.16	212-237-8951	FSheehan@jjay.cuny.edu	Faculty are very	L2.85	M&W-3	M&W-3	M&W-3	M&W-3
Recitation – 05	Helen Chan	04.70.07	646-781-5686	HChan@jjay.cuny.edu	accessible by email	L2.81	M-2			
Laboratory – 05	Rosalie Lipovetsy	03.62	use email →	RLipovetsky@jjay.cuny.edu	and in person, meeting	3.66	F-3/4			
Recitation – 06	Christopher Kluge	03.62	646-781-5743	CKluge@jjay.cuny.edu	with and without	L2.81		M-2		
Laboratory – 06	Helen Chan	04.70.07	646-781-5686	HChan@jjay.cuny.edu	appointments on	3.70		F-3/4		
Recitation – 07	Yvette Rada	03.61	646-781-5740	YRada@jjay.cuny.edu	teaching days.	L2.82			M-2	
Laboratory – 07	Rosalie Lipovetsky	03.62	use email →	RLipovetsky@jjay.cuny.edu	See handout for more	3.66			W-1/2	
Recitation – 08	Pia Austria	04.70.07	212-237-8894	PAustria@jjay.cuny.edu	specific dates/times.	L2.82				M-2
Laboratory – 08	Pia Austria	04.70.07	212-237-8894	PAustria@jjay.cuny.edu		3.70				W-1/2
							-09 (2852)			
Lecture– 09	Francis X. Sheehan	05.66.16	212-237-8951	FSheehan@jjay.cuny.edu		1.109	M&W-1			
Recitation – 09	Rosalie Lipovetsy	03.62	use email →	RLipovetsky@jjay.cuny.edu	See above.	1.107	M-2			
Laboratory – 09	Melissa Fernandez	03.62	use email →	MFernandez@jjay.cuny.edu		3.66	F-1/2			

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



ISBN-10: 0-321-787560

COURSE DESCRIPTION AND OBJECTIVES: This is the first of a two-semester course primarily intended for Forensic Science and Fire Science majors, as well as others interested in developing a strong knowledge base of general chemistry principles. It provides students with a better understanding of the chemical world around us and is a prerequisite for more advanced chemistry courses. The course introduces the basic properties and reactions of elements and compounds which will be further explored in greater detail in the second semester. The accompanying laboratory stresses principles of qualitative and semi-quantitative experimentation. The laboratory exercises are designed to foster a better understanding of chemical principles and ensure the necessary foundation skills are developed to work in a scientific laboratory safely and effectively. 3 hours lecture,1.5 hours recitation, 3 hours laboratory. 5 credits.

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)

Note: 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 at least one week for the stop to be removed.

LEARNING OUTCOMES – COURSE

Reasoning

- Apply critical thinking skills to introductory problem solving exercises in chemistry.
- Use analytical reasoning skills in course exercises of increasing complexity/difficulty.
- Understand the creative aspects of historical discoveries in chemistry.
- Analyze data and perform basic aspects of statistical analysis.
- Recognize statements of statistical validity of data.
- Understand the significance of reaction rate laws and equilibrium process in experimental data.

Knowledge

- Illustrate a basic understanding of the process of scientific investigation including experimental design, data collection and analysis, and uncertainty and error in measurement.
- Understand how the history of scientific investigation relates to core chemical concepts.
- Demonstrate an understanding of basic mathematical principles in chemistry; modern atomic and molecular theory; properties and reactions of elements and compounds; physical and chemical properties of solids, liquids, and gases including reaction stoichiometry; and molar/concentration relationships.

Practical skills

- Illustrate a basic understanding of laboratory safety; scientific measurement; chemical reactions and formulas; chemical identification; solutions and dilutions; and primary instrumentation.
- Understand the role of personal background and bias in historical scientific investigations.

Communication

- Write coherent laboratory reports.

LEARNING OUTCOMES – DETAILED BY CHAPTER

CHAPTER 1 Learning Outcomes: Students will be able to:

- distinguish among elements, compounds and mixtures (including separation methods for mixtures).
- distinguish between chemical and physical change.
- know symbols for common elements.
- know common metric unit and SI units and prefixes, and be able to convert between temperature scales.
- know definition of density and be able to calculate quantities using it.
- use significant figures, scientific notation, SI units and dimensional analysis in calculations.
- know difference between accuracy and precision, and be able to identify which numbers in a measurement are exact.
- understand the differences between a scientific hypothesis and a theory.

Impediments to avoid to achieve CHAPTER 1 Learning Outcomes:

- confusing mass and weight
- having difficulty with algebraic manipulation and difficulty converting temperatures between Celsius and Fahrenheit scales is particularly problematic
- equating density with mass
- being unfamiliar with the prefixes used in the metric system or not using them properly (e.g. $1\ pm = 1 \times 10^{-12}\ m$ vs. $1\ m = 1 \times 10^{12}\ pm$)
- using precision and accuracy interchangeably
- not appreciating that in chemistry, measurement yields numbers determined with certain precision and in certain units; both depending on the type of the measuring device
- not finding exact numbers in calculations
- confusing significant figures and decimal places in arithmetic manipulations
- rounding off too soon in calculations or reporting the result to as many figures as the calculator produces
- not understanding the use of a conversion factor of exactly one
- in dimensional analysis problems not seeing that a physical quantity is a multiplication of value and units and, therefore, not performing algebraic operations on both the number and units

CHAPTER 2 Learning Outcomes: Students will be able to:
- describe and apply the basic postulates of Dalton's atomic theory.
- describe and apply the key experiments that led to the discovery of electrons and to the nuclear model of the atom.
- relate atomic weights to the masses of individual atoms and to their natural abundances.
- describe the organization of the periodic table including the locations of metals and nonmetals.
- identify organic compounds and their isomers, and name simple alkanes and alcohols.
- describe the structure of the atom in terms of protons, neutrons, and electrons.
- describe the electric charge and relative masses of protons, neutrons, and electrons.
- express the subatomic composition of isotopes using chemical symbols together with atomic number and mass number.
- distinguish between empirical formulas and molecular formulas.
- describe how molecular formulas and structural formulas are used to represent the compositions of molecules.
- distinguish between molecular substances and ionic substances in terms of their composition.
- write the complete atomic symbol for ions (including atomic number, mass number, and charge).
- use the periodic table to predict the charges of common ions.
- write the empirical formulas of ionic compounds, given the charges of their component ions.
- write the name of an ion given its chemical formula, or write the chemical formula given its name.
- write the name of an ionic compound given its chemical formula, or write the chemical formula given its name.
- name or write chemical formulas for binary inorganic compounds and for acids.

Impediments to avoid to achieve CHAPTER 2 Learning Outcomes:
- not understanding the concept of amu
- not seeing the difference between empirical and molecular formulas
- thinking that polyatomic ions can easily dissociate into smaller ions
- failing to recognize the importance of the periodic table as a tool for organizing and remembering chemical facts
- not relating the charges on common monoatomic ions to their position in the periodic table
- not realizing that an ionic compound can consist of nonmetals only, e.g., $(NH_4)_2SO_4$
- confusing the guidelines for naming ionic compounds with those for naming binary molecular compounds
- underestimating the importance of chapter 2

CHAPTER 3 Learning Outcomes: Students will be able to:
- balance chemical equations
- identify simple combination, decomposition, and combustion reactions, predict their products, and write their balanced chemical equations
- calculate formula weights and percentage composition by mass
- convert grams to moles and moles to grams using molar masses, and convert number of molecules to moles and moles to number of atoms or molecules using Avogadro's number
- calculate the empirical and molecular formula of a compound from percentage composition and molecular weight
- calculate amounts, in grams or moles, of reactants and products for a reaction
- determine the limiting reactant in a reaction and use it to determine the amounts of products formed
- calculate the percent yield of a reaction.

Impediments to avoid to achieve CHAPTER 3 Learning Outcomes:
- confusing the subscripts in a chemical formula with the coefficients in front of the formula in a balanced reaction equation
- having difficulty grasping the meaning of a mole as a “collective,” a mole of a substance contains a fixed number (6.022×10^{23}) of “building blocks” (atoms for most elements, molecules for molecular substances, formula units for ionic substances) in the same fashion as a dozen means 12 (eggs, people, items, etc.)
- not understanding that mass of 1 mole of substance X can be significantly different from the mass of substance Y
- not appreciating that the coefficients in an empirical formula are not exact whole numbers because of experimental or round-off errors and not understanding the existence of experimental error
- not understanding the difference between the amount of material present in the laboratory (or given in the problem) and the number of moles required by stoichiometry
- not understanding that the reagent that gives the smallest amount of product is the limiting reactant
- thinking a percent yield in excess of 100% is a good thing

CHAPTER 4 Learning Outcomes: Students will be able to:

- classify substances as either strong electrolytes, weak electrolytes or non-electrolytes, and demonstrate an understanding of the differences between the three.
- given the molecular equation for a reaction be able to identify spectator ions and write the full ionic equation and/or the net ionic equation for the same reaction.
- recognize and differentiate between strong acids, weak acids, strong bases and weak bases.
- assign oxidation numbers to individual atoms in neutral substances and ions, and use these assignments to determine which substance is reduced which substance oxidized in a redox reaction.
- identify simple acid-base, precipitation and redox reactions and be able to predict the products of such reactions.
- calculate the molarity of a solution, and be able to convert between molarity, the number of moles present in a solution, and the volume of the solution.
- know how to prepare a dilute solution with a specific concentration and volume from a more concentrated solution.
- determine limiting reactants and/or calculate theoretical yields of reactions involving aqueous solutions, and use the results of a titration to determine the concentration of an unknown solution.

Impediments to avoid to achieve CHAPTER 4 Learning Outcomes:

- forgetting molarity is moles of solute per liter of solution, not per liter of solvent
- using moles instead of molarity in $M_{initial}V_{initial} = M_{final}V_{final}$
- disregarding rules for significant figures when calculating or using molarities
- thinking that water is a good conductor
- having a problem with the arbitrary difference between strong and weak electrolytes
- thinking that nonelectrolytes produce no ions in aqueous solution at all
- not being able to tell the difference between dissolution and dissociation
- confusing the symbols $\rightleftharpoons$ (equilibrium) and $\Leftrightarrow$ (resonance)
- not seeing that the net ionic equation for the reaction between strong acids and strong bases is always $H^+_{(aq)} + OH^-_{(aq)} \rightleftharpoons H_2O_{(\ell)}$
- trying to split polyatomic ions into smaller ions when they write net ionic equations
- thinking that a compound consisting of nonmetals only must be molecular (counter-example: $(NH_4)_2SO_4$ which is ionic!)
- not realizing that insoluble really means poorly soluble
- not appreciating the difference between equivalence point and end point
- thinking that an oxidation necessarily involves a reaction with oxygen and/or addition of an atom of oxygen to the formula
- thinking that all atoms of the same element must have the same oxidation number and that this number is uniquely related to the atom's location in the periodic table
- not realizing the equivalence point of a titration is the point where the stoichiometrically correct number of moles of each reactant is present and the end point of a titration is the point where the indicator changes and that they are not the same even though we choose an indicator that will change as close to the equivalence point as possible

CHAPTER 5 Learning Outcomes: Students will be able to:

- distinguish between kinetic and potential energy, and interconvert energy units.
- distinguish between the system and the surroundings in thermodynamics.
- state the first law of thermodynamics.
- understand the concept of a state function and be able to give examples of quantities that are and are not state functions.
- express the relationships among the quantities q, w, ΔE and ΔH, and be able to learn their sign conventions, including how the signs of q and ΔH relate to whether a process is exothermic or endothermic.
- use thermochemical equations to relate the change in enthalpy (ΔH) to the amount of substance involved in the reaction.
- relate temperature measurements and heat transferred by using heat capacities or specific heats (calorimetry).
- use Hess' law to determine enthalpy changes for chemical reactions.
- use standard enthalpies of formation to calculate ΔH° for reactions.
- understand the meaning of spontaneous process, reversible process, irreversible process, and isothermal process.

Impediments to avoid to achieve CHAPTER 5 Learning Outcomes:

- confusing power and energy
- confusing heat with temperature
- failing to note that the first law of thermodynamics is the law of conservation of energy
- having difficulty determining what constitutes the system and what constitutes the surroundings
- overcoming the problematic sign conventions (+ and -) used in thermodynamics
- not realizing that a chemical reaction carried out in an open container occurs at constant pressure
- thinking that heat is a state function since enthalpy is a state function and $\Delta H = q_p$
- not being able to tell the difference between enthalpy of a reaction ΔH_{rxn} (in kJ) and molar enthalpy (per one mole of one of the reacting species, in kJ/mol)
- not realizing that Hess' law is a consequence of the fact that enthalpy is a state function
- not knowing where a list of standard enthalpy values can be found in the text (Appendix C)
- having difficulties with calculating a value of $\Delta H_f°$ for a compound not listed in Appendix C from $\Delta H°_{rxn}$ and the available $\Delta H_f°$ values
- thinking that any reaction in which a given compound is formed, regardless of the type of reactants, should be called a formation reaction
- neglecting to notice that a formation reaction leads to a formation of 1 mole of a compound

CHAPTER 6 Learning Outcomes: Students will be able to:

- explain what photons are, and be able to calculate their energies given either their frequency or wavelength.
- using the Bohr theory, explain how line spectra relate to the idea of quantized energy states of electrons in atoms.
- relate the quantum numbers to the number and type of orbitals, and recognize the different orbital shapes.
- interpret radial probability function graphs for the orbitals.
- draw an energy-level diagram for the orbitals in a many-electron atom, and describe how electrons populate the orbitals in the ground-state of an atom, using the Pauli exclusion principle and hund's rule.
- use the Periodic Table to write condensed electron configurations and determine the number of unpaired electrons in an atom.
- calculate the wavelength of electromagnetic radiation given its frequency or its frequency given its wavelength.
- order the common kinds of radiation in the electromagnetic spectrum according to their wavelengths or energy.
- calculate the wavelength of a moving object.
- explain how the uncertainty principle limits how precisely we can specify the position and the momentum of subatomic particles such as electrons.

Impediments to avoid to achieve CHAPTER 6 Learning Outcomes:

- having difficulty converting between angstroms, nanometers, etc. and meters
- having difficulty switching from the language of certainties to the language of probabilities
- being put off by the mathematics, vocabulary, foreign names, and an apparent intangibility of the information
- being unaware that the quantum theory laid foundations for such areas as spectroscopy and nanotechnology, just to mention a few
- confusing Bohr's orbits with orbitals; most spellcheckers do not recognize the word "orbital"
- mistakenly thinking that spectral lines represent energy levels
- having difficulty associating a given line in an emission (or absorption) spectrum with a transition between two energy levels
- drawing 2, 6, 10, and 14 "boxes" in orbital diagrams for s, p, d, and f orbitals, respectively

CHAPTER 7 Learning Outcomes: Students will be able to:

- understand the meaning of effective nuclear charge, Z_{eff}, and how Z_{eff} depends upon nuclear charge and electron configuration.
- use the periodic table to predict the trends in atomic radii, ionic radii, ionization energy, and electron affinity.
- explain how the radius of an atom changes upon losing electrons to form a cation or gaining electrons to form an anion.
- explain how the ionization energy changes as we remove successive electrons, and recognize the jump in ionization energy that occurs when the ionization corresponds to removing a core electron.
- be able to write the electron configurations of ions.
- understand how irregularities in the periodic trends for electron affinity can be related to electron configuration.
- recognize the differences in chemical and physical properties of metals and nonmetals, including the basicity of metal oxides and the acidity of nonmetal oxides.
- understand how the atomic properties, such as ionization energy and electron configuration, are related to the chemical reactivity and physical properties of the alkali and alkaline earth metals (groups 1A and 2A).
- be able to write balanced equations for the reactions of the group 1A and 2A metals with water, oxygen, hydrogen, and the halogens.
- understand and recognize the unique characteristics of hydrogen.
- understand how the atomic properties (such as ionization energy, electron configuration, and electron affinity) of group 6A, 7A, and 8A elements are related to their chemical reactivity and physical properties.

Impediments to avoid to achieve CHAPTER 7 Learning Outcomes:

- having difficulty with the concepts of shielding and effective nuclear charge, and not recognizing that, as you move to the right in a period, shielding does not increase appreciably but the nuclear charge does, so the effective nuclear charge increases steadily as you move to the right along the period
- confusing why, within a period, atomic radii decrease with increasing atomic number
- not understanding slight irregularities in periodic trends for elements in each row after each ns subshell becomes filled, and after np and (n – 1)d subshells become half-filled
- having problems with the signs of electron affinities; in particular, why group 1A metals have negative (exothermic) electronegativities
- confusing the placement of hydrogen on the periodic table, and recognizing that, despite its common placement in column 1A, hydrogen is a nonmetal
- confusing behavior of elements in aqueous phase with periodic properties determined in gas phase (ionization energy, electron affinity) or in solid phase (ionic radius)
- confusing isoelectronic species with those with the same number of valence electrons

CHAPTER 8 Learning Outcomes: Students will be able to:

- be able to write the electron configurations of ions.
- write Lewis symbols for atoms and ions.
- understand lattice energy and be able to arrange compounds in order of increasing lattice energy based on the charges and sizes of the ions involved.
- write Lewis structures for molecules.
- identify periodic trends in electronegativity and use electronegativity differences to classify bonds as nonpolar covalent, polar covalent, or ionic bonds.
- calculate charge separation in diatomic molecules based on the experimentally measured dipole moment and bond distance.
- calculate formal charges from Lewis structures and use those formal charges to identify the dominant Lewis structure for a molecule or ion.
- recognize molecules where resonance structures are needed to describe the bonding.
- recognize exceptions to the octet rule and draw accurate Lewis structures even when the octet rule is not obeyed.
- understand the relationships among bond type (single, double, and triple), bond strength (or enthalpy) and bond length.
- use bond enthalpies to estimate enthalpy changes for reactions involving gas phase reactants and products.

Impediments to avoid to achieve CHAPTER 8 Learning Outcomes:

- thinking that a triple bond is three times as strong as a single bond, and not recognizing that the second and third bonds (π bonds) are weaker than the first (σ bond)
- confusing formal charges with real charges on atoms
- using the resonance arrow $\leftrightarrow$ to indicate equilibrium
- not appreciating that the exceptions to the octet rule are almost as common as the examples of substances that obey it
- confusing the octet rule with having any 8 valence electrons (e.g., $4s^2\ 3d^6$ for iron)
- thinking that all polar substances conduct electricity

CHAPTER 9 Learning Outcomes: Students will be able to:

- describe the three-dimensional shapes of molecules on the basis of the VSEPR (Valence Shell Electron Pair Repulsion) model.
- predict whether a molecule is polar or nonpolar based on its geometry and the individual bond dipole moments.
- explain the role that orbital overlap plays in covalent bond formation.
- specify the hybridization state of atoms in molecules based on a knowledge of the observed molecular structure.
- describe the types of hybrid orbitals that form from combining s and p atomic orbitals.
- using sketches, show how orbitals overlap to form sigma (σ) and pi (π) bonds.
- explain what is meant by a delocalized π bond in a molecule using a molecule such as benzene as an example.
- explain how bonding and antibonding orbitals are formed by overlap of atomic orbitals.
- sketch molecular orbital energy level diagrams for diatomic molecules.
- give an account of how bond orders and electron configurations follow from electron placements in homonuclear diatomic molecules.
- describe how bond order, bond strength and bond length relate to one another.

Impediments to avoid to achieve CHAPTER 9 Learning Outcomes:

- finding it difficult to think in three dimensions or believing that a square planar arrangement is the best arrangement for the least repulsion of four electron domains
- confusing the electron domain geometry and the molecular geometry (shape)
- not realizing that in order to determine whether a molecule is polar, the correct molecular geometry needs to be established
- not realizing that large molecules with several central atoms do not have easily describable molecular shapes and not realizing the geometry about each central atom has to be determined individually
- finding it difficult to understand how a molecule with polar bonds can be nonpolar; possibly needing a review of basic vector algebra to illustrate how the net dipole is derived
- attempting to determine polarity of ions
- not realizing that hybridization is related to the electron-domain geometry, not the molecular geometry
- not realizing that in wave mechanics bonding orbitals result from constructive interference and antibonding orbitals form destructive interference

CHAPTER 10 Learning Outcomes: Students will be able to:

- calculate P, V, n, or T using the ideal-gas equation.
- understand how the gas laws relate to the ideal gas equation and apply the gas laws in calculations.
- calculate the density or molecular weight of a gas.
- calculate the volume of gas consumed or formed in a chemical reaction.
- calculate the total pressure of a gas mixture given its partial pressures, or given information for calculating partial pressures.
- describe the kinetic-molecular theory of gases and how it explains the pressure and temperature of a gas, the gas laws, and the rates of effusion and diffusion.
- explain why intermolecular attractions and molecular volumes cause real gases to deviate from ideal behavior at high pressure or low pressure.

Impediments to avoid to achieve CHAPTER 10 Learning Outcomes:

- forgetting to use temperature in Kelvin in gas problems
- because there are several systems of units, using ideal gas constants with units inconsistent with values
- confusing the standard conditions for gas behavior (STP) with the standard conditions in thermodynamics
- not recognizing that ideal gas behavior should discussed as just that, ideal, and not recognizing that real gases do not behave ideally, especially at high pressures and/or low temperatures
- expecting a change in the gas particle distribution upon temperature changes at constant V
- confusing effusion and diffusion

CHAPTER 11 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.
- explain the concepts of viscosity and surface tension in liquids, and compare the relative strengths of viscosity and/or surface tension based on the composition and molecular structure.
- describe the differences in solids, liquids and gases and the characteristic properties of each, and know the names of the various changes in state between these three states of matter.
- interpret heating curves and be able to calculate quantities related to temperature and enthalpies of phase changes.
- explain how the vapor pressure of a liquid varies with changes in temperature and/or intermolecular forces, and describe the relationship between vapor pressure and boiling point and use it to predict the effect of changing pressure on the boiling point.
- be able to interpret and sketch phase diagrams. define critical pressure, critical temperature, critical point, triple point, normal melting point and normal boiling point.
- identify the characteristics of nematic, smectic and cholesteric liquid crystals and describe how they differ from ordinary liquids, and be able to recognize the features of molecules that favor formation of liquid crystalline phases.

Impediments to avoid to achieve CHAPTER 11 Learning Outcomes:

- confusing intermolecular and intramolecular forces
- not appreciating how important information from earlier chapters is for the understanding of concepts in this chapter
- having difficulty predicting the relative strength of intermolecular forces involved in different materials
- being unaware that there can be intramolecular hydrogen bonding
- confusing cohesion and adhesion
- not realizing that, under the right set of conditions, water also sublimes
- thinking that more viscous necessarily means more dense
- thinking that the “liquid” in liquid crystals refers to these materials being pliable rather than actually being liquid
- confusing LCD and plasma TV technologies

CHAPTER 12 Learning Outcomes: Students will be able to:

- classify solids based on their bonding/intermolecular forces and describe the ways in which these forces relate to the physical properties of solids.
- explain the differences between crystalline and amorphous solids, and identify each of the four two-dimensional and seven three-dimensional primitive crystal lattices.
- recognize common structures of metallic and ionic solids, and calculate the unit cell dimensions, empirical formula and density of these solids from a picture of the unit cell and tabulated values of ionic/atomic radii.
- explain how homogeneous and heterogeneous alloys differ, and describe the differences between substitutional alloys, interstitial alloys and intermetallic compounds.
- describe the similarities-differences between the electron sea model and molecular orbital model of metallic bonding, and use molecular orbital theory to qualitatively predict periodic trends in melting point, boiling point, and hardness of metallic elements
- predict the structures of ionic solids from their ionic radii and empirical formula.
- describe the basic electronic structure of a semiconductor, and use the periodic table to qualitatively compare the band gap energies of semiconductors.
- explain how doping can be used to control the conductivity of semiconductors and identify elements that can be used to n-dope or p-dope a semiconductor.
- explain how polymers are formed from monomers and recognize the features of a molecule that allow it to react to form a polymer
- explain the differences between addition polymerization and condensation polymerization.
- explain how the interactions between polymer chains are related to the physical properties of polymers.
- explain how the properties of semiconductors and metals change as the size of the crystals decreases into the nanometer-length scale.

Impediments to avoid to achieve CHAPTER 12 Learning Outcomes:

- having difficulty in “seeing” unit cells and crystal lattices or not realizing how helpful the use of models can be
- equating the word “solution” with something liquid, not realizing that, mixtures of such solids as metals are also solutions (alloys), or, similarly, liquids or solids dissolved in gases are also solutions, which we call foams
- not realizing that, in ionic solids, it is not just the strength of the electrostatic interactions but the multitude of such interactions that affects such properties as solubility, hardness and melting point
- not being aware that many nanomaterials naturally occur in the environment and living organisms and have existed prior to nanotechnology becoming a popular new field of research

Prerequisites
Open to students who have received a grade higher than C in high school chemistry or who received a grade of at least 80% on the Chemistry Regents. Co-requisite: MAT 141 or MAT 105 . Not open to students who completed CHE 102 or CHE 192.

GRADING POLICY: This five 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 an 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 online homework assignments by their due dates, as well as attendance and meaningful participation in the recitation sessions. Active participation during the 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 one, students who do not bring the required clicker to a class and use it when requested will be marked absent.

Laboratory: The final laboratory grade is based on two factors: (1) the comprehensive lab final (which tests mastery of the theoretical and practical aspects of the assigned laboratory exercises) and (2) a "performance" factor (0.00 - 1.00). The lab grade is calculated by multiplying the lab exam score (0-25.0 pts) by the performance factor. To be objective, the performance factor will be 1.00 unless a safety rule is violated, instructions are not followed, there are excessive absences (more than two), lab equipment is lost or broken, an approved calculator is not used, participation is not meaningful or a completed ASA is not submitted when requested. There is a severe (5%) performance factor penalty for each violation. The clarity of any written explanations needed to answer questions on the ASA or handouts will be graded. Any lab keys or equipment issued must be personally returned to the Lab Technician by the last day of classes to avoid a significant performance factor penalty, an SC registration stop being imposed, 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 the 2005-2007 Undergraduate Bulletin. 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.

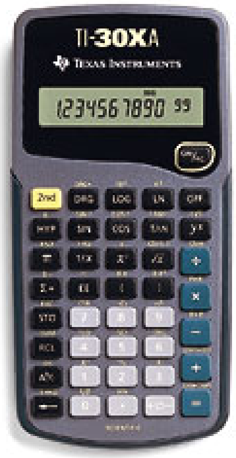
Extra Work:

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:

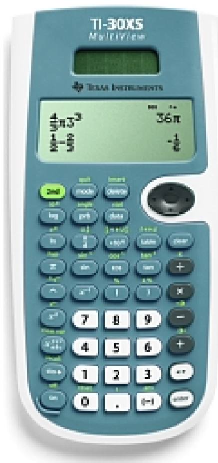
A grade of incomplete will only be issued if the student is absent from Exam 4 and/or the Lab Exam and the average of the best two of the first three exam grades applied to the missed Exam 4 and/or Lab Exam results in a passing grade. If a grade of Incomplete is assigned, it is the student's responsibility 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.).



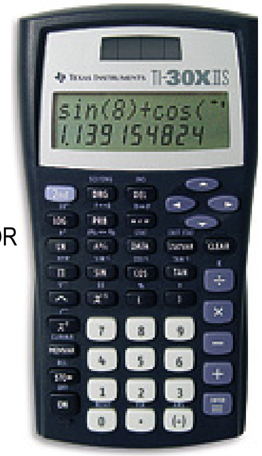
TI-30XA

OR



TI-30XS

OR

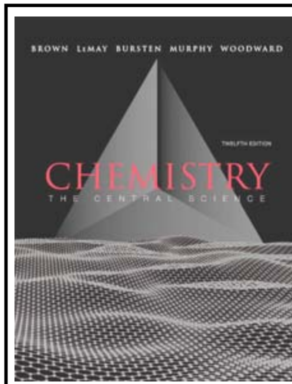


TI-30X IIS

AND

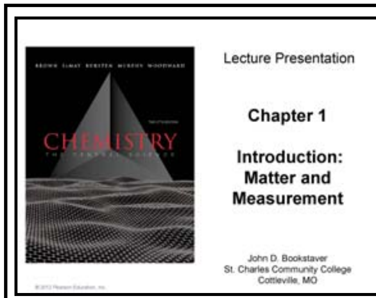
Turning Technologies
NXT (RCXR-03)

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. Thoughly 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 103 Lecture Schedule

*Dates in parentheses are Wednesday sessions

LECTURE	DATE*	TOPICS / Readings	TEXTBOOK EXERCISES (Also see MC homework note on right)
1	08/27	Course Intro, **MC**, Math Review 1.1 The Study of Chemistry 1.2 Classifications of Matter 1.3 Properties of Matter	 1.1, .5, .11, .13 1.**2**, .3, .17, .19, .21
2	(08/29)	1.4 Units of Measurement 1.5 Uncertainty in Measurement 1.6 Dimensional Analysis	1.23, .25, .27a, .31 1.33, .35, .37, .39, .41 1.45, .47, .55
3	(09/05)	2.1 The Atomic Theory of Matter 2.2 The Discovery of Atomic Structure 2.3 The Modern View of Atomic Structure	2.9, .11 2.1, .13, .15 2.19, .21, .25
4	09/10	2.4 Atomic Weights 2.5 The Periodic Table 2.6 Molecules and Molecular Compounds	2.29, .33 2.4, .37, .53 2.41, 2.43
5	(09/12)	2.7 Ions and Ionic Compounds 2.8 Naming Inorganic Compounds 2.9 Some Simple Organic Compounds	2.57, .59 2.61, .63, .69, .71 2.75, .77, .79
6	(09/19)	3.1 Chemical Equations 3.2 Some Simple Patterns of Chemical Reactivity 3.3 Formula Weights 3.4 Avogadro's Number and the Mole	3.1, .9, .11a-c, .13 3.3, .15, .17, .19 3.21a-c, 3.23a-c, .25 3.27, .33, .35b
7	09/24	3.5 Empirical Formulas from Analyses 3.6 Quantitative Information from Balanced Equations 3.7 Limiting Reactants	3.5, .43, .47, .49, .53a 3.59, .61, .63 3.7, 3.71, .73, .77
8	10/01	4.1 General Properties of Aqueous Solutions 4.2 Precipitation Reactions 4.3 Acids, Bases, and Neutralization Reactions	4.11, .13, .15, .17 4.19, .21, .23, .27 4.29, .35, .37, .39
9	(10/03)	4.4 Oxidation-Reduction Reactions 4.5 Concentrations of Solutions 4.6 Solution Stoichiometry and Chemical Analysis	4.45, .47, .49, .51a-b, .55, .57 4.59, .61, .65, .73, .75 4.79, .81, .83
	10/10◊	**LECTURE EXAM 1**	**CHAPTERS 1-3**
10	10/15	5.1 The Nature of Energy 5.2 The First Law of Thermodynamics 5.3 Enthalpy 5.4 Enthalpies of Reaction	5.1, .13, .17, .19, .21, .23 5.5, .25, .27, .29, .31 5.8, 5.33 5.35, .37, .45a, .47
11	(10/17)	5.5 Calorimetry 5.6 Hess's Law 5.7 Enthalpies of Formation 5.8 Fuels and Foods	5.49, .53, .57 5.11, .61, .65 5.67, .71, .73a-b 5.81, .83, .85
12	10/22	6.1 The Wave Nature of Light 6.2 Quantized Energy and Photons 6.3 Line Spectra and the Bohr Model 6.4 The Wave Behavior of Matter	6.2, .11, .13, .15, .17, .19 6.21, .23, .25 6.33, .35, .37, .39 6.43b, .47a
13	(10/24)	6.5 Quantum Mechanics and Atomic Orbitals 6.6 Representations of Orbitals 6.7 Many-Electron Atoms 6.8 Electron Configurations 6.9 Electron Configurations and the Periodic Table	6.5, .49, .51, .53, .55 6.57, .59 6.61, .63 6.8, .65, .67, .69 6.71 (using only the periodic table)

CONTINUED ON NEXT PAGE

Fall 2012 Semester Details

First day of clases: 08/27
No classes: 9/3, 9/17-18, 9/25-26, 10/8, 11/22-25
Last day of classes: 12/12
Reading Day: 12/13
Department Exam Day: 12/14
Finals Week: 12/14 – 12/21
Occasionally due to classroom space limitations on Dept. Exam Day, Reading Day is used to give General Chemistry Departmental Exams.

Do not make vacation or other plans for any part of 12/13-12/21 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 10/10 is a JJ Monday. Monday classes meet. Wednesday classes do not meet.

† Last day to withdraw without academic penalty is Friday, 11/09

‡ Last Day of Classes, 12/12

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 12/14 at 5pm to avoid an "SC" Science Dept. equipment registration stop being imposed.

Timely Return or Replace the Clicker

14	10/29	7.1 Development of the Periodic Table 7.2 Effective Nuclear Charge 7.3 Sizes of Atoms and Ions 7.4 Ionization Energy	To be assigned mid-semester
15	(10/31)	7.5 Electron Affinities 7.6 Metals, Nonmetals, and Metalloids 7.7 Trends for Group 1A and 2A Metals 7.8 Trends for Selected Nonmetals	To be assigned mid-semester
	11/05	**LECTURE EXAM 2**	**CHAPTERS 4-6**
16	(11/07)†	8.1 Lewis Symbols, and the Octet Rule 8.2 Ionic Bonding 8.3 Covalent Bonding 8.4 Bond Polarity and Electronegativity	To be assigned mid-semester
17	11/12	8.5 Drawing Lewis Structures 8.6 Resonance Structures 8.7 Exceptions to the Octet Rule 8.8 Strengths of Covalent Bonds	To be assigned mid-semester
18	(11/14)	9.1 Molecular Shapes 9.2 VSEPR Model 9.3 Molecular Shape and Molecular Polarity 9.4 Covalent Bonding and Orbital Overlap	To be assigned mid-semester
19	11/19	9.5 Hybrid Orbitals 9.6 Multiple Bonds 9.7 Molecular Orbitals 9.8 Period 2 Diatomic Molecules	To be assigned mid-semester
20	(11/21)	10.1 Characteristics of Gases 10.2 Pressure 10.3 Gas Laws 10.4 The Ideal-Gas Equation 10.5 Further Applications of the Ideal-Gas Equation	To be assigned mid-semester
	11/26	**LECTURE EXAM 3**	**CHAPTERS 7-9**
21	(11/28)	10.6 Gas Mixtures and Partial Pressures 10.7 Kinetic-Molecular Theory of Gases 10.8 Molecular Effusion and Diffusion 10.9 Real Gases: Deviations from Ideal Behavior	To be assigned mid-semester
22	12/03	11.1 A Molecular Comparison of Gases, Liquids, and Solids 11.2 Intermolecular Forces 11.3 Select Properties of Liquids 11.4 Phase Changes	To be assigned mid-semester
23	(12/05)	11.5 Vapor Pressure 11.6 Phase Diagrams 11.7 Liquid Crystals	To be assigned mid-semester
24	12/10	12.1 Classifications of Solids 12.2 Structures of Solids 12.3 Metallic Solids 12.4 Metallic Bonding 12.5 Ionic Solids	To be assigned mid-semester
25	(12/12)✋	12.6 Molecular Solids 12.7 Covalent-Network Solids 12.8 Polymeric Solids 12.9 Nanomaterials	To be assigned mid-semester
	TBD‡	**LECTURE EXAM 4**	**(CHAPTERS 10-12, Cumulative)**

STOP THE STOP

RETURN OR REPLACE THE LOANED CLICKER WITHIN TEN DAYS OF WITHDRAWING OR DROPPING THE COURSE OR BY DEPARTMENT EXAM DAY, 12/14/12, 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.

Get the message? We want the clickers back.

Che 103 Laboratory / Recitation* Schedule

SESSION	-01,02	-03,04,07,08	-05,06,09	LABORATORY SESSION	LAB MANUAL PGS****
1	8/27	8/29	08/31	Introduction, Syllabus, Safety Rules, Emergency Notification Data, Grading, Math Intro, Significant Figures & Scientific Notation	
2	9/10	09/05	09/07	Accuracy of Common Measuring Devices** Lab Drawer Check-In and Equipment** Introduction to Advance Study Assignments: Density ASA Work Session, p. 41	Handouts & Appendices IV, V
3	9/24	09/12	09/14	Apparatus Setup and Use (students will individually practice the following techniques)** ~~BB~~ A. Handling Chemicals, pp 3-4 ; B. Weighing Techniques, pp. 5-7; C. Volumetric Techniques, pp. 7-12; D-E. ~~Bunsen Burners, pp. 12-13~~; F. Separation Techniques, pp. 13-16; H. Working with Glass, pp. 17-20; I1. Testing for Odor, p. 20; J. Spectrophotometry, pp. 22-23; K. Treatment of Experimental Data, pp. 23-24	3 – 36, Appendices IV, V
4	10/10Δ	09/19	09/21	The Densities of Liquids and Solids**	37 (41)
5	10/01	10/03	10/05	*Review of Chapters for Monday, October 10, Lecture Exam I (two periods)******	
6	10/15	10/17	10/12	Lecture in Lab (two periods): Textbook sections to be announced	
7	10/22	10/24	10/19	Resolution of Matter into Pure Substances, I. Paper Chromatography**	43 (49)
8	11/05Δ	11/07	10/26	Resolution of Matter into Pure Substances, II. Fractional Crystallization** BB	51 (57)
9	10/29	10/31	11/02	*Review of Chapters for Monday, November 05, Lecture Exam II (two periods) ******	
10	11/12	11/14	11/09	Determination of a Chemical Formula** BB	59 (65)
11	11/19	11/21	11/16	*Review of Chapters for Monday, November 26, Lecture Exam III (two periods) ******	
12	11/26Δ	11/28	11/30	Heats Effects and Calorimetry** BB	83 (89)
13	12/03	12/05	12/07	Analysis of Al-Zn Alloy**	73 (79)
14	12/10	12/12	09/28demo	Identification of a Compound Using Mass Relationships** BB	67 (71)
	12/14	12/14	12/14	*DEPARTMENTAL COMPREHENSIVE LAB EXAMINATION****	

* There is generally one recitation session per week in accordance with the boxed schedule on page one. **Must have/wear safety glasses Δ= lab is after lecture exam

*** The Comprehensive Lab Examination will be held on Departmental Exam Day. The date, 12/14, is determined by the Registrar's Office and is subject to change, so plan to be present 12/13 – 12/21.
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 Day, scheduled labs will meet but Recitation Sessions will not since 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.

General Chemistry lab technicians (responsible for all lab preparations, supplies and equipment):
Angela Vuong (Supervising CLT, 03.82.04NB, M/W/F). Tiffany Millett (03.61.00NB, Mon: 10-2pm). Nisha Panikkaveetil (03.82.02NB, Mon: 10-2pm, Wed:7:30-2pm, Fri:10-2:pm)

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