

Chemistry 1B: General Chemistry:**Instructor Name:** R. Culp, M.S.**Location:** Reedley College**E-Mail:** robb.culp@reedleycollege.edu**(Best contact: In person or email)****Office Hours:** *There are no office hours. Plan to use down time in laboratory, or immediately following lab.***Course Syllabus:****Schedule Number:** 55257**Units:** 5**Lecture:** T/Th 3:30-4:45 PM in PHY 76**Laboratory:** T/Th 5:00 -7:50 PM in PHY 82*As a rule the lab will not dismiss before 7:50 PM***Course Description:**

This course completes the year long general chemistry (Chem 1A-1B) sequence and covers the principles of physical and inorganic chemistry with an emphasis on quantitative, mathematical problem solving. Topics covered include acid-base theory, chemical kinetics, equilibrium (acid-base, hydrolysis, and solubility), chemical thermodynamics, electrochemistry, selected topics in nuclear chemistry, coordination chemistry, and/or chemistry of selected groups. Students will analyze inorganic compounds qualitatively and quantitatively.

Required Materials

- **Lecture Text.** Chemistry a Molecular Approach, by Nivaldo J. Tro [2nd or 3rd (*highly recommended*) edition]. **Homework is drawn from the 3rd edition. At the minimum you'll need access to the 3rd Edition.**
- **Lab Text.** Laboratory Materials (Posted on Blackboard)
- 2 gigabyte memory stick for transferring files, 6 inch ruler or equivalent, black pen.
- **A simple scientific calculator (All Exams) and a Graphing Calculator with Statistics Functions: TI-30xa is recommended; it's simple and cheap.** Note: *Only simple function calculators with small rectangular windows, capable of scientific notation (handles exponents of 10), and having log and 10^x functionality are allowed during examinations.* **Graphing or programmable calculators are needed for labs, homework and study guides but are NOT allowed for use during exam.** Nothing may be written on your calculator with the exception of your name; anything other than your name may be considered cheating.
- **Computer/Internet access.** Some materials for this class are posted on blackboard. Grade updates are available only by e-mail or in class. Access to an ACTIVATED Campus email is REQUIRED.
- **Scantrons.** The final exam uses a scantron (882), answers to midterm exams are fill-in no scantron reqrd.

A.) COURSE REQUIREMENTS FOR A PASSING GRADE:

Chemistry 1B has a deserved reputation for being a difficult course. It is made even more so by students who fail to properly prepare themselves for lectures, labs and exams. Most students will not pass this course with average effort. Success commands a deliberate and thoughtful approach to the course. Below are some suggestions.

- 1.) **ATTENDANCE:** Unless you are an extraordinary individual attendance and active participation in the lecture and lab are necessary to pass. The plan for the week and day is immediately discussed at the beginning of class. Learning specific methods of problem solving and developing a conceptual understanding occurs in class. Attend every lecture, and come on time if you plan to pass.
- 2.) **COME PREPARED FOR CLASS:** After the first couple of weeks lecture is intended to be a participatory activity. **Do the assigned reading before class.** This is an important component of your homework assignment. The classroom lecture moves at a quick pace. Examples are not lectured they are discussed in a give and take manner. Students who are productive develop a fundamental understanding before class and obtain further clarity by being an active participant in lecture discussions.
- 3.) **MINIMUM TIME COMMITMENT:** Success in college chemistry stands on three factors. You are asked to divide your time (8-12 hours per week, outside class devoted to lecture) between all three (below) if you need an A, B or C grade.
 - **~1 hours per week** to read and highlight the text BEFORE lecture on the topic. The reading assignment and the lecture topics are listed for each lecture at the end of this syllabus. Students are expected to be conversant regarding the general topics, terms and applications discussed in the text. *Students who are not so informed will have difficulty understanding some topics during lecture.*

- **~2-4 hours per week** to complete a careful post lecture review. PowerPoint slides are posted on line. Download these as handouts before each class and take additional notes. We will frequently do lecture examples that supplement slides examples. **THIS IS THE MOST IMPORTANT STUDY THAT STUDENTS DO.** Home work will take many hours to complete or be impossible to complete if the student doesn't FIRST develop an understanding of the fundamentals for a solid post lecture review. Review each lecture and do the following: (1) Define key terms; these were 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" card important equation setups, terms and methods for later review and study. The actual PowerPoint file from lecture is also posted and you may review this in detail at home.
- **30 min. to 1 hr each week to update your equation card(s):** Equation cards summarize important mathematical relationships. This course has a large number of equations and unique mathematical derivations. Students are expected to maintain a file of equation setups and mathematical derivations for the entire course. As mathematical relationships are defined in class, transfer the information to your equation cards. The following minimum information should be found there. Name of the relationship, useful application, defined variables, and critical example(s) that illustrate the application. At the minimum derivations presented in class are reworked, and are clearly defined on equation cards.
- **Redefining Homework:** Homework is not an activity simply for completion. Homework has a goal to build a deeper understanding of course concepts and learning goals. Learning the processes, terms and equation manipulations is the goal of all homework. The completion of the work and the answer is a tertiary consequence. The second goal of homework is to confirm student understanding using an objective criteria (problems). Overly confident students are frequently surprised by their poor exam scores. Proof of understanding comes from efficient completion of the homework assignment.

~Minimum 4-6 hours per week for homework. Homework consists of a mix of problems that should help students check understanding of course concepts. Homework is scored as a check off. Failure to do homework usually results in a failing grade. Do additional problems as needed to assure yourself that you understand the concepts from the lecture outline. **The exam questions in some cases are lifted from the assigned homework.**

- 4.) **Plan your special events carefully:** Attending a wedding out of town, care for an ill relative, go on a cruise, have a baby, take a night off to attend a concert with free tickets, get married or any significant distraction **WILL place you at a statistical risk of failing the class.** Your instructor can excuse you from attendance, but not from the required course work or information. **Exams, homework and laboratory are never excused.**
- 5.) **Chemistry Survival:**
 - Decide today what grade you are going to accept, and commit yourself to achieving it. Half measures yield one quarter of the desired result. Just good enough is NEVER good enough! **If you push yourself to achieve, you will!**
 - Don't go it alone, get a study partner! Working with a study partner has been shown to lift the average score by half a grade point or more. In the process you are accountable for a work ethic that yields success.
 - **Who do you think you are?** *Regardless of what you do, expect to work at the level of a serious science or engineering major.* This class is targeted to that group. Doctors make up one percent of the US population, two percent are engineers. Conservatively the goals of students here represent only 5% of the US population. If you want to be one of the top 5%, you have to be better than the other 95%! **"You are who you decide to be."**
 - **Do not delude yourself, this course require a great deal from you. If you are less than industrious it will catchup with you. A work ethic is required. Substandard work will be returned ungraded. The only promise that your instructor can make to you is to hold you to a standard that will ensure your success in the courses that follow this one.**

Concluding Thoughts: It has been said that a "person building a house, digs deep and lays the foundation on rock. So when a flood comes, the torrent will not strike the house killing everyone inside. The digging is not easy in the heat of the day, but the consequences of failure are great. It is not that the house will be washed away, instead the house will be the grave of all those inside it. As a student the issues is not life or

death yet the analogy holds. Most in this class have set high goals for themselves. Failure to lay down a deep and solid foundation will entomb those goals long before they reach fruition.

We have two broad goals: **First:** Lay down the foundation of knowledge and understanding needed to go forward. Build a rock solid understanding of the “basics.” Typically the “basics” are not acquired without significant effort; if you are not challenged and occasionally stressed you aren’t working hard enough. **Secondly:** Learning to “learn” and “organize information,” or in other words “*learning to build a foundation* of knowledge.” Some of this is done through learning and some is done by organizing. Can you put words to your deliberate approach to capturing information and concepts then incorporating them into your understanding? While this is not our topic, it is a key to successful acquisition of it. Your pre-lecture study, equations cards, post-lecture study and homework will determine your success.

An old saying, “how do you eat an elephant?” You do so one bite at a time. Our topic is indeed an elephant. *Will you eat the elephant, or will the elephant eat you?* **Your effort AND approach will determine the outcome.**

B.) Course Policies and Descriptions:

1.) **Course Grading Policies:** The primary criterion for grading in this course is performance on exams, quizzes and in the laboratory. Borderline grades may be raised (1-2%) if the final exam grade reflects both your effort in the course and an increased understanding of the course material.

Grading: Your graded work is valued as follows for the purpose of calculating your overall grade:

	Number:	Percent of Grade:	Comment:
Homework:	Collected by Chapter	5 %	<i>This is a check-off</i>
Participation:	10	2 %	<i>Attendance and <u>class participation</u>.</i>
Midterm Exams:	4 Exams	47 %	
Comprehensive Final Exam:	1 Multiple Choice (60 Q)	23 %	
Laboratory:	4 Quizzes (2.5% ea.), Labs (10% total) Expt. 31 Qual. Scheme. Lab Practical	20 %	<i>Attendance in Laboratory is Required</i> <i>This is a little more than one lab quiz.</i>
% Overall = 0.05 x % HmWk + 0.02 x % Attn. + 0.47 x % Exam + 0.23 x % Final + 0.23 x % Lab			

% Overall semester scores are converted to letter grades based on the following:

> 89.9 %	A	80-89.9 %	B	70-79.9 %	C	55-69.9 %	D	<55%	F
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- 2.) **Description of Letter Grades:** An “A” grade reflects excellent work that yields clear evidence of a deep understanding of the theory taught throughout the course. These students have a clear, conversant, mastery of terms, theory and course calculations. A “B” grade reflects a good technical mastery of calculations and intermediate course concepts, but an individual who lacks the breadth of theory and application knowledge that an “A” student possesses. A “C” grade reflects a satisfactory functional understanding of most of the fundamental concepts and basic calculations. Students who wish to argue for a higher grade need to have achieved a level of performance that provides clear evidence that a grade change is warranted. **No final grade will be modified unless both the laboratory and final exam score reflect mastery at the level of the new grade.**
- 3.) **Midterm Grades:** Exams and quizzes are typically graded within a week of their administration. Once graded, exams are available for pickup in class. It is the student’s responsibility to pick up the exam and check scores. A key for worked out problems is posted on BB. **Students have a one week deadline after the exams are made available to check answers and to register a complaint about the test or calculated score. There are no exceptions to this rule.** Please pickup your exam and review it in a timely manner.
- 5.) **Midterm Exams (100 pts. Ea.):** Each exam, as a rule, covers a specific set of chapters from the text (see exam descriptions in the schedule). The guide for exam content is the Course Lecture, Course Text and Assigned HmWk. Midterm exams consist of three sections (see below). **Taken in Lab (3 hrs)**
- **Section 1 (50 pts.):** 20-30 multiple choice or fill-in questions that require minimum calculations or written responses. These questions will probe your conceptual understanding of terms and vocabulary, equation setups, fundamental calculations, end of chapter “Self-Assessment Quizzes.” This section may be comprehensive regarding current and previous exam material. **(No Partial Credit)**

- **Section 2 (20 pts.)** (5-10 problems): These questions are frequently drawn directly from lecture and homework. Calculations are formally done. These problems are of intermediate difficulty. These problems are critically graded and partial credit may be awarded.
 - **Section 3 (30 pts.)** (5-10 problems): These questions are intermediate to advanced multi-step problems. These problems typically involve a manipulation of a basic equation, or they may be problems that are of necessity multistep procedures. Graphing will be required in many instances. In other instances, you may be asked to do a short derivation similar to one presented in lecture. Some questions will ask for written explanations of chemical concepts. Most exams will have at least one brief essay question. The questions in this section will evaluate the depth of student understanding at the intermediate to advanced level. These problems are critically graded and partial credit may be awarded.
- 7.) **Midterm Exam Make-up Policies:** If a student misses an exam due to illness or personal emergency, he/she needs to inform the instructor by email on or before the day and time of the exam. to arrange an exam make-up within the week. **An exam made-up, if warranted, is done before the exam is returned to the class. After the exam is returned, there are no exam makeups.** Makeups are only offered at the option of the instructor by appointment before or after class. Students may receive a zero score for failing to notify the instructor on or before the day and time of the exam or for failing to arrange a time to make-up the exam. **Students are allowed to miss and makeup one exam with a valid excuse one exam per-semester.**
- 8.) **Final Exam:** The final exam is comprehensive and is required for all students regardless of their performance in the course. The final consists of 60 questions which span chapters 12-19, Plus Chapter 24 in our text. The questions are multiple choice. Students will need to bring a scantron 882, pencil, eraser, and a non-graphing calculator. Everything else will be provided. A rule of thumb is that the exam is one third chemistry calculations, one third terms and explanations and one third theory. What the final exam lacks in depth, it makes up for in breadth.
- Failure to take the final yields an “F” final grade. No Exceptions.**
- 9.) **Incomplete Grades:** An “I”, incomplete, grade may be assigned in a course only by approval of the course instructor if all of the following conditions are met: The student has completed all course work except the final examination. The student has a serious and verifiable reason for not completing the final. *The student has a passing grade in the course at the time the incomplete, “I” grade is assigned.* “I” grades are rarely assigned in Chemistry 1B. They are never assigned if the full criterion are not met.
- 9.) **Laboratory:** The laboratory course component is designed to teach the concepts and techniques of chemistry as an experimental science. Laboratory experiments may also provide significant support for lecture concepts. **LABORATORY ATTENDANCE IS MANDATORY.** A required component of laboratory attendance is bringing the required items for lab (Lab Procedure, calculator, lab coat, shoes, pen, and etc.) **Failure to come prepared for lab will count as an absence.** Students who fail to meet the laboratory attendance requirement or **fail to complete three laboratory reports** will receive a semester “F” grade. **“I” grades are not assigned based on failure to attend laboratory or complete assignments, even in the circumstance where a student has been present to acquire the data in Lab.**
- 10.) **Attendance:** Attendance is a component of your participation grade. It is taken at the START of each lecture, and at the start of each laboratory meeting. Class participation implies that you were present at the start of lecture and at the start and conclusion of laboratory, and participated in classroom or laboratory activities.
- C.) **College Policies:** The administration of this course adheres to ALL policies as posted in the 2015-2016 Reedley College Catalog. Below are excerpts that specifically important and apply to Chemistry 1A.
- 1.) **Students with Disabilities:** This course will adhere to the college policy regarding students with disabilities. Upon identifying themselves to the college and then the instructor, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Disabled Students Programs & Services (638-0333).
- 2.) **Academic Dishonesty:** Students at Reedley College are entitled to the best education that the college can make available to them, and they, their instructors, and their fellow students share the responsibility to ensure that this education is honestly attained. Because cheating, plagiarism, and collusion in dishonest activities erode the integrity of the college, each student is expected to exert an entirely honest effort in all academic endeavors. Academic dishonesty in any form is a very serious offense and will incur serious consequences. This course adheres to the Reedley college policy regarding cheating and plagiarism.

- **Cheating** may include, but is not limited to, copying from another's work (**THIS APPLIES TO STUDENTS WHO COPY EACH OTHERS LAB 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.
- **Plagiarism may include**, but is not limited to, failing to provide complete citations and references for all work that draws on the ideas, words, or work of others, failing to identify the contributors to work done in collaboration, submitting duplicate work to be evaluated in different courses without the knowledge and consent of the instructors involved, or failing to observe computer security systems and software copyrights.
- **Incidents of cheating and plagiarism** may result in any of a variety of sanctions and penalties, which may range from a failing grade on the particular examination, paper, project, or assignment in question to a failing grade in the course, at the discretion of the instructor and depending on the severity and frequency of the incidents.

3.) Disruptive Classroom Behavior: The classroom is a special environment. Students are expected to behave in a manner consistent with and promoting the goal of learning. Students who talk during lecture, or behave in ways that are less than respectful of others, will be asked to leave the class. The instructor for this course reserves the right to ask students to continue the course without attending lecture or have a student removed from the course in extreme cases. Please be courteous and respectful to all students in the course. This course adheres to Reedley College's Student Code of Conduct Policy (Board Policy 5520 and Educational Code 76032)

4.) No-Show Drops: A student will be dropped from this course (lecture and lab) if they fail to attend lecture during the first week of instruction and do not notify the instructor by email on or before 5 PM on the day of their absence. If a student is waiting for the seat, it will immediately be assigned to another student. Students dropped for failure to attend are not easily readmitted, since another student frequently is given the seat. **With the exception of "no-shows" it is a student's responsibility to properly drop the course.**

5.) Dropping the Course: Students may be dropped from class if they fail to attend the first class session of the semester. There are no institutionally approved excused absences for any reason to miss this first day of instruction. Additionally students who miss two consecutive weeks without communication with the instructor may be dropped. Students are expected to be in the classroom at the time the class begins. Instructors are required to take attendance at each class session and to report any student who is absent for two successive weeks of instruction. Unless there are significant extenuating circumstances, that student will be immediately dropped from class by the instructor if the absences are occurring before 50 percent of the class is expired. **STUDENTS, WHO FAIL TO TURN IN THREE LABORATORY REPORTS, MISS THREE CONSECUTIVE WEEKS OF LECTURE OR LAB WILL BE DROPPED.** If poor attendance occurs after the 50% drop deadline, a failing grade will result.

In all cases it is the student's responsibility to drop a class in which she/he no longer wishes to be enrolled.

D.) Descriptions of 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. **Work that is below minimum standards may be returned ungraded.** Laboratory reports and homework that are returned ungraded will not be regarded later.

a.) Handwriting: All homework assignments, Laboratory Experiments, Study Guides, Exams, and Quizzes, 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 will ALWAYS be written in blue or black pen,** No Whiteout will EVER be used. "Laboratory data" is defined as any laboratory measurement. A single line strikes through the errors and the correct value is entered next to the original. Do not use any color pen other than blue or black. Erasable pens are not acceptable. Failure to use pen for data losses 10% of the report grade.
- Homework, and calculations are done neatly in pencil, using a good eraser to erase errors.
- **All responses are neatly printed** with capital letters at the start of each sentence, while using correct spelling, and punctuation.
- **Letters and numbers are universally well formed** and presented in a neat horizontal orientation.
- **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.
- **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 or no 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. As a rule questions require more than a one or two word answer. **Show your understanding of the concept when answering questions.**
- **Any calculation requiring unit conversions** will use the format for unit conversion. Proportion is not an acceptable method. Show that you have learned the calculation method as you determine a result.
- **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 calculations 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 value in a mathematical equation.
- **Significant Figures:** Answers associated with single step calculations are first recorded in an unrounded form with units at the conclusion of a calculation and then in rounded form beside the original. Longer multistep calculations are not rounded until the final step has been completed. The final 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: Please write, **“SEE ATTACHED.”** Then very clearly label and attach the calculation to the report form or study guide. If the answer is not easily found it will not be graded, nor will it be regarded.

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 individual student. If your work is identical, neither paper will be graded.

2.) **Laboratory Reports:** ~50 % of the laboratory score is represented by laboratory experiment reports. We will complete more than 20 reports during the semester. The procedures and forms are found on Black Board in the Laboratory Folder. The normal schedule after the completion of the third week will be as follows. Students will complete a standard format prelab (see below) and the prelab form in the lab book. **Both components are due as a student arrives for lab at the next meeting.** These docs are date stamped and held by the instructor until the lab report is turned in. No Lab is graded unless the prelab was turned in on time. The prelab is graded with the lab report. **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 safety lecture and then turn students loose to complete the laboratory experiment. The Lab report and post lab are due before beginning the laboratory. No prelabs are accepted after 5:30 PM. Attendance is taken at the end of the laboratory, please filing the time of your departure. ***No credit is granted for a laboratory unless the student was present of the collection of all the laboratory data and cleanup.***

a.) **Prelab Format For All Labs:** This prelab cover page is written by the student and attached to the front of the prelab form found in your lab book. The prelab cover page will neatly address the same seven questions for each laboratory experiment resulting from a careful reading of the laboratory introduction and laboratory procedure. **Do not copy someone else’s. The lab will not be graded without a attached prelab.**

(1) Below the Experiment Write Your Name

Example: *Robert Smith*

(2) At the top of the handwritten prelab cover sheet write the name of the experiment.

Example: *Empirical Formula Ratio of a Copper Sulfide Compound*

(3) What is the overall goal of the experiment in no more than two sentences?

Example: *In this experiment we will determine the empirical formula ratio of a copper sulfide compound resulting from the reaction of copper metal with elemental sulfur.*

4.) Briefly derive and explain any mathematical relationships and variables used in the laboratory experiment. While this may be presented in the laboratory, prelabs will include a clear well-presented derivation, and communicate how the equation will be used in the laboratory expt.

5.) What essential information needed to communicate the expt. method? (100 words or less)

Example: *A one gram sample of copper wire is massed with good precision in a premassed porcelain crucible. The copper metal is covered with ~20 grams of sulfur and heated*

on a clay triangle at high temperature in a well vented hood. After heating the cooled crucible is reweighed and the net mass of sulfur that remains is calculated. The moles present as copper and sulfur are determined followed by the whole number empirical mole ratio for the compound.

(5) What are the sources of potential error for this experiment?

Example: *The experiment assumes complete reaction of copper with sulfur. If the reaction is incomplete the result will yield a smaller number of moles of sulfur and introduce an error into the calculated formula.*

If the reaction is removed from the heat prematurely excess sulfur will not be driven off and a higher final mass for sulfur will result. This will yield a larger number of moles for sulfur than expected and a potential error.

(6) What are the safety considerations for this experiment?

Example: *The vaporized sulfur is very toxic so the experiment must be done in a hood.*

The crucible will be very hot and is delicate when heated. It is important to handle it with great care.

(7) What are the practical considerations for this experiment?

Example: *A large excess of sulfur and very fine copper wire are required to assure complete reaction in the experiment.*

3.) Homework: Successful students will learn what they understand well and identify topics for further study by doing homework. Homework problems should be addressed as though they are potential exam questions which in many cases is a valid assumption. 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 to learn procedures, definitions and calculations with the homework so they can be reviewed for exams. **So in short homework is not a chore, it is practice.**

a.) Suggested 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. Homework in this class is a check off, so the good practices below are a suggestion.

- **General Information:** Do the problems in the assignment order, the order follows the lecture. 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 should 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. One or two word responses are rarely useful.
- **Processes:** Questions that ask the student to identify the steps or process to obtain a result should have enough information to convey an understanding for future reference. Clear well thought out flow charts, or numbered steps are the expectation. The goal is to capture information for future reference.
- **Calculations:** Students should identify the variables explicitly provided in the problem and those implicit to the calculation. If a simple or multistep derivation is required, it should be included with the problem. 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 laboratory each Tuesday.** It will normally be graded and returned during the next lab. Late homework is not accepted.
- **Homework Rubric: Each homework set is scored as zero or 10 pts. possible.**

Week	Date	Ch. & Sec.	Lecture and Laboratory Outline and Due Dates:
1	1/13	12.5 Lec/Lab is in PHY 76	Lec: Syllabus: Introduction to the Course and Requirements Lab. SG 7 The Fundamentals of Chemistry, A Review (Due 1/22). This is a very comprehensive review. Take time during labs to ask questions and refresh your memory. Identify a study group and plow through this long assignment. Goals: Understanding (Primary), Answers (Secondary). Note: As long as it is, it will be graded critically.
	1/15	12.1-12.4 Last day to add	Lec: Introduction to Solutions <ul style="list-style-type: none"> • Discussion of Prelab and Laboratory Procedures: • Laboratory Safety, Assignment of Laboratory Lockers • Check in and fill out lab drawers before they leave.
2	1/20	12.6-12.8	Lec: Colligative Properties and Colloids Expt. 20A Spectroscopy of Sun Screens (Due 1/22) SG 8: Fundamentals of Excel Graphing, Calculator Math & Statistics for General Chemistry (Due 1/27)
	1/22	13. 1-13.2	Lec: Average rates of formation & composition, average rates of reactions, instantaneous & initial rates, rate laws (HmWk Ch. 12 is due) Expt. 20B Spectroscopy of Sun Screens (Due 1/22)
3	1/27	13. 3-13.4	Lec: Determining a rate law: initial rate methods & integrated rate laws method (0, 1 st & 2 nd order) Expt. 22a Enthalpy of Solution by Calorimetry (day 1)
	1/29	13.4- 13.6	Lec: Half-life (0, 1 st & 2 nd order), The effect of temperature on reaction rate (collision theory, Arrhenius equation: "plain", linear, 2-pt forms, transition theory), reaction profiles Expt. 22b Enthalpy of Solution by Calorimetry (day 1)
4	2/3	13.6- 13.7	Lec: The effect of surface area on reaction rate, reaction mechanisms (elementary steps, rds, slow initial 1 st step, fast equilibrium 1 st step), the effect of a catalyst, brief description of homogeneous, heterogeneous and enzyme catalysis Expt. 23 Kinetics: Oxidation of Isopropyl Alcohol (IPA) (Due 2/10)
	2/5	14.1-14.5	Lec: Chemical equilibrium definition, <u>equilibrium constant expressions</u> for Kc & Kp, equilibrium & kinetics, units of K, relating Kc & Kp, modifying the equilibrium constant, heterogeneous equilibria, qualitative interpretation of K, (HmWk Ch. 13 is due) Lab Quiz: Units of Conc., SG 7, 8, Expts. 20, 21, 22 After Quiz: SG 9 Organic Nomenclature (Due 2/12)
5	2/10	14.6-14.8	Lec: Reaction quotient, direction of reaction shift, solving for all equilibrium concentrations (including using quadratic equation, and approximations) Expt 24: Molar Mass of an Organic Acid by Titration (Due 2/12)
	2/12	14.8-14.9	Lec: Le Chaterlier's Principle (concentration, pressure, volume, temperature changes), effect of a catalyst. Expt 25: Equilibrium and Le Châtelier's Principle (Due 2/19)
6	2/17	15.2-15.3, 15.11	Lec: Acid-Base Definitions (Arrhenius, Brønsted-Lowry, and Lewis (15.11) acids) (HmWk Ch. 14 is due) Exam 1: (Chapters 12, 13 and 14) 3 hours The students cardstock equation card(s) is due as the exam begins, scored 0-5 pts counts as extra credit on the 100 pt exam. No other extra credit is offered. Only well organized and well thought-out, useful work will be graded.
	2/19	15.4-15.6 15.10	Lec: Monoprotic strong and weak acids, the auto ionization constant (Ka), pH and the pH scale, Acid Strength and Molecular Structure (15.10) Expt. 26: Factors Affecting Reaction Rates (Due 2/24)
7	2/24	15.6-7	Lec: Auto- ionization of water, percent ionization (WA), pH of an acid mixture, Calculating [H ₃ O ⁺], [OH ⁻], pH, pOH of strong acids and bases, p-scales inter-relation, relationship. Expt. 27A Synthesis and Analysis of Aspirin (Due 3/3)
	2/26	15.7-8	Lec: Strong Arrhenius Bases and Weak Brønsted Lowry Bases, and the acid-base properties of ions and salts (Hydrolysis). Calculating: [H₃O⁺], [OH⁻], pH, pOH, Kb, Expt. 27B Synthesis and Analysis of Aspirin (Due 3/3)
8	3/3	15.8-10	Lec: Cations as weak acids, classifying salt solutions as acidic, basic, neutral. Dissociation of weak bases, % dissociation of weak acids (including using an approximation), and pH, [H ₂ A ⁻], [HA ²⁻], [A ³⁻] for polyprotic acids. SG 10: Ionization of Diprotic, Triprotic Acids, and Diprotic Brønsted Lowry Bases

	3/5	16.2-16.3	<p>Lec: Common ion effect (qualitative and quantitative approach on ionization and pH), buffers (definition, pH of buffer, pH after adding acids/bases to a buffer) (HmWk Ch. 15 is due)</p> <p>Lab Quiz 2: SG 9 and 10, Expt. 23, 24, 25, and 27.</p>
9 3/13 last day to drop with a "W" grade.	3/10	16.2-16.3	<p>Lec: Henderson-Hasselbalch equation, buffer characteristics (capacity, effectiveness, limits, pH range), how to prepare a buffer</p> <p>Expt. 28A LeChâtelier's Principle; Buffer Solutions (Due 3/12)</p>
	3/12	16.4	<p>Lec: Titrations (definitions), titrations of strong acid w/ strong base, and strong base w/ acid (how to calculate initial pH, pH before equivalence, pH at equivalence, pH past equivalence)</p> <p>Expt. 28B LeChâtelier's Principle; Buffer Solutions (Due 3/12)</p>
10	3/17	16.4	<p>Lec: Titrations of weak acid w/ strong base, (how to calculate initial pH, pH before equivalence, pH at equivalence, pH past equivalence), $\text{pH} = \text{pK}_a$ at $\frac{1}{2}$ equivalence</p> <p>Expt. 29a Titration Curves: Titration of: Strong Acid w/ Strong Base, Weak Base w/ Strong Acid, and Weak Acid w/ Strong Base.</p>
	3/19	16.5-6	<p>Solubility (definitions), solubility product constant, molar solubility, common ion effect, pH effect, determining if precipitation will occur, determining if precipitation is complete,</p> <p>Expt. 29b Determination of K_a, and K_b from Expt. Data.</p>
11 Sprg Brk 3/30-4/3	3/24	16.6-8	<p>Selective precipitation, complex ion formation, K_f and K_d, calculating concentration of metal ion after complex ion formation, effect of complex ion equilibrium on a solubility equilibrium (qualitative prediction, calculating the solubility, determining if precipitation will occur), amphoteric hydroxides, qualitative analysis (separation into analytical groups),</p> <p>SG 11: Titration Curve of 0.1 M Ammonia and 0.1 M Acetic Acid (Due 3:26)</p>
	3/26	No Lec.	<p>Exam 2: Chapter 15-16.8 (HmWk Ch. 16 is due) <i>The students cardstock equation card(s) is due as the exam begins, scored 0-5 pts counts as extra credit on the 100 pt exam. No other extra credit is offered. Only well organized and well thought-out, useful work will be graded.</i></p> <p>Assignment for Spring Break (Handout) Four page paper on a General Chemistry Topic. (Due 4/7) Students need to complete their library research before 3/27. This is a 150 pt assignment; it is graded critically for content, and standards of English, grammar, spelling and punctuation.</p>
12	4/7	24.2-24.4	<p>Lec: Quick survey of transition element properties and electron configurations, coordination compounds definitions, coordination covalent bond, coordination number, geometries, mono-, bi-, polydentate ligands, chelating agents, nomenclature, structure and isomerization (structural isomers: coordination, linkage, stereoisomers: geometric (cis/trans, fac/mer), enantiomers, polarization of light, racemic mixtures)</p> <p>Expt. 30A Establish the Formula of a Coordination Complex using Spectroscopy</p>
	4/9	24.4-24.5	<p>Lec: Valence bond theory, crystal field theory (octahedral complexes: orbital splitting, pairing energy vs. splitting energy) high/low spin complexes, spectrochemical series, paramagnetism), tetrahedral, square-planar, and linear complexes, color</p> <p>Expt. 30B Determination of Iron Content in a Common Cereal using Spectroscopy</p>
13	4/14	17.2-17.5	<p>Lec: Spontaneity, entropy (definition (S) and example of microstates vs. macrostates), qualitative prediction for entropy for different systems and changes, 2nd law of thermodynamics, ΔS_{sys}, ΔS_{surr}, ΔS_{univ}, Gibbs Free Energy and spontaneity. (HmWk Ch. 24 is due)</p> <p>Quiz 3: SG 10, Expt. 27-30 (1.5 hrs)</p> <p>Expt. 31: Introduction to The Qual. Scheme (Flow Chart for Qual. Schemes) An inexpensive lab journal is required for Expt. 30-33. Your neat well-presented work in this journal is graded. You may write anything you want in the journal, but no pasted or taped additions. Students develop a flowchart for the analysis of group I, II, and III metal ions.</p>
	4/16	17.6-17.7	<p>Lec: 3rd law of thermodynamics, standard entropy, entropy and spontaneity (qualitative prediction and ΔS_{rxn}), ΔS_{univ} and spontaneity, free energy and spontaneity (ΔG from Gibbs equation, ΔG from ΔS_{univ}, ΔG standard, ΔG_{rxn}, how to use change of temperature to affect spontaneity, calculating at what temperature ΔG changes sign, ΔG and coupled reactions)</p>

			Expt. 32 Qual. Scheme Group I and II Ions (Journal is Due 4/23) <i>Students will practice the qual. scheme for Grp. 1 and II, make detailed observations and add to their flow chart and notes. Digital pictures are a good augment to observations.</i>
14	4/21	17.8-9	Free energy and non-standard states (ΔG plot, non-standard conditions, ΔG non-standard equation, free energy and equilibrium, K is also a measure of spontaneity), dependence of ΔG standard and K on temperature what does "free" in free energy mean. Expt. 33 Qual. Scheme Group III Ions (Journal is Due 4/23) <i>Students will practice the qual. scheme for Grp. III, make detailed observations and add to their flow chart and notes. Digital pictures are a good augment to observations.</i>
	4/23	18.2	Review of oxidation, reduction, oxidizing and reducing reagent definitions, balancing redox reactions in acidic and basic conditions. Start looking at Study Guide 11. (HmWk Ch. 17 is due) Expt. 34 Lab Practical Qual. Scheme for Group I, II and III ions (4/23) Backpacks are in the front of the room. Each student will attempt to identify. 2 cation unknowns from Group III, 1 or 2 ions from each of Groups 1 and II for a total of 5. The time constraint mandates careful preplanning and preparation of an experimental procedure, followed by thoughtful, accurate and precise implementation of the planned procedure. A card stock (8.5" x 11") flow chart (both sides) and the prepared procedure written into A lab journal are the only allowed items for guiding the student in the procedure. Students may post pictures in their journal, but all text must be <u>handwritten</u> . The flow chart(10%), journal (15%) and the report of unknown results (75%) are due at the conclusion of the laboratory.
15	4/28	18.3-18.4	Voltaic cells (definitions, construction of a voltaic cell, notation), electromotive force, calculating ΔG from E_{cell} , E_{cell} and spontaneity, standard reduction potential, E_{red} , E_{ox} , calculating E_{cell} . Exam 3: Ch. 24, and Ch. 17 <i>The students cardstock equation card(s) is due as the exam begins, scored 0-5 pts counts as extra credit on the 100 pt exam. No other extra credit is offered. Only well organized and well thought-out, useful work will be graded.</i> SG. 11 Redox Reaction Study Guide (Please Self Correct using the posted key)
	4/30	18.5	Strength of oxidant and reductant us inf E_{red} , direction of spontaneity for a redox reaction, equilibrium constant and electromotive force, dependence of electromotive force on concentration (Nernst equation, concentration cells, determination of pH) Expt. 35 Electrolytic Cells and Avogadro's Number
16	5/5	18.8-18.9	Electrolytic cells (electrolysis, polarities of electrodes, predicting the products of an electrolysis, overvoltage, quantitative electrolysis) Lab 4 Quiz: SG 11, SG 9 (Review), Expts. 29-35
	5/7	19.3-19.5	Chemical reactions vs. nuclear reactions, radioactivity, nuclear equations, types of radioactivity, predicting types of radioactivity (nuclear stability, strong force, band of stability, magic numbers, paired neutrons and paired protons), radioactive decay series. (HmWk Ch. 18 is due)
			Final Exam Review and Discussion:
17	5/12	19.6, 19.11	Detecting radioactivity, biological effects, units of radiation, rate of radioactive decay, half-life, integrated rate law, radio-dating with C-14 and with K-40. Lab Check-Out, Discussion of the final Exam.
	5/14	Review	Exam 4; Chapter 18 and Chapter 19 (HmWk Ch. 19 is due) <i>The students cardstock equation card(s) is due as the exam begins, scored 0-5 pts counts as extra credit on the 100 pt exam. No other extra credit is offered. Only well organized and well thought-out, useful work will be graded. Exam Key will be posted after the Exam is Graded on Friday. No Work is accepted after 5/14.</i>
18	5/19	Final	Final Exam is Scheduled for: 3-4:50 PM: Note this is not our normal start time for lec. No Work is kept beyond 5/19, with the exception of final exams. Pickup your graded work.

Use of this schedule: The lecture will stick very close to this schedule. But is not a slave to it. Your instructor reserves the right to reschedule exams, quizzes, laboratory experiments to serve the broader goals of covering the material in a logical order. In some cases lecture slides will not be fully addressed in lecture. Students are still responsible for this material.

Homework is typically due for the entire chapter the lecture after we complete lecture on the chapter. Please turn in the work for each chapter as a single assignment. It is broken up below for your convenience. Due to the availability of answers odd questions are assigned whenever possible. Even questions are assigned when there are no substitutes. Even questions frequently find their way onto exams.

Week	Date	Ch. & Sec.	Homework Assignment: (Due the Tuesday of the week following its assignment)
1	1/13	12.5 Lec/Lab is in PHY 76	3rd Edition: 12: 51, 59, 61, 63, 67 This is a small selection, due to the many parallel problems assigned on SG 7.
	1/15	12.1-12.4 Last day to add	3rd Edition: 12: 29, 33, 35, 37, 39, 43, 45, 99, 103 <ul style="list-style-type: none"> • Short hm. wk. set this week. Use your extra time to work on SG 7. • Get started on setting up your equation cards.
2	1/20	12.6-12.8	3rd Edition: 12: 71, 73, 75, 77, 79, 81, 83, 85, 91, 97, 113, 117 Exam Review: 12: 2, 4, 5, 7, 9, 10, 12, 13, 15, 18, 19, 20, 22, 23, 25, 26, 27 Exam review problems are not assigned for collection. Review these conceptual questions with your study group before the next exam. They are fair game for short answer and essay questions.
	1/22	13. 1-13.2	3rd Edition: 13: 25, 28, 29, 31, 33
3	1/27	13. 3-13.4	3rd Edition: 13: 35, 36, 37, 39, 43, 45, 47, 49, 51
	1/29	13.4- 13.6	3rd Edition: 13: 55, 57, 59, 61, 63 (Attach MS Excel spreadsheet and graph for 63 and 65), 65, 67, 69, 71, 72 (Explain your answer for 71 and 72)
4	2/3	13.6- 13.7	3rd Edition: 13: 73, 75, 77, 79, 80, 89, 94, 97, 103, 117 Exam Review: 13: 3, 4, 5, 7, 8, 10, 11, 12, 13, 15, 17, 19, 20, 21, 22, 23, 24 Exam review problems are not assigned for collection. Review these conceptual questions with your study group before the next exam. They are fair game for short answer and essay questions.
	2/5	14.1-14.5	3rd Edition: 14: 21, 23, 25, 26, 27, 29, 31, 32, 33, 34, 35
5	2/10	14.6-14.8	3rd Edition: 14: 37, 39, 41, 43, 45, 47, 53, 55, 57, 61, 75
	2/12	14.9	3rd Edition: 14: 63, 65, 67, 71, 73, 80, 84, 91 Exam Review: 14: 4, 5, 7, 9, 17, 18, 19, 20 Exam review problems are not assigned for collection. Review these conceptual questions with your study group before the next exam. They are fair game for short answer and essay questions.

Exam 1 (2 hr, 50 min) covers chapters 12-14. (Section 12.5 is excluded, but is addressed in the lab quiz.)

All exams are a combination of multiple choice, computation, short response and essay questions.

- The first section (50%) is represented by 25-30 multiple choice questions that are drawn from lecture, homework, text examples and the self-assessment quiz questions. In some cases classroom examples and homework problems are rephrased to assess your understanding of the theory beneath the calculation. The multiple choice section will access the breadth of the students' knowledge and understanding of theory, terms, and fundamental calculations. No Scantron is required.
- The second section (20%) is primarily computational. This portion of the exam will access student mastery of computational problems and equation setups. Some questions are very similar to homework and lecture examples, while others are rephrased with the same computational objectives.
- The final section is primarily conceptual (30%). Students are asked to correctly put into words their understanding of theory from lecture in short answer and essay format. At least 2 questions are asked that the text calls "Cumulative Problems." The questions require the application of a student's broader understanding to complete. These questions will be unique to the test and are not based on specific homework or lecture problems.

Students may use a single 3"x 5" index card. Blank cards are available from Mr. Culp on the days before the exam. Do not plan to use a card unless it is stamped by Mr. Culp. Please plan to use a simple non-graphing calculator on the exam.

Exam Extra-Credit: A student equation card may be turned in at the START of the exam for 5 points of extra exam credit. Simple lists, incomplete lists, poorly formatted presentations score 0-1 pt. A 5 pt score represents a document that is clearly useful and one that is used by the student. Variables are defined and important examples are presented in an organized manner. Equations are presented in a thoughtful, neat and creative manner. Efforts along this line will score from 2-5 pts. **Copies of others work scores zero pts.**

Week	Date	Ch. & Sec.	Homework Assignment: (Due the Tuesday of the week following its assignment)
6	2/17	15.2-15.3, 15.11	3rd Edition: 15: 33, 37, 39, 40, 123, 125 <ul style="list-style-type: none"> Classify the following acids as strong or weak acids: Name the acid or base then identify the conjugate acid-base pair for each of the following acids: HF (aq), H₂SO₄ (aq), NH₃ (aq), HNO₃ (aq), H₂S (aq), and H₃PO₄
	2/19	15.4-15.6 15.10	3rd Edition: 15: 41, 43, 45, 47, 48, 49, 51(Ex Q.), 55, 57, 61, 81, 83, 117, 119, 120
7	2/24	15.6-7	3rd Edition: 15: 63, 65, 67, 73, 77, 79, 85, 89, 93
	2/26	15.7-8	3rd Edition: 15: 95, 97, 99, 101, 103, 105
8	3/3	15.8-10	3rd Edition: 15: 109, 111, 113, 115, 116 (Ex Q.), 131, 135, 139, 149, 157 Exam Review: 15: 4, 5, 6, 8, 9, 14, 15, 16, 19, 21, 23, 27, 28, 29 Exam review problems are not assigned for collection. Review these conceptual questions with your study group before the next exam. They are fair game for short answer and essay questions.
	3/5	16.2-16.3	3rd Edition: 16: 27 (explain your answer), 29, 30, 31, 33, 35
9	3/10		3rd Edition: 16: 37, 39, 41, 43, 47, 49 (Ex Q.), 51, 53, 55, 59, 115
10	3/12	16.4	3rd Edition: 16: 61, 62, 63, 65, 67, 69, 71, 73, 75, 77, 81, 82, 83 (Ex Q.),
	3/17		
	3/19	16.5	3rd Edition: 16: 85, 86, 87, 89, 91, 93, 95, 97, 99
11	3/24	16.6-8	3rd Edition: 16: 101, 103, 105, 107, 126 (Ex Q.), 127, 149, 153 Exam Review: 16: 3, 5, 7, 8, 9, 10, 11, 13, 14, 15, 17, 20, 21, 26 Exam review problems are not assigned for collection. Review these conceptual questions with your study group before the next exam. They are fair game for short answer and essay questions.
	3/26	Exam 2 covers Chapters 15-16. See the exam 1 description for more details on how the exam is organized.	
12	4/7	24.2-24.4	3rd Edition: 24: 17, 18, 19, 21, 23, 25, 27, 29, 35, 37
	4/9	24.4-24.5	3rd Edition: 24: 41, 43, 45, 47, 49, 55, 57, 63, 73(Ex Q.) Exam Review: 24: 1, 2, 3, 5, 6, 7, 9, 10, 11, 13, 16 Exam review problems are not assigned for collection. Review these conceptual questions with your study group before the next exam. They are fair game for short answer and essay questions.
13	4/14	17.2-17.5	3rd Edition: 17: 27, 31, 33, 35, 37, 39, 41, 43, 45
	4/16	17.6-17.7	3rd Edition: 17: 47, 49, 51, 53, 57 & 59 (Ex Q.), 63
14	4/21	17.8-9	3rd Edition: 17: 65 (Ex Q.), 67, 69, 75, 77, 79, 81a(Ex Q.), 93 (Ex Q.) Exam Review: 17: 1, 5, 6, 7, 8, 9, 10, 11, 13, 15, 17, 22, 23, 25, 26 Exam review problems are not assigned for collection. Review these conceptual questions with your study group before the next exam. They are fair game for short answer and essay questions.
	4/23	18.2	3rd Edition: 18: 39, 41, 42 <i>These questions are also fair game for the lab quiz.</i> This is a small selection, due to the many parallel problems assigned on SG 11.
15	4/28	Exam 3 covers Chapters 24 and 17. See the exam 1 description for more details on how the exam is organized.	
		18.3-18.4	3rd Edition: 18: 43, 45, 47, 49, 51, 53, 55, 57, 59 (explain result) (Ex Q.), 61
	4/30	18.5	3rd Edition: 18: 63, 64, 65, 67, 69, 71, 75, 77, 81
16	5/5	18.8-18.9	3rd Edition: 18: 89, 91, 93, 95, 101(Ex Q.), 103, 107 Exam Review: 18: 3, 4, 5, 6, 7, 9, 11, 13, 15, 17, 19, 21, 27, 29, 31, 33 Exam review problems are not assigned for collection. Review these conceptual questions with your study group before the next exam. They are fair game for short answer and essay questions.

Week	Date	Ch. & Sec.	Homework Assignment: (Due the Tuesday of the week following its assignment)
	5/7	19.3-19.5	3 rd Edition: 19: 31, 33, 34(Ex Q.), 35, 37, 41, 43(Explain your answer).
17	5/12	19.6, 19.11	3 rd Edition: 19: 45, 46, 51, 55, 57, 69, 75 Exam Review: 19: 3, 5, 6, 7, 8, 9, 10, 11, 15, 16, 20, 21, 27 Exam review problems are not assigned for collection. Review these conceptual questions with your study group before the next exam. They are fair game for short answer and essay questions.
	5/14		Exam 4 covers Chapters 18 and 19. See the exam 1 description for more details on how the exam is organized.
	5/19	Final	The final exam is a 60 question comprehensive multiple choice exam. The exam is equally divided covering all chapters addressed during the semester and pertinent laboratory concepts. A scantron 882 is needed for the final exam, along a non-graphing calculator and pencil. Students may use a single 3"x 5" index card. Blank cards are available from Mr. Culp on the days before the exam. Do not plan to use a card unless it is stamped by Mr. Culp. Please plan to use a simple non-graphing calculator on the exam.

EXPERIMENT 0First and Last Name (print) _____ Semester: Fall-2014Course Number: Chem 1A Lab Instructor Name (print) R. CULP Section Number: _____**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.**