REEDLEY COLLEGE **JANUARY 9, - MAY 19,**
CHEMISTRY 3A COURSE SYLLABUS **SPRING 2017**

INSTRUCTOR: R. C. CULP **REQUIRED ITEMS:** **TEXT: Introductory Chemistry** By Nivaldo J. Tro, 2nd, 3rd, 4th or 5th ed. **"Lecture Handouts Chemistry 3A,"** by R. Culp These are available on Canvas . Print and bring these to lecture. **"Calculator" (TI-30xa): Programmable calculators ARE NOT ALLOWED DURING EXAMS**. You will need a simple, nonprogrammable calculator. The **TI-30xa** is suggested for the course. **SCANTRON FORM # 882-E** (SIX ARE NEEDED) **LAB TEXT:** Chemistry 3A Lab Manual **(POSTED ON CANVAS)** **ASSORTED STUDY GUIDES AND HANDOUTS** (posted on Canvas or in the lab manual; print as needed.)	**LECTURE/LABORATORY LOCATIONS:** **BOTH SECTIONS: 59803, 56900** M/W: 5:30-6:45 PM LECTURE ROOM: PHY 76 **LABORATORY (R. CULP):** (56900) MON 07:00-10:05 PM PHY 82 **LABORATORY (M. NAITO):** (59803) WED 07:00-10:05 PM PHY 82 **CONTACT INFORMATION:** • E-MAIL: **robb.culp@reedleycollege.edu** • PHONE: **No Message Phone At Reedley** **LAB. SUPPLIES: Shoes**, approved safety goggles or **glasses** are uncompromisingly required; additionally, a **pen**, pencil, straight edge (ruler), and **lab coat** are required. You may not use them at every meeting, but they should be with you nonetheless

RECOMMENDED: This course makes extensive use of downloadable PowerPoint files, video and electronic documents. If you do not have a computer, you will need access to one. The suggested software is as follows: Office 2007 or 2010, Adobe Acrobat Reader, and Firefox web browser.

COURSE DESCRIPTION: This is a survey course in the principles of inorganic chemistry covering the composition of matter, physical and chemical changes, atomic and molecular structure, inorganic nomenclature, chemical formula and reaction calculations, gas laws, bonding, solutions, net-ionic equations, acid-base theories, pH, oxidation-reduction reactions, thermodynamics, nuclear chemistry and equilibrium. The course emphasizes problem solving and chemical calculations. Both qualitative and quantitative theory and techniques will be covered. It is intended for applied science and non-science majors or for students preparing to take Chemistry 1A.

PREREQUISITES: Mathematics 103. ADVISORIES: English 1A, Chemistry 10 or high school chemistry. (A, CSU-GE, UC, I) **Comment:** It is not enough to have simply "completed" the prerequisite course work. A thorough understanding of the fundamentals of Algebra inclusive of working with fractions, mathematical order of operations and fundamental manipulations of Algebraic variables is required.

A.) COURSE REQUIREMENTS FOR A PASSING GRADE:

1.) **ATTENDANCE:** Class starts promptly at the scheduled time. If you do not sign in on the attendance sheet, you are counted as absent. *Lecture material is exam material. Failure to turn in two laboratory reports yields a failing grade in all cases. Missing lecture is usually a poor decision.*

2.) **COME PREPARED FOR CLASS:** Do the assigned reading before class. The classroom lecture moves at a good pace. If you want to be productive, do the assigned reading and **bring the lecture note slide handouts posted on Canvas for you to download and print.**

3.) **MINIMUM TIME COMMITMENT:** Success in college chemistry stands on three factors. You are asked to divide your time **(3 hours minimum per day, outside class)** between all three if you need an A, B or C grade. *You may find depending on the quality of your previous course work, that more time is required, so plan accordingly.*

- **45-60 minutes per week** to skim read and highlight the text **BEFORE** lecture on the topic. The reading assignment is listed for each week at the end of this syllabus.
- **45 minutes per lec** to complete a careful post-lecture review. Review the PowerPoint slides and complete your lecture notes by referring to the text. We will frequently do examples that supplement examples in the notes. Review each lecture and do the following: (1) Define key terms; these are highlighted during lecture. (2) Rework ALL examples from the lecture and text (**Make sure you understand each example).** (3) Identify and transfer to a 3" x 5" cards or a notebook, important equation setups, methods, and definitions.
- **2-3 hours per week** to complete written homework. The goal of homework study is not to simply complete the homework, but to UNDERSTAND it. High School well indoctrinates most students in a completion mentality. While we want to complete the homework, this is strictly a SECONDARY GOAL. Taking the time to UNDERSTAND the definitions and processes and there is good profit in the exercise.

4.) **PLAN YOUR SPECIAL EVENTS CAREFULLY:** If you are attending a wedding out of town, caring for an ill relative, going on a cruise, having a baby, getting married, taking a previously planned vacation or missing any class during a semester for any other reason places you at statistical risk of failing the class. **Exams, homework and laboratory are not excused.** ***Plan backup transportation and babysitting if you foresee either as a factor.***

B.) GRADES: Grades are based on **class participation** (attendance, written homework), **five semester multiple choice exams**, **laboratory reports, and a comprehensive final**. Your final grade is a weighted average of all four components. NO EXAMS ARE DROPPED. The percent break down is below:

CLASS PARTICIPATION: (TOTAL 10%)	
• **ATTENDANCE (3%) & WRITTEN HMWK. (7%)**	**10%**
SEMESTER EXAMS: (None are dropped; all count.)	**(Total 43%)**
• **EXAM 1 (CHAPTERS 1-4)**	**4%**
• **EXAM 2 (CHAPTERS 5-7)**	**6%**
• **EXAM 3 (CHAPTERS 5-10.4, 13.5-8)** **(This is a genuine midterm)**	**10 %**
• **EXAM 4 (CHAPTERS 9-12) (Reviews some material from Exam 3)**	**13 %**
• **EXAM 5 (CHAPTERS 13-16)**	**10 %**
LABORATORY: (See the explanation in syllabus.)	**25 %**
Final Exam: (Required Comprehensive ~60 Q's)	**22%**

The course is purposefully weighted heavily toward the end of the class and less so toward the beginning. You should not read this as a reason to treat these first topics lightly. These introductory topics are used throughout the class. If you do well on individual exams and understand the lecture concepts as we progress and study for the final, the average student will match his exam average or improve on it with the final.

- **Final Grade:** At the end of the course, is an overall weighted percent average will be determined based on the above. Grades are assigned based on a calculated overall score as below:

Overall % = 0.1 x (HmWk & Attn %) + 0.43 x % Exams + 0.25 x %Lab + 0.22 x % Final

88% and above	A	See the section below: **"Passing Chemistry 3A"**
77% to 87 %	B	
65% to 76 %	C	
45% to 64 %	D	
Below 44 %	F	(Failure to take the final yields a semester "F", incompletes are rarely assigned)

Midterm Grades: After each exam your scores and grade to date are updated. **You will receive a grade report after each exam.** Your final will not be available until the end of the course. **As a result midterm percent overall scores are calculated based on:**

- **10% Participation** (Attendance and Homework)
- **25% Laboratory (Experiments and Study Guides)**
- **65% Exams (Individual exams are partially weighted until the final)**

Assignment of a letter grade is based on midterm scores for your convenience. <u>They are not used in the computation of your overall scores once the final is complete.</u> *Be aware that the last three exams count for more points than exams taken early in the semester. Each of the last three exams has the potential to impact your overall scores by a full grade point.*

- **Passing Chemistry 3A** requires a laboratory overall score that is > 60%. Students who fail to turn in three laboratory reports for any reason fail the course. A % Final Exam score > 55% and an overall score >65% are required for a passing "C" grade. <u>There are no exceptions regardless of circumstances.</u> **Plan accordingly.**
- **Final Grades:** The grade breaks for the course are identified above. This may potentially be altered for the class at large by 1-3%. Individuals who score higher on the final AND laboratory than they did overall may be given consideration for a higher grade. Grades are not changed because a particular student is close to the break or "needs" the higher grade. **If a student "NEEDS" a higher grade he "NEEDS" to work at that level.** Grades are not a gift, they are earned. There are no exceptions.

C.) EXPLANATION OF COURSE COMPONENTS: What are we trying to accomplish here? More than 25% (5 in 20) of a typical Chemistry 3A class section fails to finish Chemistry 3A successfully. If you are committed to being one of the statistics, drop now. If not, commit yourself to the work needed to be successful. The following are the minimums needed to be successful in the course. If you can't devote the time, it is wise to wait until you can. For most folks, failure to spend the needed time to be successful leads to failure to achieve the desired grade.

- **ASSIGNED READING:** Read the assigned sections to prepare for the upcoming lecture.
- **HOMEWORK ASSIGNMENTS:** Homework is assigned to help you develop a deeper understanding of lecture topics as presented in class, in your text, and in lecture notes. Written homework is required. Please see the instructions for formatting and submitting your work. As a rule, I don't accept late homework submissions except for very good, once during the semester reasons. Homework is intended to help students learn and develop an understanding of exam topics. Copy the key or someone else's homework at your peril.

- **Lecture Exams** consist of ~50 multiple choice theory, computation or applied problems regarding chemistry: concepts, equations, and mathematics, and laboratory experiments. These questions are drawn from the full breadth of topics you studied. Many definition type questions draw heavily on the lecture. Questions are phrased to confirm your UNDERSTANDING of lecture and homework topics. Memorization without understanding is not useful. One exam per semester draws all the exam problems from Homework questions.

  Your instructor reserves the right to move students as needed to assure the integrity of an exam.

  WHAT TO BRING TO EXAMS:
  1.) One Scantron form #882 (its color is green) for each exam. Write your FULL name on the exam question set and the Scantron. Please come prepared for the exam. **Normally, no pencils, calculators or scantrons are available for students who fail to bring their own.**
  2.) A calculator: The Texas Instruments TI-30xa is highly recommended. **No Graphing Calculators Please.**
  3.) DO NOT BRING scratch paper or a Periodic Table. These will be provided for you.
  4.) You are allowed a SINGLE HANDWRITTEN (both sides) 3 inch by 5 inch index note card for all exams. **If it isn't a "note card," don't bring it.** No typed note cards please.

- **WHAT TO SECURE IN A BOOK BAG DURING AN EXAM: If any of the items below are in out during the exam, even if they are not being used, you will be asked to leave or retake the entire exam in a secure setting.**
  1.) Personal items and electronic devices: Please do not attempt to use IPODs or other music players, digital cameras, headphones, cell phones, or electronic devices other than a calculator during an exam or while in the classroom. **These items should be secured in your book bag or left in your car.**
  2.) Any paper or card, written on or not, that was not specifically authorized by your instructor for use during the exam.

- **MAKE-UP EXAMS: No make-up exams are offered.** In extremely rare circumstances, an alternative examination time may be arranged if you contact your instructor well before the scheduled examination date. In the event of a makeup, students will normally take an equivalent or near equivalent exam from a previous semester. Emergencies will be handled on a case by case basis. There is no make up for the final exam under any circumstance.

- **FINAL EXAM:** The **final exam** will be comprehensive and given during the normal scheduled time. Please bring a scantron 882-E, pencil, eraser and approved calculator. Nothing else is allowed for the exam. The final is held during a 2 hour time period.

- **LABORATORY: Laboratory constitutes 25% of your semester grade.** Chem. 3A is a general education course for some of the students attending; however, for many it is a prerequisite for courses that require good laboratory skills. Laboratory grades are strictly related to student performance. **Below are some of the expectations for individual success in laboratory:**

  

  1.) Please come on time prepared to complete the laboratory activity. Bring your lab book, goggles, lab coat, shoes, pen and calculator to every laboratory meeting. Failure to bring needed materials counts as an absence.
  2.) **COMPLETE THE ASSIGNED PRELAB BEFORE CLASS. It is due as you arrive or soon (within 5 minutes) of the completion of the lab. lecture.**
  3.) Students record their data **(using blue or black pen)** and observations directly onto their laboratory report using a readable **hand** printed script.
  3.) Students report ALL numbers using the correct **format and units.**
  4.) Students show properly formatted calculations that lead to the reported experiment results.
  5.) **A student's work is their own** and is not copied from another individual.
  6.) Students turn in their work when due. Graded work is returned within one week of being turned in. **The low lab score > 0 for a semester is dropped,** but missing lab reports are not. **Failure to complete more than two laboratory experiments due to absence or other reason will result in a semester "F."** Unfortunately there are no exceptions.
  7.) **No lab is graded unless the student has attended the lab.** Functionally this means that if a student fails to turn in a prelab, they will not receive a grade for their lab report.
  8.) **The instructor will grade poorly done, sloppy work or evidence of less than an industrious attitude very severely.** Fill out each lab as instructed, show the required work and post the requested results using the correct format.

  LABORATORY REPORT GRADES: Laboratory Reports and Study Guides are graded against 50-200 pts possible based on difficulty. Your comments, calculations and experimental results are graded for each lab. In most cases, you will receive a detailed evaluation of each laboratory report. **Do the best work that you are capable of. A passing grade (>60%) in lab is required.** There are no exceptions.

  SEE ALSO THE SECTION: "**F.) Descriptions and Required Format for Course Assignments:"** Repetitive formatting errors are the most common reason that points are lost on Lab. Rprts.

LABORATORY SAFETY: Your safety and that of your fellow students is paramount. Many rules apply to working in the chemistry laboratory. Most of these will be discussed on the first day of actual laboratory work. Many of the compounds that are handled have the potential to cause severe eye injury or blindness if allowed to contact the tissue of your eyes. Approved goggles, lab coats and shoes are required. If your instructor is wearing eye protection, you are expected to do so also. Your instructor will have ZERO TOLERANCE for inappropriate eye protection! **Additionally, closed toe shoes are required for all laboratory meetings in the laboratory.** This applies even if there are no experiments scheduled.

D.) CLASS POLICIES:

- **POLICIES**: As stated in the Reedley College 2016-2017course catalog.
- **ATTENDANCE**: Students are expected to attend all lecture and laboratory sessions of classes for which they are enrolled. Excessive absence will jeopardize a student's satisfactory progress in a class and affect the calculated grade. Students may be dropped from a class if they fail to attend the first class meeting of the semester. **Any student who misses 4 class meetings in a row may be dropped (during the first 9 weeks of the semester) unless the student has checked in with the instructor.** See disruptive behavior below.
- **INCOMPLETE GRADES:** As a rule incompletes are issued for verifiable reasons for missing a final exam. Incompletes are not issued for missing laboratories. Incompletes require a passing grade in both lecture and lab. Incomplete may be assigned for an otherwise successful student who fails to complete the final due to a verifiable reason.
- **REQUIREMENT TO PASS LAB:** A long standing departmental policy requires a student to pass both the lecture and the laboratory component of the course. If a student needs to repeat Chemistry 3A due to failing either the lecture or the lab components (missing more than 2 labs or lab score <60%), it is necessary to retake both the lecture and the lab components of the class.
- **REQUIREMENT TO PASS THE COMPREHENSIVE FINAL:** Students are required to score 54.9% or better on the final exam to pass the class with a computed C grade or better. There are no exceptions. The lab requirement and the final exam requirements are firm.
- **DISRUPTIVE BEHAVIOR:** The classroom is a special environment in which students and faculty come together to promote learning and growth. It is essential to this learning environment that all participants respect the rights of others, respect for the professionalism of the instructor. The general goals of academic freedom are maintained. ... *Student conduct which disrupts the learning process shall not be tolerated and may lead to disciplinary action and/or removal from class*. At the very least students who engage in distracting or disruptive behavior will be asked to leave the lecture or laboratory meeting as a result. **Coming late to class is also considered distracting behavior. You may be refused admittance to lecture if you are late.**
- **DROPPING THE COURSE: DO NOT DEPEND ON YOUR INSTRUCTOR TO DROP YOU.** Doing so may result in a semester "F" grade**.** The last opportunity to drop with a "W" is during the third week**. Note:** It is the student's responsibility to properly withdraw from any class he/she does not intend to complete. Failure to withdraw will result in the assignment of the appropriate grade (F).
- **STUDENTS WITH DISABILITIES:** If you have special needs, as addressed by the "Americans with Disabilities Act" (ADA), you will receive reasonable accommodation for learning and evaluation. For more information, contact the College's office of "Disabled Students Programs and Services" (638-0332).
- **CHEATING & PLAGIARISM:** Cheating is the act or attempted act of taking an examination or performing an assigned, evaluated task in a fraudulent or deceptive manner, such as having improper access to answers, in an attempt to gain an unearned academic advantage. Cheating may include, but is not limited to, copying from another's work, supplying one's work to another, giving or receiving copies of examinations without an instructor's permission, using or displaying notes or devices inappropriate to the conditions of the examination, allowing someone other than the officially enrolled student to represent the student, or failing to disclose research results completely.

  No form of cheating or plagiarism will be tolerated in this class. Anyone **suspected** of these offensives will be issued a zero on the questioned work, and referred to the Dean of Students.
- **NON-DISCRIMINATION STATEMENT:** The State Center Community College District does not discriminate nor harass on the basis of race, color, national origin, gender, sexual orientation, disability, or age in any of its policies, procedures, or practices, nor does it tolerate sexual harassment.

E.) Course Content and Learning Objectives: The college has established a set of learning objectives for this course. Learning objectives represent the incremental learning process that occurs through the semester. These are evaluated on your final exam. The context of these statements establishes the goals for day to day classroom instruction which will address the first 17 chapters of your textbook.

- **Learning Objectives**: If you want to view the credit course outline or objectives for any class, visit the link below to the Reedley College web page:

http://www.curricunet.com/reedley/reports/course_outline_html_new.cfm?courses_id=2921

- **Upon completion of this course, students will be able to:**
  A. Use dimensional analysis to solve for an unknown parameter of density, volume, mass, pressure, temperature, molar mass, concentration, or an empirical formula.
  B. Construct and balance a chemical reaction and use the reaction to predict stoichiometric quantities.
  C. Explain concepts from the periodic table and the use the periodic table to solve chemical problems.
  D. Describe acid-base reactions and how to calculate pH.
  E. Name and draw Lewis diagrams of inorganic and molecular compounds from the formula and vice versa.
  F. Safely conduct laboratory experiments implementing concepts and principles learned in lecture.

- **In the process of completing this course, students will:**
  A. describe the impact of chemistry on modern society and the relationship between chemistry and other disciplines including agriculture, the medical field, and industry;
  B. identify types of matter, recognize physical properties and chemical properties, and apply the Law of Conservation of Mass and the Law of Conservation of Energy;
  C. perform unit conversions using the correct significant figures; between the English and metric systems, temperatures in different units, density, energy, and with SI units;
  D. use the periodic table to identify physical and chemical properties of elements and calculate molar masses of compounds and molecules;
  E. recognize the electromagnetic spectrum and explain the basic principles of the quantum mechanical model of the atom;
  F. name inorganic compounds given their formulas, and write formulas given names;
  G. distinguish and identify metals, non-metals, metalloids, alkali metals, alkaline earth metals, halogens, noble gases, transition metals, and of the lanthanide and actinide series;
  H. identify different types of intramolecular and intermolecular forces of attraction present in various substances based on chemical formulas and structures;
  I. develop techniques to write Lewis electron-dot formulas and identify the shape using the VSEPR theory;
  J. explain, write and balance chemical equations, and use these equations along with stoichiometry and the mole concept to convert quantities (e.g. grams or moles) of a given substance into quantities of an unknown substance;
  K. calculate empirical formulas, and mass percentage composition given the appropriate data;
  L. complete, identify type and balance chemical equations of reactions;
  M. perform calculations involving a limiting reactant and determine the percent yield;
  N. predict the physical behavior of gases to pressure, temperature, and volume changes;
  O. prepare and solve simple mathematical problems involving formula calculations related to gas laws;
  P. apply gas laws and stoichiometry to calculate quantities (e.g. moles, volume, grams) of gas produced or consumed during a reaction;
  Q. calculate molarity, mass percentage concentration and density of solutions and apply the molarity in dilution calculations.
  R. diagram heating and cooling curves;
  S. explain state and energy changes accompanying heating and cooling curves;
  T. identify the principles of equilibrium in reversible reactions, saturated solutions, solutions of weak electrolytes and solutions of gases in solving related problems;
  U. apply solution properties and stoichiometry to calculate quantities (e.g. moles, volume, grams) of reactants and products in a reaction;
  V. explain colligative properties of solutions (e.g. boiling point elevation, freezing point depression, and osmotic pressure);
  W. define and identify acids and bases and perform math calculations involving pH measurements;
  X. identify the nature and applications for electron exchange reactions;
  Y. understand the structure of the atomic nucleus;
  Z. explain the fundamental types of nuclear radiation and the effects they have on biological systems
  AA. and demonstrate laboratory skills which include operating an analytical balance; calibrating and/or use fundamental lab equipment such as a thermometer, barometer, buret, pipette; recognizing use and limitations of laboratory glassware; recording and reporting observations; using error analysis techniques to evaluate certainty of data; use safety precautions and general laboratory procedures.

F.) Descriptions and Required Format for Course Assignments:

1.) Assignment Formatting for a Successful Grade: Work that looks like the work of a professional will receive a much better grade than that of a typical high School Student.

a.) Handwriting: All homework assignments, Laboratory Experiments, Study Guides, Exams, and Quizzes, with one exception will be handwritten. Any answer submitted by a student must be easily read, neat and properly formatted. Written responses that are graded will need to meet a few minimal criteria. *Follow the bullets below or your work will not be graded.*

- **Laboratory data (Measurements) will ALWAYS be written in black pen,** No Whiteout will EVER be used. A single line strikes through the error and the correct value is entered next to the original. Do not use any color pen other than black. Erasable pens are not acceptable. **This is specifically applicable to ALL laboratory measurements.**
- **Homework**, and calculations are done neatly in pencil, use whiteout or a good eraser is used to erase errors. Your writing needs to be dark enough to read easily.
- **All responses are neatly printed** with capital letters at the start of each sentence; responses will use good spelling, and reasonable punctuation.

- **Letters and numbers are universally well formed** and presented in a neat horizontal orientation. Points are frequently lost here.
- **There is no ambiguity in the presentation of numbers and equations.** If there is some doubt as to the numbers or relationships within a student response it will not be graded or will be graded down..
- **The font used in a written response will be large enough to be easily read.**

b.) Answers to Questions: Answer questions compactly and COMPLETELY address the question asked. Additionally, *No Equation Setup, No Units, No Rounding for Significant Figures always yields a poor grade.* **No Exceptions...EVER!**

- **Yes/No Answers:** Many questions on lab reports, homework and on exams will ask for a yes or no answer AND an explanation. Failure to address the explanation will yield NO points for the question.
- **Any calculation requiring unit conversions** will use the format for unit conversion. Proportion is not an acceptable method. Student calculations should look like those presented in class.
- **Equation Set-ups:** Frequently students turn in a list of answers for study guides, post labs, or homework sets. **NO NUMERICAL ANSWER is ever valid in this course without formally showing how it was obtained.** Easy or hard question ALWAYS require a formal equation.
- **Units:** Unless data is collected on a table where the column or row is labeled by name and unit, "units" will be reported for every number recorded as a result, or within a mathematical equation.
- **Significant Figures:** Answers associated with single step calculations are first recorded in an unrounded form with units and then in rounded form beside the original. Longer multistep calculations are not rounded until the final step has been completed. The result is first recorded and then the correctly rounded final result is recorded beside it.
- **In the event, there is not enough room on a laboratory report form,** or study guide to show all the work required to obtain a particular result, students will write in the space allowed for the calculation: **SEE ATTACHED**. The calculation will be very clearly labeled and attached to the report form or study guide. If the answer is not easily found it will not be graded.

c.) Plagiarism: Study partners are allowed to share ideas, experimental raw data and methods but not answers. If you copy your friends work, he/she will inevitably make a calculation error or misstatement that identifies that work as belonging to a single student. If your work is identical, neither paper will be graded.

2.) Laboratory Reports: At least 50 % of the laboratory score is represented by laboratory experiment reports. We will complete 12-15 reports and study guides during the semester. The procedures and forms are found in the lab book. **Most labs will have a brief prelab that is due as a student arrives.** No Lab is graded unless the prelab was signed on time. The prelab is date stamped or graded and then returned. This is your proof that you were present in lab. Attach it to the lab report when it is turned in. Missing prelabs are counted as an absence. FAILURE TO TURN IN THREE PRELABS, OR THREE COMPLETED LAB REPORTS OR SOME COMBINATION YIELDS AN AUTOMATIC "F" SEMESTER GRADE.

Typically the instructor will have a short laboratory procedure and safety lecture, will then receive prelabs and turn students loose to complete the laboratory experiment. The Lab report and post lab are due as established in the laboratory schedule.

3.) Homework: In many classes homework is done for a grade. In most chemistry courses homework is designed to practice the skills and concepts that students learn in lecture and through self-study. It is intended to be the last step in the study process. By completing homework problems students will identify areas they need more work on and prove their understanding of other topics. Successful students will learn what they understand well and identify topics for further study. Homework problems should be addressed as though they were exam questions which in many cases they will be. As with exam questions, we are less interested in the answer than in probing a student's understanding of the process needed to obtain the answer. A secondary goal is to retain hard learned procedures, definitions and calculations with the homework so they can be reviewed for exams. **In short, homework is not a chore, it is practice.**

Weak areas require more work above time spent on homework and strong areas we can set aside until reviewing for the exam.

a.) **Homework Format:** To better achieve the goals above this course requires traditional written homework. Students may include notes comments or any useful info regarding problems worked for homework. Below is the minimum format. <u>The info below also applies to exam questions.</u>

- **General Information:** Please turn in problems in the assignment order. For each question include a brief summary of the question and its number. The entire pack should be stapled in the upper right hand corner, no paperclips or folded corners please.
- **Definitions:** Answers will have enough information to convince the grader that the student both understands the concept and has set it on paper at a level where that information can be retained for future reference. Sentence or two sentence responses are the norm.
- **Processes:** Questions that ask the student to identify the steps or process to obtain a result will have enough information to convince the grader that the student both understands the process and has set it on paper at a level where that information can be retained for future reference. Clear well thought out flow charts, or numbered steps are the expectation.
- **Calculations:** Students will identify the variables explicitly provided in the problem and those implicit to the calculation. If a simple or multistep derivation is required, it will be included with the problem. Students will use the formatting required for all calculations in this course. These steps are modeled in how examples are done in lecture.
- **Homework is due at the start of the first lecture of any given week.** It will normally be graded and returned during lab. Late homework is not accepted. **Please turn it in as ONE stapled packet.**

Day	Lecture Topics and Assigned Reading	Homework/Laboratory Assignments
Week 1 **Classes Begin** **1/9, 1/11**	**Welcome to a rapid paced summer chem. course. This is an exceedingly busy week geared to help you decide if you have the time for this course.** **Introductory Chemical Concepts** 1.4-1.5 Scientific Method 2.3-2.4 Significant Figures **(introduced in lab)** 2.5 Weight, Mass & Metric System Standard International Units (S.I. Units) 2.6 Simple Unit Conversions 2.7 Conversion Maps and Conversion Calcs. 2.9 Density Calculations and Basic Algebra	**Mr. Culp's Ch. 1-2 HmWk 1 (due 1/18)** Posted on Canvas with a key, please self-correct. • Syllabus (30 min.) • Safety Lecture (45 minutes) • Lec. on Study Guide #1 (Due Next Lab Meeting) (1 hr) **Please self-correct (answers posted on CANVAS)** **Exam 1: Questions related to S.G. 1:** 1.) How many significant figures are in a measurement? 2.) How many significant figures results from a calculation? 3.) Do simple calculations using scientific notation.
Week 2 **1/18** **PowerPoint is reduced due to the holiday.** **MLK Holiday** **1/16**	**Ch. 3 Matter and Energy** 3.2-3.3 Matter and Its Phases: Composition (Solids, Liquids and Gases); Solids: Crystalline and Amorphous 3.4 Pure Substances: Elements and Compounds, and mixtures: Homogenous and Heterogeneous **Ch. 3 Physical and Chemical Changes** 3. 5 Physical and Chemical Properties. 3.6 Physical and Chemical Change 3.8-3.12 Temperature, Heat (q), Heat Capacity (C_s) and Energy.	**Mr. Culp's Ch. 3 HmWk 2 (due 1/23)** Posted on Canvas with a key, please self-correct. **No M. Lab Meeting (56900)** **W. Lab.** Lecture on Study Guide #2 (due 1/27 lab) (1 hr) **Finish and Check answers on SGs 1 and 2** **(W) Lab.: Expt. 1A: The Mass of a Penny (2 hrs)** **Due 1/25 Prelab is due after the lab lecture.**
Week 3 **1/23, 1/25** **1/27** **Last day to drop without a "W"**	**Ch. 4 Introduction to the Nuclear Atom** 4.3 Subatomic Particles in the Atom • Protons, Neutrons and Electrons 4.5 Element Atoms (Symbols and Names) • Atomic # (Z), Number of Protons and Electrons 4.7 Number of Electrons In Ions 4.6 Observations of Periodic Trends • Main Group Elements, Transition Elements and Inner Transition Elements 4.8 Nuclides, Mass Number and Isotopes 4.9 Atomic Mass and The Atomic Weight Calculation	**Mr. Culp's Ch. 4 HmWk 3 (due 1/30)** Posted on Canvas with a key, please self-correct. **M. Lab.** Lecture on Study Guide #2 (due 2/1 lab) (20 min) **Finish and Check answers on SGs 1 and 2** **Collect Data for Expt. 2. (see below)** **W. Lab.** **Expt. 2 Mass, Volume and Density of Salt Soln. (Due next lab meeting.)** There is a required graph associated with this lab using Microsoft Excel, the template is posted on Canvas. Be sure to read the posted instructions before opening and using the template.
Week 4 **1/30, 2/2**	**Ch. 5 Molecules and Compounds (Lec for Pts, 2 and 3 for SG. 3: Type 2 Ionic Compounds and Nonmetal Compounds)** 5.2 Law of Constant Composition 5.3-4 Defining Chemical Formulas • Formulas of Element Molecules and Compounds 5.5-5.7 Formulas & Nomenclature of Ionic Compounds • Type Two Compounds • Polyatomic Ions (Name, Formula and Ion Charge) 5.8 Nomenclature of Nonmetal Compounds 5.9 Nomenclature of Acids • Binary Acids, and Ternary (Oxy-Acids) Acids	**Mr. Culp's Ch. 5 HmWk 4 (due 2/6)** Posted on Canvas with a key, please self-correct. **Ch. 1-4 Exam. 1 40-50 multiple choice questions.** **Exam Includes: HmWk, Lecture and Lab concepts.** **Exam is in the lecture room. If you are not taking the exam, please leave the area after lecture.**
Week 5 **2/6, 2/8**	**Ch. 6 Introduction to the Mole Unit** 6.2 Introduction to the Mole. **(lec notes)** 6.3 Mole Calculations with Elements 6.4-6.5 Mole Calculations Survey. (Formula Ratio) 6.6 Mass % Composition is a Mass Ratio for 100 g. 6.7-6.8 Mass % Composition to an Empirical Formula 6.9 Determination of a Molecular Formula from an Emp. Formula and Molecular Mass or Molar Mass.	**Mr. Culp's Ch. 6 HmWk 5 (due 2/13)** Posted on Canvas with a key, please self-correct. **Primary objective:** Learn how to use the conversion card handout. **Laboratory: Experiment #4: Atomic Weight of Cu** **(Due at next lab meeting)**
Week 6 **2/13, 2/15**	**Ch. 7 Intro. To Balancing Chemical Equations** 7.2 Has a Chemical Reaction Occurred? 7.3-7.4 Balancing Chemical Reactions Based on Conservation of Mass, Some General Guidelines. **Ch. 7 Applied Concepts in Rxn Balancing** 7.10 Chemical Reactions By Type (quick overview) • Ionic Reactions 7.5 *Aqueous Solutions and Solubility* 7.7 Complete and Net Ionic Reactions	**Mr. Culp's Ch. 7 HmWk 6 (due 2/22)** **Laboratory: Expt. 15:** Estimating the Size of a Mole **(Due at next lab meeting)**

Day	Lecture Topics and Assigned Reading	Homework/Laboratory Assignments
Week 7 **2/22** **2/20** **Wash. B. Day**	**Ch. 8 Stoichiometry** 8.3 Mole Calcs. Involving Reactants and Products. ***Review*** Molar Mass & Mole Amounts (pp. 168-180) • Reaction Ratio as a Conv. Factor 8.4 Stoichiometry and Mass Reactant to Mass Product Conversion. 8.5-8.6 Limiting Reaction Calculations Theoretical Yield and Percent Yield	**Mr. Culp's Ch. 8 HmWk 7 (due 3/1)** **No M. Lab. Meeting (56900)** **Laboratory: Expt. 5:** Formula of Magnesium Oxide (Due in Lab 2/22) (Due during the next Lab. Meeting)
Week 8 **2/27, 3/1**	8.7 Reaction Enthalpy (ΔH) Not on Exam 2 • Exothermic • Endothermic Stoichiometric Energy Calculations. **Ch. 13.5-13.8 Units for Solution Concentration** 13.5 Percent by Mass of a Solute • % by Mass as a Conversion Factor 13.6 Solution Concentrations • Molarity (M) • Mole Given M and Volume • Mole Ion Given M and Volume • Grams Given M and Volume 13.7 Dilution Calculation 14.6 Titration Methods	**Mr. Culp's Ch. 13,5-8 & 14.6 HmWk 8 (due 3/6)** **Exam 2: Covering Ch. 5-8.4:** Specific attention is paid to Chemical Nomenclature, Writing Formulas, mole calculations, reaction balancing and Net Ionic Reactions and Associated Concepts. First concepts from chapter 8 (Rxn Ratio) and fundamental stoichiometry calcs. Does not include limiting reactant problems and reaction energy calcs. **Exam is in the lecture room. If you are not taking the exam, please leave the area after lecture.**
Week 9 **3/6, 3/8** **3/10** **Last Day to Drop with "W."**	**Chapter 9 Modern Atomic Theory** 9.2 Light: Electromagnetic Radiation • Energy and Photons (Quanta) 9.3 Electromagnetic Spectrum 9.4 Bohr: A Simple Model of the Atom. 9.5 The Quantum Model of the Atom 9.6 Distribution of Electrons in the Grnd. State. 9.8-9.9 Valence Electrons & Periodic Trends.	**Mr. Culp's Ch. 9 HmWk 9 (due 3/13)** **Laboratory: Experiment # 7 Preparation of Alum** (Due during the next Lab. Meeting)
Week 10 **3/13, 3/15**	10.1-2 Explanatory Power of Lewis Theory • Simplified Overview of Bonding • Introduction to Lewis Diagrams 10.4 Simple Covalent Bonding • Single, Double and Triple Bonds 10.8 Polar Covalent Bonding (Electronegativity) 10.5 Writing Simple Lewis Diagrams of Molecules 10.7 Shapes of Molecules • Effect of Valence Electron Pairs • Effect of Electronegativity • Polar and Nonpolar Covalent Bonds	**Mr. Culp's Ch. 10 HmWk 10 (due 3/20)** **Laboratory: Expt. 8 Total Water Hardness Titration** (Due during the next Lab. Meeting)
Week 11 **3/20, 3/22**	**Properties of Gases** 11.2 Introduction of Kinetic Molecular Theory and Specifically as It Applies to Gases. 11.3 What is Pressure? 11.4-7 Empirical Gas Laws (Changing Conditions) 11.8 Derivation of the Ideal Gas Law (**Static** Cond.) 11.4-11.7 **Changing** Condition Calculations 11.8 Molar Mass 11.10 Stoichiometry of Gases (Gas phase limiting reactant problem: see notes) 11.9 Dalton's Law of Partial Pressure	**Mr. Culp's Ch. 11 HmWk 11 (due 3/27)** **Exam 3 (lab): Specifically covers Ch. 8.5- Ch. 10, and Ch. 13.5-8** is taken in laboratory and covers Ch. 5-10.4. **The exam is comprehensive regarding chemical nomenclature and mole calculations.** **Exam is in the lecture room. If you are not taking the exam, please leave the area after lecture.**
Week 12 **3/27, 3/29**	**Properties of Pure Liquids and Solids** **Ch. 12.1 Liquids, Solids and Intermolecular Forces** **12.2-3** Consequences of Intermolecular Forces • Viscosity and Surface Tension **12.6** Survey of Intermolecular Forces of Attraction. • Dispersion Forces • Dipole-Dipole Forces Hydrogen Bonding **12.7** Types of Crystalline Solids • Molecular Solids (H_2O & CO_2) • Ionic Solids (NaCl) • Atomic Solids (diamond) **12.3-12.4** Boiling Point. • When Does a Liquid Boil? • Heat of a Phase Change **12.2-5** Consequences of Intermolecular Forces	**Mr. Culp's Ch. 12 HmWk 12 (due 4/5)** **Laboratory: Expt. 10 Determination of Citric Acid in Lemon Lime Soda: (220 pts) Due Thursday** **Students will turn in the prelab within 30 minutes of the start of class. Late prelabs are not graded. Once the prelab is checked, students will complete 4 titrations for each of the two sections. The lab is due at the conclusion of laboratory.** **This lab is graded critically, all calculations should have units, table values need to be correctly rounded**

Day	Lecture Topics and Assigned Reading	Homework/Laboratory Assignments
Week 12 (cont.)	• Viscosity and Surface Tension **12.3-12.4** Boiling Point. • When Does a Liquid Boil? • Heat of a Phase Change **12.7** Types of Crystalline Solids • Molecular Solids (H_2O & CO_2) • Ionic Solids (NaCl) • Atomic Solids (diamond)	**Exam Prep: <u>Additionally,</u> define each of the intermolecular forces of attraction, crystalline versus amorphous, allotrope, types of crystalline solids.** **Laboratory Titrations**
Week 13 4/3, 4/5	**Properties of Solutions** **13.2-3 Formation and Definitions of Solutions** 13.3-4 Solubility; Temperature and Pressure Trends **Colligative Properties (Very Quick Overview)** 13.9 Freezing Point Depression/Boiling Point Elevation • 13.10 Osmotic Pressure	**Mr. Culp's Ch. 13 HmWk 13 (due 4/17)** **Laboratory: Expt. 9 Determination of the Gas Constant "R" Due in Lab (4/3 or 4/5)**
Spring Break (4/10 - 4/14)		
Week 14 4/17, 4/19	**Acid and Base Definitions** **14.1-14.3** Defining Acids and Bases **14. 4** Molecular Definitions • Arrhenius Definition • Brönsted-Lowry Definition Conjugate Acids and Bases **14.7** Strong and Weak Brönsted-Lowry Acids & Bases, and Hydrolysis 14.8 Equilibrium and the Self-Ionization of Water • Acidic and Basic Solutions 14.9 pH, pOH to Describe Acidic and Basic Solutions • Calculating pH and pOH • Calculating Hydronium Ion From pH and Hydroxide Ion from pOH **Defining Acidic and Basic Solutions based on pH**	**Mr. Culp's Ch. 14 HmWk 14 (due 4/24)** **Exam 4** is taken <u>during laboratory</u>: The exam covers Ch. 9-13. This exam will also review molarity calculations and titration calculations (2 hrs) **Exam is in the lecture room. If you are not taking the exam, please leave the area after lecture.** **Laboratory*:* MSDS Assignment:** Students will write a four-page, typed and double spaced paper to the posted outline/handout regarding the interpretation of a material safety data sheet for a chemical of their choice. Check with Mr. Culp/Mr. Naito on your choice of chemical. **<u>No two students may choose the same chemical.</u>** Spelling and grammar are graded components. (Due in Lab 5/1 or 5/4) **See also the posted video that explains the sections of a material safety data sheet.**
Week 15 4/24, 4/26	**Chemical Equilibrium** 15.2 Rate of Reaction (overview) Components of Collision Theory *Collision, Orientation and Energy* • Activation Energy • Concentration and Temperature • Effect of a Catalyst (15.12) 15.4 Equilibrium Expressions 15.5 Involving Pure Solids and Liquids as Products or Reactants. 15.6 Using Equilibrium Constants in a Calculation.	**Mr. Culp's Ch. 15 HmWk 15 (due 5/1)** **Experiment 11: Molar Heat of Fusion of Water** *(Due during the next Lab. Meeting)*
Week 16 5/1, 5/4	**Ch. 16 Introduction to Oxidation-Reduction Rxns** 16.2 Defining Oxidation Reduction Reactions 16.5 Activity Series • Single Replacement Reactions • Active Metals • Predicting Reaction Direction **Ch. 17 Radioactivity Topics** • Radioactivity, types, half-life, radio carbon dating • The bomb, nuclear power, units of measurement, effects of radiation, medical uses.	**Mr. Culp's Ch. 16-Ch 17 HmWk 16 (Not Collected)** **Expt. 12:** The Color Spectra of a Dye and the Perception of Color (Due in Lab Next Week) **Students will use Spec. 20 spectrophotometers** • **See the video posted on CANVAS** so you will know how to operate the SPEC-20 instrument. • **A graph template is posted on CANVAS to help in completing the required graph.**
Week 17 5/8, 5/10	**Lecture Catch Up** **Calculation Review** **Final Exam Review**	**Exam 5 is taken <u>in laboratory</u> covers Chap.14-17** **Exam is in the lecture room. If you are not taking the exam, please leave the area after lecture.**
Week 18 5/17 (W) **Final Exam**	**Final Exam** • Required for All students. 60 Q. Multi. Choice • Failure to take the final will result in a non-passing grade (F) for the course. • Grades go to Web Advisor and CANVAS by F, 5/19/2017	**WHEN: W (5/17/2017) at 5:30 PM** **WHERE: LECTURE ROOM: PHY 76**

EXPERIMENT 0

First and Last Name (print) _____ Semester: Spring-2014

Course Number: **Chem 3A** Lab Instructor Name (print) **R. CULP/M. NAITO**

Section Number: __ _____ Meeting Days: Lab. Meeting Time: _____.

Safety in Laboratory Courses

To the student: You are required to read, understand and implement the safety precautions indicated in your laboratory manual or laboratory handouts, which are summarized below. Your signature on the attached sheet indicates your absolute willingness to abide by these precautions while you are in the laboratory.

1. Work in the laboratory only as authorized by your instructor. Do not perform unauthorized experiments.

2. You are required to purchase safety goggles and wear them as directed during laboratory sessions.

3. Learn emergency procedures and know the locations of the nearest eye wash, safety shower, fire extinguisher, fire blanket, fire alarms and chemical cleanup materials.

4. If you are injured or if any type of accident or fire occurs, IMMEDIATELY call your instructor for assistance.

5. Carefully read all instructions and thoroughly plan your work.

6. Wear appropriate clothing and shoes, not sandals, in the lab. Confine long hair.

7. Carefully read all labels on chemical bottles and familiarize yourself with the number/color hazards codes. More information is available on MSDS forms upon request.

8. Do not eat, drink or smoke in the lab. Never taste chemicals. Smell chemicals cautiously by wafting the vapors toward you. Be sure to wash your hands before you handle food, gum, cigarettes, etc., after you leave the laboratory.

9. When mixing or heating chemicals in a test tube, point the test tube away from people.

10. Do not use bunsen burners or other sources of spark or flame in the vicinity of flammable liquids. Note that most organic solvents are flammable.

12. While mixing acid and water, always add the acid to the water, not vice-versa.

13. Fill a pipet by using a pipet bulb or mechanical pipettor only; never pipet by mouth.

14. If a spill occurs refer it to your instructor or other trained person immediately. If no senior person (faculty member, Dean, ect.) is available, leave the area immediately and call the police.

15. Dispose of chemicals as directed by your instructor and in a manner consistent with federal, state and local hazardous waste disposal regulations. Organic solvents are **never** to be disposed of down the sink; receptacles will be provided as needed for their collection. If a container is not present, not labeled, or full tell your instructor immediately.

16. Do not touch hot glassware or hot hardware. Hot glassware and cold glassware look alike.

17. Never return excess chemicals to the stock bottles. Do not put a pipet or a dropper directly into a commercial stock reagent bottle. Instead, pour an aliquot of the reagent from the stock bottle into a beaker. Use premixed lab reagents as directed in the instructions for specific laboratory exercises. Do not insert anything, including a "clean spatula or dropper" in a class reagent bottle, or return excess material to a class reagent bottle. If a stopper or solid reagent seems stuck in a bottle, see the instructor for help.

18. Use great care in inserting glass tubing into rubber stoppers. Lubricate with glycerol/glycerin or water. Keep your hands on a straight piece of the glass, close to the stopper, but keep your hands and the glass well away from your body.

I have read carefully and understand all of the safety rules contained on this sheet. I also agree to read all rules for specific exercises contained in the laboratory manual or laboratory handouts required for this course. I recognize that it is my responsibility to obey them faithfully.

I realize that all chemicals are potentially dangerous; therefore I will exercise care in handling them. If I am unsure of the potential hazards of any chemical, I will discuss this with my instructor prior to using the chemical in question.

I understand that I am required to wear safety goggles at all times when directed to do so in the laboratory. I also understand that there are dangers involved in wearing all types of contact lenses in laboratory situations where reactive chemical agents, biological fixatives, or volatile organics are in use. If I do elect to wear contact lenses in the laboratory, I will inform my instructor **and** I will assume all responsibility for damages caused by wearing them in the lab.

If I have a medical condition such as, but not limited to, hypo- or hyperglycemia, diabetes, epilepsy, pregnancy, heart ailments, or **any other medical condition** which may cause sudden loss of consciousness, I certify that I am under a doctor's care and that my doctor has given me explicit permission to participate in this laboratory course. It is the student's responsibility to inform the instructor if any such condition exists.

I FURTHER UNDERSTAND THAT I AM NOT PERMITTED TO WORK IN THE LABORATORY WITHOUT THE SUPERVISION OF A LABORATORY INSTRUCTOR. **THERE ARE NO EXCEPTIONS FOR ENROLLED LABORATORY STUDENTS.**