Georgia Perimeter College

Survey of Chemistry Laboratories
Syllabus, Policies and Equipment
CHEM 1151L and CHEM 1152L
Dunwoody Campus

INSTRUCTOR:
OFFICE:
EMAIL:
PHONE:
OFFICE HOURS:
COURSE CRN AND SECTION:

CONTENTS OF THIS DOCUMENT

Course Syllabus

Course Description:
Laboratory exercises supplement the lecture material of CHEM 1151. This course is intended for students in physical education, business, humanities, social sciences, and allied health (Nursing or Dental Hygiene) planning to pursue baccalaureate degrees. The primary topics covered are measurements, nomenclature, atomic bonding, states of matter, solutions, equilibria, acids, bases, and pH. This course lays the foundation for understanding of biochemical processes.

Objective:
The main objective of this course is to acquaint you with the techniques and equipment required to carry out basic chemistry experiments. The laboratory experiments are designed to demonstrate and test some of the basic principles taught in Chemistry 1151 lecture. (CHEM 1151 lecture is a co-requisite with CHEM 1151L.)

Expected Educational Results:

Upon successful completion of Chemistry 1151 lab, the student should be able to:

1. Recognize and state the use of appropriate laboratory apparatus.

2. Define accuracy, precision and significant digits as related to laboratory measurements.

3. Given appropriate measuring devices and lab apparatus, determine physical properties of substances using appropriate significant figures.

4. Define and use appropriately methods of separating known components of mixtures based on chemical and physical properties.

5. Where appropriate, calculate percent error of experimental results relative to standards.

6. Upon carrying out chemical reactions in the lab and given appropriate reference materials (i.e., polyatomic ion formulas, periodic table, activity series and solubility rules) convert observable laboratory reactions to balanced equations

7. Given a set of data related to a specific experiment
    a. identify all measurable quantities
    b. recognize sources of error
    c. identify limitations of measuring devices in order to state the uncertainty in measurements.
    d. come to a valid conclusion based on the data

8. Given appropriate data, use stoichiometry to determine the formula of a compound.

9. Given appropriate titration data, determine the number of moles of an unknown acid or base present, determine the solution concentration and operationally define a titration, endpoint, equivalence point and indicator.

Student Equipment List

Lab Manual Textbooks: CHEM 1151L- Survey of Chemistry, CHEM 1151L Laboratory Experiments. This text is available only at the college bookstore.
CHEM 1152L- Signature Labs Series, Survey of Organic and Biochemistry. This text is available only at the college bookstore.

Lab Notebook: Record keeping is essential. You will need a hardbound notebook to record data and observations. A quad ruled, bound composition book is best. **No loose leaf or ringed binders!**

A Calculator.

An Ink Pen: Blue or black ink ONLY.

Laboratory Goggles: Must have a Z87 safety rating. Available from the college bookstore, Home Depot and Ace Hardware; must have side shields.

Grading

The final grade for the laboratory course shall be calculated as follows:

Quizzes / Reports:	45%
Notebook / Safety / Clean up	30%
Final Exam:	25%

Quizzes:
Quizzes may be given periodically throughout the semester with or without advance notice. The instructor will give a minimum of five quizzes throughout the semester. Instructors schedule their own quiz dates. The quizzes will cover material taught in the laboratory course. A quiz carries the same weight as a weekly assignment.

Weekly Assignments/ Reports:
Students will be required to submit data and calculations from each experiment. They will also be asked to complete pre and post lab questions that are found in the lab manual at the end of each lab experiment. These questions and calculations will be graded for completion and correctness. Each assignment is due one week after the experiment has been completed. Late reports will be penalized with a grade reduction.

Final Exam:
The final exam will be comprehensive.

Laboratory Schedules

The lab schedules are posted at **http://www.gpc.edu/~dunchelb/**. It is the student's responsibility to check the schedule and prepare the correct lab materials for each lab period.

Statement of Academic Honesty

All of your assignments and experiments must be your original work. Your only source of outside assistance is your laboratory instructor. Cheating includes copying or using any data from another person, falsifying data by alteration or invention, or in any way submitting work or data not actually as you measured it while performing the experiment in our laboratory during this semester. Any cheating will result in a "0" for that grade or "F" in the course at the instructor's discretion.

Attendance Rules

One can only learn experimental techniques by showing up for lab. Attendance will be taken at every laboratory session.

1. **There will be no makeup sessions for a missed session. If absent, you will receive a zero for the laboratory session that you missed.** Exceptions to this rule are listed below.

    a. Exceptions may be made for the following situations provided the student has written and dated documentation: military service, jury duty, court dates, job interview, medical need (doctor's note on letter head required) or death of a first degree family member (spouse, child, parent). One such exception is allowed per term at the discretion on the instructor. In such case, the student is to be excused from the lab and the grade not counted towards the final grade.

    b. Alternately, a professor may choose to drop one lab grade for all students in his or her section, in such case, no other exceptions need be made.

    c. Instructors may allow a student to attend another lab section if and only if they are the instructor for said section. It is the instructor's responsibility to prep materials for the student to make up a lab under these circumstances.

    d. **When in doubt, or in case of dispute, please refer to attendance rule #1.** The Laboratory Supervisor will not mediate or arrange lab make ups.

2. Students who <u>never attend</u> a class and <u>never "log-in"</u> for a distance learning class by the end of the first two weeks of the term will be reported for non-attendance.

3. Any student who is receiving government financial assistance, veteran's benefits or is on a student Visa and is absent from more than one laboratory session will be reported to the Financial Aid Department.

4. Tardiness: Students must arrive on time. The instructor may not allow students to attend lab if the student arrives after the experiment is in session or misses the pre-lab lecture. If a student arrives after quiz has been given, the instructor may not allow a make-up quiz.

Withdrawal from the Course:

Attendance will be taken at each laboratory session. The College will assign a grade of "W" if the student officially withdraws by mid-semester. After mid-semester, withdrawal will result in a grade of "F" unless a hardship waiver is granted by the Head of the Science Department. Withdrawal from the lecture requires withdrawal from the laboratory course. Likewise, withdrawal from the laboratory course requires withdrawal from the lecture course. It is the student's full responsibility to withdraw through the registrar's office if the need arises.

<u>Withdrawal Option for Students with Increased Medical Risks</u>

Students with special conditions (such as wearing contact lenses, pregnancy, nursing mothers, allergies, suppression of the immune system through causes such as disease, chemotherapy, transplants, etc.) should be aware that science laboratories contain materials which when handled improperly pose potential hazardous effects. **These students should contact their physicians for advice about continuing the laboratory. Students wishing to withdraw from the laboratory course after consultation with a physician may receive a full refund for a laboratory course, provided a letter is submitted from the physician within the first two weeks of the semester. The physician's letter must indicate that the student should not attend the laboratory course due to a health risk.**
The Laboratory Course must be completed before proceeding to the next course in the sequence. Information about the chemical compounds used in the science laboratories is available from the department head.

Chemistry Laboratory Safety

Absolutely no food, drink, gum, tobacco products or makeup should be consumed or used in the laboratory.

→You must wear eye protection (goggles) and closed shoes at all times while in the laboratory.

> **Goggles:** You must wear safety goggles at all times during an experiment. Goggles may be purchased at the college bookstore or at a local hardware store. Laboratory aprons are also available for purchase. While aprons are not required, keep in mind you may not wish to wear your best clothes on lab day.

→No exposed midriffs, baggy pants, exposed underwear or hats are allowed in the laboratory.

→Students who are deemed inappropriately dresses are to be excused from lab by the instructor, but may return to lab if appropriate and safe clothing, shoes and eye protection is obtained *and* if there remains sufficient time to complete the lab. (Students who are excused from lab because of safety violations can receive a grade of zero for the day.)*

→Do not sit on the lab benches. Chemicals may be present which can cause damage to clothing and serious burns to the skin.

→All books, bags and coats are to be stored under the balance tables during the lab period.

The lab is equipped with a safety shower and eyewash.

Material Safety Data Sheets are available for each chemical in the lab. These sheets are located online. Please see the Laboratory Supervisor (NE1110) if you need assistance with this information.

Students may not enter the stockroom without permission of the instructor.

Finally, irresponsible behavior will not be tolerated and will result in expulsion from the laboratory. First offense—a warning will result. Second offense—dismissal for the laboratory session and a "0" will be assigned for that session. Third offense—instructor initiated withdrawal from both the laboratory and the lecture.

Equipment: You will be assigned a workstation and a plastic box containing glassware and additional equipment. You are responsible for the maintenance of this equipment and your station. You must return all borrowed materials to the appropriate place and leave the lab clean of chemicals, spills, and paper waste.

Broken glassware: You must dispose of all broken glassware in the appropriate box marked for broken glassware. If possible, rinse any chemical residue from the glassware before adding it to the box. Also, obtain a broken glassware slip and return it to the stockroom to replace the broken glassware.

The Student Laboratory Notebook

You will be required to keep a lab notebook. The notebook should be brought to every lab session. To prepare for each laboratory you must read the assigned lab in the manual or obtain the handout from the web. (Specific instructions will be given by your instructor for each lab.)

All observations, calculations and data should be recorded into your bound notebook using blue or black ink. No pencil! No white out! All markings are permanent. If you need to correct a mistake, simply draw a single line through the word or phrase in error. No pages may be torn or removed from the lab notebook. All pages should be numbered.

Prior to arrival in lab, you should read the lab and record the purpose and procedure in your notebook. You should include enough detail that you could complete the experiment with your notebook alone, without the aid of your lab manual. The format is listed below:

Page One of the Notebook: Title page includes course title, section number, semester, date and your name.

Page Two of the Notebook: Table of Contents should include each experiment and its beginning page number.

Overall format for writing up each experiment in the lab notebook:

1. Experiment title and date performed.
2. Partner's name if lab was a team effort.
3. *Purpose*: two or three sentences of your own words to explain what you are attempting to determine and the method used.
4. *Procedure*: a concise step by step outline of exactly what you must do to perform the experiment
5. *Data/Observations*: all measurements you make (time, length, volume) and descriptions of what you see (color changes, precipitation)

6. *Calculations*: Show ALL calculations required to answer questions and problems for report sheets. Whenever applicable an experimental value should be compared to a known or theoretical value. The source of the known value should be cited. Percent error should be calculated to compare known and experimental values.

7. *Conclusions*: a brief statement in your own words to summarize the experiment. If the results were unexpected, cite possible sources of error. The conclusion should be scientific and practical, not a personal reaction to the lab. Opinions and personal statements are not valid, such as "the lab was fun." Also, a statement such as "this experiment was successful" is not sufficient without explanation.

8. Each section must be clearly labeled. Leave appropriate space between sections to make notes and observations. **Your laboratory instructor must sign your notebook before you leave each session.**

Your lab notebook may be collected at the end of the semester and graded for completeness and proper use. There may also be daily spot checks any time during the semester. **Again, you should arrive to each lab session with your purpose and procedure already recorded in your lab notebook in ink!**

Instructions for a Written Lab Report

The laboratory report is written based upon the findings recorded in your lab notebook. The written laboratory report is due one week from the lab session at the BEGINNING of the following lab session. All pre and post laboratory questions are due as part of the written report. A penalty of 10% off the report grade will be assessed for each day the report is late. The report must be typed and stapled. YOUR NAME AND THE EXPERIMENT NAME SHOULD BE ON EVERY PAGE OF THE REPORT!

The following guidelines should be consulted before writing your report.

Introduction: Give a brief discussion of the purpose of the experiment. For example, "The purpose of this experiment was to determine the atomic mass of zinc using an electrochemical method." Discuss the principle and theory as the basis for the experiment. Briefly describe the chemical reactions and physical changes that took place in the experiment. State the key mathematical and chemical equations used to analyze the experimental data and calculate results that you report.

Procedure: Provide a brief summary of the procedure you followed to acquire the data. References can be made to the laboratory manual. If significant modifications were made from the originally published manual procedure, indicate the changes.

Tabulated Experimental Data: Your laboratory data must be presented in a neat tabular form with each column clearly labeled. You should maintain significant figures throughout the report and assign correct units to all tables of data.

Sample Calculations: One complete set of representative calculations using your data necessary to arrive at your final result must be included.

Tabulated Results of Calculations: This section must show the results of your calculations in table form. These results may be included with Part 3, but a clear table of experimental results must appear as part of the report.

Discussion of Results and Conclusions: Interpret your results in terms of the stated purpose. Explain in your own words whether or not your experimental results verified the theory or principle discussed in your introduction section. Explain why the results do or do not match the theory, principle or law. You should make comparison to known values when available. Any references or handbooks used for obtaining known values should be properly cited.

Pre-Lab and Post-Lab Questions: show all of your work for all questions.

References: The books you use to prepare the report should be cited in the MLA format; see URL: http://www.libs.uga.edu/ref/mlastyle.html for additional information.

APPENDIX1- Departmental Policies

ACADEMIC HONESTY POLICY - Cheating and Plagiarism
Cheating includes any attempt to defraud, deceive or mislead the instructor in arriving at an honest grade assessment. Plagiarism is a form of cheating that involves presenting as one's own the ideas or work of another.

All portions of any test, project or final exam submitted by you for a grade must be your own work unless you are instructed to work collaboratively. Specific requirements will be described for collaborative projects, but all work presented must be the work of members of that group. Research materials used must be properly cited.

Violation of the Academic Honesty Policy will result in a grade of zero for that test, project or exam. The second offense will result in assignment of a grade of "F" for the course and a formal charge of Academic Dishonesty will be lodged with the Campus Dean for Student Services.

Policies have been established by Georgia Perimeter College to insure due process in charges of cheating or plagiarism. A copy of these procedures can be found in the Student Handbook.

Dunwoody Campus Science Department, September 1997

AMERICANS WITH DISABILITIES ACT STATEMENT
If you are a student who is disabled as defined under the Americans with Disabilities Act and require assistance or support services, please seek assistance through the Center for Disability Services. A CDS Counselor will coordinate those services.

STATEMENT OF NON-DISCRIMINATION
Georgia Perimeter College supports the Civil Rights Act of 1964, Executive Order #11246, Title IX of the Educational Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act. No person shall, on the basis of age, race, religion, color, gender, sexual orientation, national origin or disability, be excluded from participation in, or be denied the benefits of, or be subjected to discrimination under any program or activity of the college.

Any individual with a grievance related to the enforcement of any of the above provisions should contact the Assistant Director of Human Resources, Ombudsperson.

AFFIRMATIVE ACTION STATEMENT
Georgia Perimeter College adheres to affirmative action policies designed to promote diversity and equal opportunity for all faculty and students.

THE REGENTS' TEST
The University System of Georgia requires that all students enrolled in undergraduate degree programs in University System institutions (including Georgia Perimeter College) successfully complete all parts of a competency examination in reading and English composition. This competency examination is commonly called "the Regents' Test", and it is free of charge. A student has two attempts to pass this test before accumulating 45 hours of collegiate credit. Please sign up for the Regents' Test when you enroll in English 1102. Do this in time to have two attempts before accumulating 45 credit hours!

APPENDIX 2-Dunwoody Campus Science Department Laboratory Safety Policy

This policy is meant to be a reference for science faculty who are teaching science laboratory courses. It consists of recommendations for a number of particular situations that an instructor might encounter. Instructors should include portions of this policy in their syllabi as appropriate.

In case of a fire alarm - Turn off main gas. Turn off and unplug electrical appliances (e.g. hot plates, hot water baths). Close bottles containing corrosive or toxic chemicals. Exit the laboratory and direct students out of the building.

In case of a tornado alarm - Turn off main gas. Turn off and unplug electrical appliances (e.g. hot plates, hot water baths). Close bottles containing corrosive or toxic chemicals. Exit the laboratory and direct students to the designated area in the building.

Policy addressing tardiness - Students arriving in lab late may be denied entry into the laboratory if they have missed important safety information or if it is impossible for them to complete the experiment in the remaining time. Whether or not a student should be denied entry is at the discretion of the laboratory instructor. The instructor also has the right to determine if a make-up laboratory is possible or if the student must be assigned a grade of "0" for that lab session.

If the instructor is required to focus on one particular student - If an extreme situation arises where an instructor must focus all of his/her attention on one particular student (for example, if a student is seriously injured), the instructor should order all other students to stop what they are doing, turn off the gas, turn off electrical appliances (e.g. hot plates, hot water baths), close bottles containing corrosive or toxic chemicals, and go wait in the hall. The instructor may call 9 - 911 and/or 3039, Campus Protective Services, if necessary.

If utilities fail before the scheduled lab session begins - If the instructor finds that the water or electricity in the building is off prior to the beginning of the lab session, he/she should contact the laboratory supervisor to determine if there are any changes in the procedure for the experiment or if the lab session is to be cancelled.

If utilities fail during the scheduled lab session - If utilities (water, electricity) fail during a lab session, the instructor should assess the situation and decide if it is necessary to cancel the laboratory. Whether or not the lab is cancelled will depend on the particular experiment being performed, the materials and equipment being utilized, the time length of the utility failure, and any other considerations specific to the particular situation.

In case the instructor becomes incapacitated - During the first experiment (or possibly written in the syllabus), students should be instructed what to do in case the instructor becomes unable to function. Students must stop what they are doing, turn off the gas, turn off electrical appliances (e.g. hot plates, hot water baths), close bottles containing corrosive or toxic chemicals, and call 9 - 911, then 3039, Campus Protective Services.

Policy concerning appropriate dress in the laboratory - Students should be encouraged to wear appropriate clothing in laboratories where corrosive and/or flammable chemicals are used. Examples of appropriate clothing are long pants / long skirts, close-toed shoes, laboratory aprons or coats, barrettes to hold long hair back.

APPENDIX 3- General Information

Tutoring

Chemistry tutors are available in the Learning and Teaching Center on the top floor of the library.

Laboratory Success

Chemistry is one of the most challenging science subjects, not only because of its beauty and complexity, but also because students often do not know how to study effectively. Here are a few suggestions that will help you get the most out of your chemistry lab experience.

Read the lab and complete the pre lab assignments. Most quiz material comes from the pre lab assignments

Prepare your notebook as directed by your instructor. Some instructors do not want you to write anything in the lab notebook before you come to lab. Remember that an empty notebook must not equal an empty head.

Read the corollary material in you textbook. and work out some of the problems that seem pertinent to the lab.

PLAN you activities and rehearse your plan in your head. Will you need to fetch materials from the cart, set up burets, weigh samples or label vials? Know what order these tasks are best carried out before lab starts and try to anticipate what problems may arise.

If you will work with a partner, meet with him/her prior to lab to discuss the PLAN.

Wash your glassware before you use it. Don’t assume the last section left it clean.

Wash your glassware and your hands before you leave the lab.

The lab final is cumulative. Learn as you go and build upon your knowledge every period.