

## General Education Course Proposal

Proposed Course: Chem 3A Introductory General Chemistry Units 4  
Prefix No. Title

Department: Chemistry School: Natural Sciences

### GE Category (Indicate one category only):

Foundation: A1\_\_\_; A2\_\_\_; A3\_\_\_; B4\_\_\_  
Breadth: B1 X; B2\_\_\_; C1\_\_\_; C2\_\_\_; D\_\_\_; E\_\_\_  
Integration: B\_\_\_; C\_\_\_; D\_\_\_; International/Multicultural\_\_\_

Existing Course X; Revised Course \_\_\_; New Course \_\_\_

Course Included in Current GE Program X

New courses require the Undergraduate Course Proposal form in addition to this form.

Revised courses require the Undergraduate Course Change Request in addition to this form.

**Proposed catalog description:** Limit course description to 40 words using succinct phrases. Include prerequisites, limitations, lecture/lab hours. Indicate former course number, e.g., (Former Biol 105)

No credit for Chem 3A after 1A. Prerequisite: General Education Area B4 completed. For nonscience majors. Composition of matter and physical and chemical changes; fundamental laws and principles; atomic and molecular structure; acid-base theory, redox and equilibria; qualitative and quantitative theory and techniques. General Education BREADTH, Division B1. (3 lecture, 3 lab hours.)

Enrollment limit per section: 120-200 (lecture), 25 (lab)

Expected number of sections per semester – Year 1 2; Year 3 2

### Attachments:

1. A statement presenting the ways in which this course meets the Specifications provided in the appropriate section of the General Education Policy as well as in the Policies for Inclusion and Evaluation of General Education Courses.
2. A statement of elements common to all sections of this course, identifying content, objectives, required student activities, grading policy, representative texts, and an approximate schedule for the course. Required student activities include such things as papers, research projects, homework, laboratory and/or studio performance, recitations, participation, attendance, and exams.
3. A typical syllabus for a particular offering of the course.
4. Any special cost factors associated with this course.

### Approval for Inclusion in General Education

J R Vandell 9/2/98  
Department Chair Date

Stanley M. Zuyli 9/2/98  
School Dean Date

Brandt Kehoe 12/22/98  
Associate Provost Date

J. Mammen 9/2/98  
School Curriculum Committee Date

Red Ann 12/15/98  
General Education Subcommittee Date

Forward Original and TWELVE copies to:  
Associate Provost for Academic Affairs, M/S 54

## Attachment 2: Elements of the Course

**Chemistry 3A, Introductory General Chemistry**  
4 units

**Semester, Year**  
Schedule # 12345

**Catalog description:** No credit for Chem 3A after 1A. For nonscience majors. Composition of matter and physical and chemical changes; fundamental laws and principles; atomic and molecular structures; acid-base theory; redox and equilibria; qualitative and quantitative theory and techniques. General Education BREADTH, Division B1. (3 lecture, 3 lab hours)

**General Education:** This course meets general education requirements.

**Instructor:** Name  
**Office:** Instructor's Office  
**Office hours:** Instructors office hours  
**Phone/e-mail:** Instructor's office phone/e-mail address  
**Dept. Office:** Chemistry Office, S-380  
**Dept. Phone:** 278-2103

**Textbooks:** The following textbooks are required/recommended for the course and can be purchased at the Kennel Bookstore.

Typical Text: "Introductory Chemistry--FlexText" by Peters and Cracolice (1998)

Typical Lab Manual: "Basics of Chemistry in the Laboratory, 10th Edition" by D. L. Frank

**Fees:** There are no fees attached to this course.

**Prerequisites:** Students must have completed the B4 General Education requirement.

### I. Identifying Content

The following topics are central to most curricula in Introductory General Chemistry. The emphases in coverage may vary according to the textbook used and the discretion of the instructor:

#### Lecture

Through lectures, discussions, laboratory demonstrations, audiovisual presentations, and directed problem solving, the lecture portion of the course presents the fundamental principles underlying the chemical sciences.

Topic #	Approx. Time Spent	Lecture Topics
Topic T1	.5 Weeks	Introduction: Historical Origins of Modern Chemistry; Experiments and the Scientific Method; Data, Results and Conclusions; Hypothesis, Law, and Theory.

Topic T2	1 Week	Matter, Changes, and Energy: Types of Matter; Elements, Compounds and Mixtures; Physical and Chemical Properties; Physical and Chemical Changes; Energy and its Various Forms; Energy Resources.
Topic T3	1 Week	Measurements and Units: The Metric System; Scientific Notation; Uncertainty in Measurements: Significant Figures; Temperature Measurements; Working with Units: Dimensional Analysis.
Topic T4	1 Week	Atomic Theory and the Periodic Table: Dalton's Atomic Theory and Other Competing Ideas; The Nuclear Atom; Isotopes; The Periodic Table and Elemental Symbols
Topic T5	1 Week	Modern Atomic Theory: The Electromagnetic Spectrum; The Development of Quantum Mechanics; Electron Configuration; Valence Electrons and Periodic Table Trends.
Topic T6	1 Week	Chemical Nomenclature: Formulas of Elements; Names of Simple and Complex Ions; Names of Ionic Compounds; Names of Acids and Binary Covalent Compounds, Common Chemicals
Topic T7	1 Week	Chemical Reactions: Chemical Equations; Balancing Chemical Equations; Types of Chemical Reactions
Topic T8	1 Week	Chemical Stoichiometry: Mole Concept; Formula Determination; Stoichiometry Theory; Solution Stoichiometry.
Topic T9	1 Weeks	The Chemical Bond and Molecular Structure: Ionic, Covalent, and Metallic Bonding; Multiple Bonds; Lewis Diagrams; Electron Pair Repulsion; Molecular Geometry; Polarity of Molecules.
Topic T10	1.5 Weeks	Gases and the Atmosphere: The Composition of the Atmosphere; Properties of Gases; Kinetic Theory of Matter; Gas Laws; Partial Pressure; The Ideal Gas Law
Topic T11	.5 Week	Properties of Liquids and Solids: Types of Intermolecular Forces; Liquid-Vapor Equilibrium; The Uniqueness of Water; Types of Crystalline Solids; Energy and Change of State and Temperature; Energy Effects on Weather and the Environment
Topic T12	1.5 Week	Aqueous Solutions: Solvents and Solutes; Solubility; Ion Formation; Net Ionic Equation; Ion Combination Reactions; Hardness of Water.
Topic T13	1 Week	Acids, Bases, and Salts: Different Theories of Acids and Bases; Relative Strengths of Acids and Bases; Salts; pH: a Measure of Acidity; Buffer Systems; Acid Rain.
Topic T14	1 Week	Reaction Rates and Equilibrium: Rates of Chemical Reactions; Reactions at Equilibrium; Le Chatelier's Principle; the Equilibrium Constants.
Topic T15	1 Week	Oxidation-Reduction Reactions: Electron-transfer Reactions; Oxidation Numbers; Oxidizing and Reducing Agents; Writing Redox Reactions.
Topic T16	1 Week	Nuclear Chemistry (optional); Radioactivity and the History of Nuclear Chemistry; The Rate of Radioactive Decay: Half-Lives; Nuclear Equations; Nuclear Fission and Nuclear Fusion; Health Aspects of Radiation.

## Laboratory

The laboratory portion of the course teaches the experimental approach to scientific discoveries in the chemical sciences, emphasizing the scientific method, experimental laboratory techniques, data acquisition, mathematical manipulations, and analysis of experimental results. Through the selection of experimental topics such as water hardness and acidity determination, the laboratory emphasizes real world applications of chemical experimentation. Through experimental laboratory reports and study guides it also serves to reinforce and expand on concepts taught in the lecture portion of the course. Typically, the laboratory grade contributes 15 to 20% to the overall course grade.

Topic #	Approx. Time Spent (Weeks and % of lab time)	Laboratory Topics
Topic L1	12 Weeks (5%)	Laboratory Safety and Proper Laboratory Procedures
Topic L2	11 Weeks (15%)	Experimental Measurement Skills such as Mass Determination, Temperature Measurements, Volume Determination, Titrations, Gasometric Analysis.
Topic L3	11 Weeks (5%)	The Proper Use of Laboratory Equipment such as Analytical Balances, Burets, Pipettes, Spectrophotometers, Scientific Glassware and Heating Devices.
Topic L4	11 Weeks (10%)	Methods of Scientific Experimentation: Observation, Standardization, Data Acquisition, Analysis.
Topic L5	12 Weeks (15%)	Mathematical Calculations such as Concentration Calculations, Data Manipulation, Error Analysis, Significant Figures.
Topic L6	13 Weeks (20%)	Scientific Reasoning: Data Interpretation, Inductive and Deductive Reasoning
Topic L7	4 Weeks (30%)	Reinforcement of Lecture Topics through Study Guides and other Laboratory Assignments.
Topic L8	0.5 Week (5%)	Introduction to Chemical Literature Resources: Library References, Popular Science Periodicals, Scientific Journals.

## II. Course Objectives

- A) To teach students the fundamental theoretical concepts of General Chemistry.
- B) To provide students with the scientific vocabulary needed to understand and participate in modern scientific debates.
- C) To give students an appreciation of the role chemistry plays in the real world.
- D) To develop problem solving skills: the mathematical and deductive talents needed to understand complicated scientific relationships.
- E) To allow students to appreciate the complexity but also the predictive power of science.
- F) To teach the historical evolution of chemistry as a science, and the scientific method, emphasizing the creation and evaluation of hypotheses, and the criteria chemists use in discriminating among competing theories.
- G) To provide students with the laboratory skills, techniques, analytical judgment, and mathematical proficiency necessary for them to understand and participate in the process of chemical science.

## III. Required Student Activities

- A) **Chemistry 3A Laboratory:** meets once per week for 3 hours. Students are required to participate in the laboratory activities, performing the experimental procedures, analyzing the results of the experiments, and completing and submitting a laboratory report for each activity. The laboratory provides an opportunity to perform experimental chemistry and to relate experimental observation to fundamental principles of chemistry. The laboratory is designed to teach the concepts and techniques of an experimental science. The experiments may also provide significant support for lecture concepts. Laboratory attendance is mandatory since an experiment must be performed to be properly understood. Two unexcused Not made up) can result in an F

in the laboratory and thus an **F** in the course. An unavoidably missed lab may be made up only during the same week the experiment is scheduled and only during another scheduled Chem. 3A laboratory in which there is room to work. The laboratory instructor in the make-up lab must give permission to work and must sign and date the lab book to verify your attendance in the lab.

There will be weekly written laboratory reports and regularly scheduled laboratory quizzes. Other writing assignments may be required. Write-ups for each laboratory experiment will be extensive, and contributes significantly to the 2000 word GE writing requirements.

**B) Homework** is usually optional, but may be required, at the discretion of the instructor. The homework covers all aspects of each chapter of the text and usually consist of 20-30 questions per chapter. Consistently turning in completed homework assignments will not only increase the knowledge of the student, but can positively affect their course grade by either adding to their point total, or being taken into consideration in the case of borderline final grades.

### **C) Exams & Grading Policy**

The only criterion for grading in this course is performance on exams and in the laboratory, although borderline grades may be raised if evidence of effort is shown (i.e., a consistent record for completing homework.) Exams in the past have been primarily multiple-choice.

Typically, quizzes (3 to 4) and semester examinations (3 to 4) account for about 50-60% of the point total with the final examination accounting for about 25% and the laboratory accounting for 15 to 20%.

The point distribution in a typical course offering would be:

3 Quizzes	100 points
3 Hour Exams	300 points
Final Examination	200 points
Laboratory Grade	120 points

### **D) Attendance Policy**

This policy varies according to lecturer. Most do not require attendance at lectures. However, students are responsible for all material covered and all announcements made in class whether or not the student was present. Attendance is mandatory in the laboratory. More than two unexcused absences in the laboratory can result in an "F" for the course. Missed laboratories can be made up in other laboratory sections only during the week the laboratory was missed.

### **E) Writing Requirement**

Approximately 80-85 % of the 2000 word Writing Requirement will be fulfilled in the laboratory and 15-20% will be fulfilled by a library literature assignment.

*In Laboratory:* Each experiment will require a pre-lab essay which summarizes the theory, techniques, and procedures of the lab experiment, as well as a post lab essay in which the students summarizes his or her observations, errors, results and conclusions. Teaching assistants will be required to attend a session to learn how to evaluate these lab essays. Students will be required to submit acceptable essays (which follow the rules of proper syntax, spelling, and grammar) before receiving credit for the experiment. Significant writing is also required within the body of the laboratory report where most of the experiments require written descriptions of procedures, observations, and analyses and have end-of-experiment questions requiring written responses..

*In the Library Literature Assignment:* Students will find popular press articles about a topic related to chemistry as designated by the instructor (the environment, chemical health risks, new drug discoveries, new materials, etc.). Each student will prepare a term paper (300-400 words) summarizing and analyzing the articles. The paper will be graded by the instructor and/or graduate teaching assistants, using the same criteria used for the laboratory essays.

## COURSE INFORMATION CHEM 3A, 1998

### GENERAL

Successful completion of the B4 General Education requirement is a prerequisite for the course. Chem. 3A is designed for non-science majors to teach the fundamentals of chemistry as presented in the lecture, as described in the textbook and as performed in the laboratory.

### CLASS ATTENDANCE

Lecture attendance is not mandatory, however, students are responsible for **all material covered and all announcements** made in class whether or not the student is present.  
LABORATORY ATTENDANCE IS MANDATORY.

### HOMEWORK

Homework assignments are given because some students need the extra motivation to do them. In general, 20-30 of the questions at the end of each chapter are required; **you must choose a mix of problems which provides a fair sampling of the work of each assigned section and at least one half of the problems must be from the black colored problems.** Homework counts this way: if you have a good homework record and your final grade is borderline, you will be raised to the higher grade, at the discretion of the instructor.

To be given homework credit, your work must be complete, properly titled, and must be turned in on time. Your paper should be stapled, then folded in half, lengthwise. You must write in your name, date and Chapter Letter on the folded exterior page of the homework .

### MACCHEM TUTOR: CHEMISTRY TUTORIALS ON THE MACINTOSH COMPUTER

A variety of computer tutorials for Chem. 3A should be available on computers in MCL 239.

### GENERAL EDUCATION WRITING REQUIREMENT

*In Laboratory:* Each experiment will require a pre-lab essay (75-100 words) which summarizes the theory, techniques, and procedures of the lab experiment, as well as a post lab essay (100-150 words) in which the students summarizes his or her observations, errors, results and conclusions. Students will be required to submit acceptable essays (which follow the rules of proper syntax, spelling, and grammar) before receiving credit for the experiment. Significant writing is also required within the body of the laboratory report where most of the experiments require written descriptions of procedures, observations, and analyses and have end-of-experiment questions requiring written responses..

*In the Library Literature Assignment:* Students will find popular press articles about a topic related to chemistry as designated by the instructor (the environment, chemical health risks, new drug discoveries, new materials, etc.). Each student will prepare a term paper (300-400 words) summarizing and analyzing the articles. The paper will be graded by the instructor and/or graduate teaching assistants, using the same criteria used for the laboratory essays. The score on the paper will be incorporated into the laboratory grade.

### THE LABORATORY

The laboratory provides an opportunity to perform experimental chemistry and to relate experimental observation to fundamental principles of chemistry. The laboratory is designed to teach the concepts and techniques of an experimental science. The experiments may also provide significant support for lecture concepts. **LABORATORY ATTENDANCE IS MANDATORY** since an experiment must be performed to be properly understood. **TWO UNEXCUSED ABSENCES (NOT MADE UP) IS AN AUTOMATIC F IN THE LABORATORY AND THUS AN F IN THE COURSE.** An unavoidably missed lab may be made up only during the same week the experiment is scheduled and only during another scheduled Chem. 3A laboratory in which there is room to work. The laboratory instructor in the make up lab must give permission to work and must sign and date the lab book to verify your attendance in the lab.

## EXAMS AND GRADING

Bring with you to all exams

- A. Scantron form #20052 (its color is brown) (On the form write your name, date, seat number and exam version.), A soft lead pencil (#2 or softer) with a good, working eraser
- B. A calculator (The Texas Instruments TI-30SLR is cheap, and is powered by light. Batteries have a way of failing just when you need them.). **Only simple function calculators with small rectangular windows are allowed on the exams.**
- C. DO NOT BRING scrap paper or a Periodic Table. These will be provided to you.
- D. Bring positive identification containing your photograph (Student ID or drivers license). If you are asked for and do not have proper identification, your exam may not be accepted.

THE ONLY CRITERION FOR GRADING IN THIS COURSE IS PERFORMANCE ON EXAMS AND IN THE LABORATORY, although borderline grades may be raised if evidence of effort is shown (i.e., a consistent record for completing homework .)

The course grade is determined by the following:

Four one hour exams*	400 points	(56%)
Final exam	200 points	(28%)
Laboratory**	<u>120 points</u>	(17%)
Total points:	720 points	

Tentative grade scale for the hour exams (in %):

100 A 87 A-B Border 85 B 73 B-C Border 70 C 53 C-D Border 50 D 43 D-F Border 40 F

\*There are four scheduled quizzes, each worth 35 points. If it will improve your grade, the total of your highest three quizzes will be substituted for your lowest one hour exam. If you miss an exam, the total of your highest three quizzes will be substituted for the missed exam.

\*\*Includes the term paper. Infrequently a lab TA will not turn in grades or will turn in grades which do not distinguish among students' chemistry competency (i.e., almost everyone has received an "A" or "B"). In these situations the laboratory grade will not be used in the calculation of a final grade. In situations where a student's total average score including lab is borderline, and is significantly higher (more than 2% points) than the lecture score average without lab, the instructor will place more emphasis on the lecture grade average in awarding a final grade.

### **NO MAKE UP EXAMS WILL BE GIVEN.**

The final is comprehensive and required. Each one hour exam (except the first) may contain some material covered on the previous exam.

Incomplete Grades: An incomplete grade (I) can be given only if a student has a passing grade in all work completed in the course **AND** has completed at least two-thirds of the course work **AND** presents to the instructor complete written documentation of the reason(s) for requesting the incomplete. Incomplete grades are rarely given and only for fully justified reasons.

**A LONG STANDING DEPARTMENTAL POLICY CONSIDERS AN F IN EITHER LECTURE OR LABORATORY TO BE AN F IN THE COURSE. IF EITHER LECTURE OR LABORATORY IS FAILED, THE ENTIRE COURSE MUST BE REPEATED.**

## HELP

If you are having difficulty with the material in this course, GET HELP immediately from one or more of the following sources.



1. Keep up with the material and study with others. Students who study in groups tend to do better.
2. See me during office hours or attend the scheduled review sessions.
3. Attend the Chemistry Dept. (free) tutorials sessions at the announced times or get tutorial help from the Office of Tutorial Services.
4. Get a tutor from a list in the Chem. Dept. Office (NS 380). These tutors charge for their services.

#### CRITICAL DATES

XXXX Last day to drop a class without documented reasons.

XXXX Last day to drop a class for serious and compelling reasons. Your "serious and compelling" reason for dropping the course must be supported with written documentation and presented to the Dean of Natural Sciences. A poor grade in a course is not a "serious and compelling" reason.

## CHEMISTRY 3A LECTURE SCHEDULE—1998

TTh 11:10-12:25, MCL 161

Instructor: H. K. Ono Office: S-380 Telephone: 278-2103

Text: Introductory Chemistry--FlexText by Peters and Cracolice

Lab Manual: Basics of Chemistry in the Laboratory by D. L. Frank, 10th Edition

WEEK	CHAPTER	SUBJECTS (Bold underlined letters indicate Identifying Content topics from Attachment 2)
1	1, M, C	Intro, Course Policies, CHAP.1: Introduction. CHAP. M: Matter and Energy, (HWK: 30 questions, Chap. M) CHAP. C: Measurements in Chemistry (HWK: 30 questions, Chap. C.) ( <u>T1,2,3 L5</u> )
2	C, G	Finish CHAP. C. CHAP. G: The Gas Laws (HWK: 30 questions Chap. G.) ( <u>T3,10 L2,4,6</u> )
3	G, A	Finish CHAP. G. CHAP. A: Atomic Theory (HWK: 30 questions Chap. A.) ( <u>T1,3,4,10 L 2,4,6</u> )  QUIZ #1
4	A, N	Finish CHAP. A. CHAP. N: Chemical Nomenclature (HWK: 30 questions Chap. N.) ( <u>T6</u> )  EXAM #1 CHAPTERS M-A
5	N, F	Finish CHAP. N. CHAP. F: Chemical Formula Problems (HWK: 30 questions Chap. F.).( <u>T6 L5</u> )
6	F, S (part), R	Finish CHAP. F. CHAP. S: Solutions S.5-S.6 (HWK: 20 questions from S.5 and S.6 only.) CHAP R: Reactions and Equations. (HWK: 30 questions from Chap. R.) ( <u>T3,7,12 L5</u> )
7	H	CHAP. H: Quantity Relationships in Chemical Reactions OMIT H.3, 4, 10, 11. HWK: 30 questions Chap. H.) ( <u>T8 L5</u> ) QUIZ #2

8	Q	CHAP. Q: Atomic Theory: The Quantum Model of the Atom (HWK: 30 questions Chap. Q.). ( <u>T1,5 L4,6</u> )  EXAM #2 CHAPTERS N-H and S.5-6.
9	B, D	CHAP. B: Chemical Bonding (HWK: 30 questions Chap. B.) CHAP. D: The Structure and Shape of Molecules (HWK: 30 questions Chap. D.). ( <u>T9</u> )
10 )	D, I, W	Finish CHAP. D. CHAP. I: The Ideal Gas Law and Its Applications. (HWK: 25 questions Chap. I) CHAP W: Gases, Liquids and Solids (HWK: 20 questions Chap. W).( <u>T10,11 L5,6</u> )  QUIZ #3
11	S, Z	CHAP S: Solutions (HWK: 20 questions Chap. S.) CHAP. Z: Net Ionic Equations (HWK: 25 questions Chap. Z) ( <u>L12</u> )  EXAM #3 CHAPTERS H-W
12	Z, P	Finish CHAP. Z. CHAP. P: Acid-Base Reactions (HWK: 25 questions Chap. P.) ( <u>L3,13,14 T5,6</u> )
13	P, E	Finish CHAP. P. CHAP E: Chemical Equilibrium. (HWK: 25 questions Chap. E.) ( <u>T14 L6</u> )
14	E, X	Finish CHAP. E CHAP X: Oxidation-Reduction Reactions—Sections X.1-5 only.) ( <u>T15 L5</u> )  QUIZ #4
15		EXAM #4 CHAPTERS S-X
		FINAL EXAMINATION

## CHEM 3A LAB SAMPLE SCHEDULE 1998

Lab Manual: Basics of Chemistry in the Laboratory by D. L. Frank, 10th Ed.  
 Coordinator: Dr. H.K. Ono  
 Office: S-380; tel. 278-2103

NOTE: ALL STUDENTS MUST WEAR SAFETY GLASSES, GOGGLES OR EYE GLASSES IN  
 THE LABORATORY IF ANY LAB WORK IS BEING DONE ANYWHERE IN THE LAB.  
 FAILURE TO DO SO MAY RESULT IN EXPULSION FROM THE LAB.

Week	Week of...	Experiment Number	Title (Bold type indicates syllabus topics)
1			Lab safety, Schedule and Policies (L1)
2		1	Introduction to the Laboratory (L4-7)
3		3	Physical Properties of Substances (T3,10,11 L1-6)
4			Quiz #1 (Safety, Expt 1&3) Exam Review
5		2	Mass and Volume Measurement (T2,3,12 L1-6)
6		Study Guide A	Formulas and Nomenclature (Part of Study Guide A will be a take home assignment) (T6, L6,7)
7		4	Relative Masses of Cu and Zn ions. Study Guide C-Part Term Paper topic submitted (T3,8,12,15 L1-6)
8		Study Guide B	Quiz #2 (Expt 2&4, SGA, SGC) then Moles and Stoichiometry (T7,8 L1-6)
9		5	Det. of the Empirical Formula of a Compound (T8 L1-6)
10		6	Alum from Scrap Aluminum (T7,8 L1-6)
11		7	Gravimetric Analysis: % water in a hydrate (T7,8 L1-6)
12		12	Quiz #3 (SGB, Expt 5,6,7) Determination of Ca and Mg ions in water (Hardness) (T12,13 L1-7)
13		10	Gasometric Analysis of Hydrogen Peroxide Solution. Study Guide D: Writing Net Ionic Equations. Term Paper Draft Due(T10,12 L1-7)
14		15	Introduction to Acids and Bases. Turn in and have corrected: Study Guide D (T13 L1-6)
15			Quiz #4 (Expt, 10, 12, 15, SGD) Term Paper Due

WARNING: Two unexcused missed labs which are not made up will result in an F for the course, not just for the lab. An absence can only be made up in another section with the permission of your instructor and that section's instructor and only during the same week the experiment is scheduled. Attendance is recorded when the report is presented to instructor and is deemed satisfactory.

### Lab Grade Criteria:

Quality of reports and demonstrated understanding of concepts	10%
Subjective evaluation by instructor	10%
Term Paper	10%
Lab Quizzes	70%

Lab counts approximately 15% of your final grade. However, both lab and lecture grades must independently be passed in order to pass the course. For example, a grade of "B" in lecture and "F" in the lab equals a course grade of "F". Similarly, a grade of "F" in lecture and "A" in lab equals a course grade of "F". Laboratory work must be completed and required assignments presented to the instructor before you are counted as having been present in the laboratory.