SYLLABUS FOR CHEMISTRY 1A – FALL 2012
Sections 56493 and 56494

Instructor: **Veronica Cornel**

Lab Instructors: 11-1:50 Veronica Cornel or 2:00-4:50 Bill Blanken

Contact info: e-mail   **vmcornel3@verizon.net** (using "Chem1A" as the subject or I will delete it) or leave message at the front desk or on my voicemail (559) 638-3641 ext. 3449

Website: http://blackboard.reedleycollege.edu

Office Hours: 10-11am MWF in PHY78

Tutoring: Free tutoring available in the Tutorial Center (by the library).

Course Objectives: Chemistry 1A is an general course in chemistry designed not only for chemistry majors, but also for biology, physics, chemical engineering, pre-medical and pre-pharmacy majors. As a prerequisite students need to have passed **CHEM10, or High School chemistry**, with at least a C grade as well as basic algebra (**Math 103**).

Textbook: Nivaldo J. Tro: Chemistry: A Molecular Approach (1st or 2nd Edition). A softcover, version of the 2nd edition is available at our bookstore. The first half of the book will be used in CHEM1A and the second half in CHEM1B. The Mastering Chem CD is not required for CHEM1A homework, but will be required for CHEM1B. The license is valid for both semesters. For CHEM1A you may choose whether to do your homework on Mastering Chemistry or on paper. If you do use Mastering Chemistry select the 2nd edition of the textbook and use CORNEL1AFA2012 as the course name.

Lab Manual: Dekker: Quantitative and Qualitative Laboratory Experiments **BOOK A** (not BOOK B)

Other Supplies: A calculator is required (needs exponents and logs, but not a programmable calculator. Approved safety glasses, lab coat and closed shoes

Lecture Notes: **Download** from my Blackboard website prior to class and **fill in** the notes during class. Homework from your textbook is assigned at the end of the notes and is due the next lecture period, or you may do the homework on Mastering Chemistry. Studies have shown that 90% of the lecture material is retained if you review the lecture within 24 hours.

Homework: Homework will be assigned every lecture. It is essential to your success in this class that you do all the assigned homework and read the relevant sections in your Textbook. All homework will be collected at the beginning of the following lecture and selected problems graded. This is to ensure that you work consistently and can apply what you learn to problems. There will be no make-up homework assignments, but I will drop the lowest two homework assignments. Do not just copy somebody else's homework or you will not be able to do the problems for yourself in the exams. You can ask another student or tutor to help you start some problems, but you need to work them out for yourself. Even if you get all the problems wrong, you will still get 70% for the assignment for attempting all the problems yourself and showing all your work. You will learn where you are going wrong when I go over the homework. The latest I will accept homework is just before I hand back the graded homework the next lecture. This is not ideal as you won't have your homework in front of you when I go over it and you will loose 10% for the homework being late. Absence is not an excuse for not doing your homework as you can send it in with another student, or count that assignment as one you drop. If you leave the class or are disruptive while I go over homework, I will also deduct points. It is advisable to write out the homework questions as well as the answers so you can study your homework. You can also do the corresponding odd number problems for extra practice and check the answers at the back of the book.

Attendance: Attendance in lecture and lab is mandatory. As an incentive to attend lectures, <u>an additional two homework assignments will be dropped at the end of the semester if a student attends 90% of the lectures</u>. The student will be <u>dropped</u> automatically if she/he misses <u>the first day of class</u>, without contacting the instructor. <u>If a student misses more than 25% of the lectures/labs, without contacting the instructor with a valid excuse, they will also be dropped</u>. Always inform the instructor ahead of time if you know you have to miss an exam. If you miss a lecture you need to read and summarize the chapter in the textbook **before** meeting with the instructor to discuss any problems. The homework will be on the internet notes so that you can do the homework even if you missed the lecture. <u>There will be no make-up exams.</u> The <u>final exam grade</u> will be <u>counted</u> for the grade for the <u>missing exam</u>. If you have not missed any exams, and do better in the final exam than one of the earlier exams, the final exam grade will <u>replace the earlier exam grade</u>. If a student is disruptive (including using cell-phones, interrupting the instructor continuously) they may be asked to leave the lecture/lab and recorded as "absent".

Drop Date for a refund: The last day to drop this class and get a refund is Aug 24.
Drop Date to avoid a "W": The last day to drop this class to avoid a "W" is September 3 (on WebAdvisor)
Labor Day: Monday Sept 3, no classes
Change to Pass/No Pass: The last day to make this change is September 14.
Drop Date for a "W": The last day to drop this class is Friday October 12. After this date a grade will be assigned.
Veteran's Day: Monday, Nov 12, no classes
Thanksgiving: Thursday and Friday Nov 22-23, no classes
Final Exam Date: Wednesday, Dec 12 from 11:00-12:50 in PHY76. The American Chemical Society CHEM1A exam will be given (multiple choice and cumulative).

Grading : There will be 5 lecture exams and the final exam, equally weighted and counting 65% of your grade. Homework will count 10% and your lab work will count 25% (12.5% lab reports and 12.5% lab quizzes)
General Grading break-off : **A** 90-100%, **B** 80-89%, **C** 70-79%, **D** 60-69%, **F** 0-59%

Please be aware of the following rules:
- Tardiness, leaving early, or sleeping during lectures will result in a partial or full absence being recorded. Students need to sign the sign-in sheet within the first 10 minutes of class.
- Fraudulent behavior during exams is graded with a (0) zero.
- Copying of homework, experimental data, and lab reports is considered fraudulent behavior for both <u>the copier and the originator</u>. DO NOT HAND IN IDENTICAL HOMEWORK.
- No homework may be handed in after I have gone over it in class. <u>No alternative homework will be given</u>. I will drop the lowest two homework assignments though.
- No extra credit will be given. <u>You need to work consistently from the beginning</u>.
- Please turn your cell phones onto "silent buzzer" mode during lectures so as not to disturb the class. No cell phones or i-pods will be allowed during exams.

LABS
- Safety glasses need to be worn whenever somebody near you is conducting an experiment.
- No experiments may be conducted without the instructor or teaching assistant present
- No horseplay or unauthorized experiments. Do not taste any chemical or smell any chemical directly.
- Dangerous behavior in the lab will result in the student being asked to leave the lab.
- No visitors inside the lab. You need to go outside to meet with them.
- No food or drinks allowed.

- Backpacks should not be left on the floor where others can trip over them.
- Closed shoes and lab coats must be worn in the lab at all times.
- Long hair should be tied back so it will not fall into chemicals or flames.
- If any accident occurs in the lab, inform your instructor and follow safety procedures. (To be discussed during first lab period)
- Clean up any spills promptly (Clean-up procedures will be discussed during first lab period)
- Do not point the open end of a test tube towards anybody
- Turn off flames when working with organic solvents. Dispose of them in waste bottles in the fume hood, not down the sink.
- At the beginning of each lab your instructor will inform you of any special safety precautions and how to dispose of used chemicals. You need to be on time for the lab so that you hear these instructions.
- Do not dispose of matches, paper or solid chemicals in the sink. Use the large evaporating dishes or sand bucket for spent matches.
- Put broken glassware in the "broken glassware box", not in the trash.
- Before leaving the lab, <u>wipe the desktop and wash your hands with soap and water</u>.

If you have a verified need for an academic accommodation (especially in labs) or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact me as soon as possible.

<u>**Course Outline: Each Topic takes 1-2 weeks References are to "Chemistry: A Molecular Approach" by Nivaldo Tro.**</u>

A. Matter and energy (Chapter 1)
   1. The Laws of conservation of matter and energy (Chapter 1.2)
   2. States of Matter (Chapter 1.3)
   3. Chemical and physical properties of matter (Chapter 1.4)
   4. Chemical and physical changes of matter (Chapter 1.4)

B. Measurements in chemistry
   1. Length, mass, volume (Chapter 1.6)
   2. Density and specific gravity (Chapter 1.6)
   3. Significant Figures (Chapter 1.7)
   4. Dimensional Analysis (Chapter 1.8)

C. Atoms, molecules, ions, compounds, elements and mixtures (Chapter 2)
   Atomic mass units and isotopes (Chapter 2.6)

D. Nomenclature
   1. Naming inorganic compounds with monatomic and polyatomic ions (Chapter 3.5)
   2. Naming moleculular compounds (Chapter 3.6)

E. Stiochiometry, chemical formulas, and equations
   1. Formulas of compounds, etc., and what they mean (Chapter 3.5-3.6)
   2. The mole, Avogadro's Number, and molar mass (Chapter 3.7)
   3. Formula weight, molecular weights, and moles (Chapter 3.7)
   4. Writing and balancing chemical equations (Chapter 3.10)
   5. Percent composition and formulas of compound (Chapter 3.8)
      a. Empirical formula (Chapter 3.9)
      b. Molecular formula (Chapter 3.9)
         1) Chemical equations and calculations (Stoichiometry) (Chapter 4.2)

2) Percent purity, yield, and limiting reagent in equations (Chapter 4.3)

F. Concentration of solutions (Chapter 4.4)
   1. Percent by mass and volume
   2. Molarity (M) molar concentration
   3. Dilution of solutions

G. A systematic study of chemical reactions
   1. Aqueous solutions, electrolytes, nonelectrolytes and extent of ionization (Chapter 4.5)
   2. Solubility rules (chapter 4.5)
   4. Net Ionic equations (Chapter 4.7)
   5. Classification of chemical reactions
       a. combination and decomposition
       b. single replacement reactions
       c. metathesis or double replacement reactions (precipitation, acid-base neutralization) (Chapter 4.6 and 4.8)
       d. combustion reactions

H. Acids, Bases, and Salts (Chapter 4.7-4.8)
   1. Arrhenius acids and bases
   2. Bronsted-Lowry acids and bases
   3. Properties of acids and bases
   4. Preparation of acids and bases
   5. Concentrations and acid-base reactions in aqueous solutions.
   6. Titrations

I. Oxidation Reduction Reaction (Chapter 4.9)
   1. Assigning oxidation numbers
   2. Recognizing redox equations by changing in oxidation state
   3. Balancing simple redox equations (Chapter 18.2)

J. Physical behavior of gases (Chapter 5)
   1. The relationship of pressure and volume; Boyle's Laws (Chapter 5.3)
   2. The relationship of volume and temperature. Charles' Gay Lussac Law (Chapter 5.3)
   3. Temperature (Kelvin absolute scale) (Chapter 5.3)
   4. STP : standard temperature and pressure (Chapter 5.3)
   5. Combined gas laws and molar volume (Chapter 5.3)
   6. The Ideal Gas Law (Chapter 5.4)
   7. Molecular weight calculation and Dalton's Law of partial pressures (Chapter 5.5 and 5.6)
   8. Graham's Law of effusion (Chapter 5.9)

K. Thermochemistry (Chapter 6)
   1. Heats of reactions and calorimetry (Chapter 6.5-6.6)
   2. Work (Chapter 6.3)
   3. The first Law of Thermodynamics (Chapter 6.2)
   4. Hess's Law (Chapter 6.8)
   5. Standard enthalpies of formation (Chapter 6.7-6.8)

L. Atomic Structure (Chapters 2, 7 and 8)
   1. Fundamental particles of atom (Chapter 2.6)

2. History of atomic structure and fundamental particles (Chapter 2.4-2.5)
3. Atomic number and mass number (Chapter 2.6)
4. Nuclear stability and binding energy (Chapter 2.6)
5. Atomic spectra and the Bohr atoms (Chapter 7.3)
6. Quantum numbers, orbitals, main shells and subshells (7.5-7.6, 8.3)
7. Electronic configuration (Chapter 8.3)

M. Chemical periodicity and ionic bonding
1. The periodic table (Chapter 8.2)
2. Periodic properties and trends (Chapter 8.6)
3. Ionization energy, electron affinity, electronegativity, and size of atoms (Chapter 8.7-8.8)
4. Metals, non-metals and metalloids (Chapter 2.7)
5. Valence Electrons (Chapter 8.4)

N. Chemical Bonding (Chapter 9)
1. Kinds of chemical bonds
2. Ionic bonding, ionic changes, oxidation numbers
3. The covalent bond
    a. polar and nonpolar bonds (Chapter 10.5) and intermolecular forces (Chapter 11.2)
    b. Lewis dot formulas (Chapter 9.7)
    c. Octet rule and its limitations (Chapter 9.8? and 9.9)
    d. Basic motions of bonding theory and resonance (Chapter 9.8)
    e. Formal charges of Lewis dot formulas (Chapter 9.8)

O. Covalent bonding and molecular structure (Chapter 10)
1. VSEPR Theory and Valence Bond theory (Chapter 10.2-10.3)
2. Geometry of molecules from VSEPR or Valence Bond theory (Chapter 10.4)
3. Geometry of polyatomic ions (Chapter 10.5)
4. The shape of molecular orbitals (Chapter 10.7)
5. Energy level diagram of orbitals
6. Homonuclear and heteronuclear diatomic molecules (Chapter 10.8)

P. Liquids and Solids (Chapter 11)
1. Liquid state, adhesive and cohesive forces (Chapter 11.3)
    a. Viscosity
    b. Surface tension
    c. Vapor pressure
    d. Boiliing points and freezing points
    e. Heat transfer
2. The Solid State (Chapter 11.12)
    a. Melting point
    b. Heating point
    c. Sublimation and vapor pressure
    d. Crystal structure and amorphous
    e. Bonding in solids
    f. Metallic bonding (Chapter 9.11)

Q. Solutions (Chapter 12)
1. Solutions terminology
2. Concentration units (mole fraction, molality, molarity)

3. Dilution of solutions

STUDENT LEARNING OUTCOMES:
(Specify the learning skills the student demonstrates through completing the course and link critical thinking skills to specific course content and objectives.)

Upon completion of this course, students will be able to:
A. Collect and analyze data and have reasonable conclusions. Assessed by the lab practical.
B. Competent knowledge of the periodic table, molecules, and compounds. Assessed from a pre-test administered at the beginning of the semester and the final exam administered at the end of the semester.
C. Ability to apply skills to solve chemical problems especially math skills. Assessed from a pre-test administered at the beginning of the semester and the final exam administered at the end of the semester.

III. COURSE OBJECTIVES:
(Specify major objectives in terms of the observable knowledge and/or skills to be attained.)

In the process of completing this course, students will:
A. Use systematic nomenclature to name and classify chemical species.
B. Predict ionic and covalent bonding between species.
C. Convert from the English to the metric system in weights, volume, and linear measurements.
D. Calculate molecular weights, formula weights, gas volumes, temperature, pressure concentration of solutions, molarity, empirical and molecular formulas, and percentage composition.
E. Define the structural peroidiity of the elements and discuss the trends in all directions on the periodic chart and the terms for grouping elements, i.e., metalloids, transition elements, inner transition, etc..
F. Use stoichiometric relationships to calculate quantities of reactants, products, limiting reactants, theoretical yields, percent yields, and chemical formulas.
G. Describe covalently bonded structures using Lewis theory, valence bond theory (including hybrid orbitals), and molecular orbital theory of diatomic molecules.
H. Define the theoretical and mathematical description of ideal gases, including the concepts of temperature and kinetic energy distribution.
I. Identify types of reactions, predict the outcomes of chemical reactions, and write and balance chemical reactions.
J. Apply the first law of thermodynamics, contrast internal energy and enthalpy, describe how energy changes are related to temperature, atomic motions, and change in chemical bonding and perform thermochemical calculations.
K. Describe colligative properties of solutions of ionic and non-ionic substances and solve their numerical problems.
L. Effectively collect, record, and analyze experimental data, recognize the limitations of measurements and identify sources or error, and interpret experimental results and correlate experimental results with the appropriate theory.

Chemistry 1A   Fall 2012

Week	Date	Labs (T/Th)	Lectures (M/W/F)
1. Aug 13-17	Aug 14	Pre-semester quiz. Bring a calculator. Mastering Chemistry tutorial	Syllabus and Periodic Table 1. Matter 1. Dimensional Analysis
	Aug 16	Unit 1: Introduction to Laboratory Safety, and Inventory Check-in	
2. Aug 20-24	Aug 21	Unit 2: Mixtures and Pure Substances	1. Scientific Notation and Significant Figures 2. Atoms 3.5 Ionic Compounds
	Aug 23	Unit 3: Measurement	
3	Aug 28	Unit 4: Gravimetric Analysis	3.6 Molecules
	Aug 30	*Nomenclature Worksheet*	**Exam 1 (Wednesday)** 2.9 Mole
	Aug 31	**Last Day to drop class (in person) to avoid a "W"**	
	Sept 3	**Last Day to drop class (on Webadvisor) to avoid a "W"**	
4	**Sep 3**	**Labor Day – no lecture**	3.10, 4.6 Writing and Balancing Reactions 3.8-9 Percent composition and Empirical Formulas 4.2 Stoichiometry
	Sep 4	Unit 7: The Mole	
	Sep 6	**Lab Quiz 1 (Labs 1,2,3,4,7, Safety and Nomenclature)**	
5	Sep 11	*Balancing Reactions Worksheet*	4.3 Limiting Reactions 4.4 Solutions 4.5 Electrolytes and
	Sep 13	*Empirical Formulas: Oxide of Tin and Worksheet*	
	Sept 14	**Last Day to change class to Pass/No Pass**	
6	Sep 18	Unit 8: The Formula of a Hydrate	**Exam 2 (Monday)** 4.8 Acid-Base reactions 4.7 Titrations and Reaction Types
	Sep 20	Unit 5: Double Displacement Reactions	
7	Sep 25	Unit 9: Stoichiometry	4.9 Redox Reactions 18.2 Balancing Redox Reactions and Redox titrations 5. Gas 1
	Sept 27	Unit 10: Alum Crystallization. Recycling Aluminum Cans	
8	Oct 2	Unit 15: Redox Reactions- The Burning of Magnesium	5. Gas 2-3 **Exam 3 (Friday)**
	Oct 4	**Lab Quiz 2 (Labs 5-6, 8-11 and empirical formulas)**	
9	Oct 9	Unit 16: Formation of a Simple Salt and Complex Ions	5. Gas 4 6. Thermo 1, 2
	Oct 11	Unit 21: Charles's Law	
	Oct 12	**Last Day to drop class to get a "W"**	
10	Oct 16	Unit 22: Molecular Mass of a Volatile Liquid	6. Thermo 3 7. Light 1 and 2
	Oct 18	Unit 23: Atomic Mass of an Unknown Divalent Metal Unit	
11	Oct 23	Unit 27: Heat Flow, Calorimetry	8.4 Electron Configuration 7. Quantum Numbers **Exam 4 (Friday)**
	Oct 25	*Thermo Worksheet*	
12	Oct 30	Unit 13: Acids and Bases	8. Periodicity 9. Lewis Diagrams 1and 2
	Nov 1	**Lab Quiz 3 (Labs 15-16, 21-23, 27)**	
13	**Nov 6**	Unit 19: Vitamin C in Fruit Juices Unit	10. Geometry 1-2

	Nov 8	Unit 17: Percent Iron (II) in an Unknown	9.8 Formal Charges and Polar Bonds
14	**Nov 12**	**Veteran's Day**	**Veteran's Day (no class Mon)**
	Nov 13	**Titration Practical Exam (Tues)**	**Exam 5 (Wednesday)**
	Nov 15	Unit 28: Molecular Geometry 1	10.5 Dipoles
15	Nov 20	Unit 28: Molecular Geometry 2	10.7 Hybridization
	Nov 22-23	**Thanksgiving (No lab Thurs or lecture Fri)**	9.8 Resonance **Thanksgiving (no lecture Fri)**
16	Nov 27	Unit 14: Buffers and Antacids	11.2 Intermolecular Forces 11.2-3 Liquids
	Nov 29	Unit 11: Properties of Solutions	11.6-8/11-12 Solids
17	Dec 4	**Lab Quiz 4 (Labs 13-14, 17, 19, 28)**	12.5-6. Solutions **Exam 6 (Wednesday)**
	Dec 6	Unit 30: Freezing Point Depression and Making Slime (see Unit 31)	Review for Final
18 Wed	**Dec 12**	**Final Exam 11:00-12:50pm in PHY76**	