



Georgia Perimeter College

Principles of Chemistry Laboratories
Syllabus, Policies and Equipment
CHEM 1211L AND CHEM 1212L
Dunwoody Campus
Revised May 18, 2009

INSTRUCTOR:
OFFICE:
EMAIL:
PHONE
OFFICE HOURS
Course CRN and Section:

Students enrolled in the Principles of Chemistry Laboratory courses are required to have a non-programmable scientific calculator for the laboratory final exams. (Such as the Texas Instruments TI-30Xa.)

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Course Syllabus

Course Description:

Laboratory exercises supplement the lecture material of CHEM 1211 and CHEM 1212. These courses are intended for science majors planning to pursue baccalaureate or professional degrees.

CHEM 1211L: The primary topics covered are measurements, nomenclature, stoichiometry acids, bases, gases, thermochemistry, atomic bonding and elementary synthesis and analysis of compounds, This course lays the foundation for all subsequent chemistry courses.

CHEM 1212L: This is the second in a two-semester sequence of introductory chemistry. The primary topics are states of matter, solutions, kinetics, aqueous equilibria, and intermediate analysis of compounds, pH and applications of aqueous equilibria.

Objective:

The objective of this course is to acquaint you with the techniques and equipment required to carry out basic chemistry experiments. The laboratory experiments demonstrate some of the basic principles taught in the lecture course.

Expected Educational Results CHEM 1211L and CHEM 1212L

Upon successful completion of a laboratory course in chemistry, the student should be able to:

1. Carry out, properly record and interpret quantitative experiments.
2. Identify patterns in a set of observations.
3. Design a data table which summarizes a set of experimental data.
4. Organize data from experiments into graphs or charts in order to illustrate and determine patterns.
5. Express as a graph a set of data containing two variables.
6. Use experimental results to draw a reasonable conclusion which can be extrapolated to the results of similar situations.
7. Express a mathematical relationship in the form of a written statement.
8. Use standard reference books to compare experimental results with accepted values.
9. Relate the data acquired in the lab to theory, drawing conclusions about the relationships studied. Demonstrate with appropriate safety precautions, the correct use and handling of laboratory equipment and chemicals.

Grading

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

Notebook	15 %
Final exam (up to)	25 %
Laboratory	60 %

The laboratory portion of the grade shall be composed of the following: formal reports, procedural writings, daily data sheets and Pre Lab Quizzes, at the instructor's discretion.

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.

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

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 of 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 never attend a class and never "log-in" 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. Please refer to Appendix 1 for the general policies of the Science Department. Also refer to Appendix 2 for general help and guidance

Withdrawal Option for Students with Increased Medical Risks

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.

Student Equipment List

Students are **required** to bring the following materials to every lab session:

Lab Manual Textbook: *Principles of Chemistry Laboratory Experiments- A Project Oriented Approach.* (Available at the college bookstore.)

Lab notebook: Record keeping is essential. You will need a hard bound notebook to record data and observations. **No loose leaf or ringed binders!**

Goggles: You **must** wear safety goggles at all times during an experiment. Goggles may be purchased at the college bookstore. 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.

Pen black ink
Closed toed and heeled shoes
Calculator
Metric ruler
"Sharpie" marker-black
Floppy disk or USB memory
Lab coat or apron (recommended)

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.

Tutoring

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

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 dressed 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.)¹

→ 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.

Chemical Safety

1. Caution should be used when handling chemicals.
2. Material Safety Data Sheets are available for each chemical in the lab. These sheets are located in the chemistry prep room.
3. If you spill any acid, base or other chemical, contact the instructor immediately.
4. Thoroughly wash your skin of any chemical contaminants.
5. If any chemical gets in your eye, you must contact the instructor immediately and proceed to the eyewash station. It may be helpful to have another student assist you in walking to the eyewash or alerting your instructor.
6. The lab is equipped with a safety shower and eyewash. If you encounter a chemical splash or a fire, you must immediately go to the safety shower. Alert the instructor who will assist you during the emergency.
7. Dispose of chemical waste in the appropriate waste container located in the hood. Carefully read the label and do not mix waste materials as this may result in a dangerous chemical reaction. DO NOT pour any chemicals down the drain without permission from your instructor.
8. In the event of a mercury spill from a broken thermometer, contact your instructor immediately and do not touch the mercury.
9. Students may not enter the stockroom without permission of the instructor.
10. **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.
11. **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.
12. 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.

Note: The safety quiz covers general information in lab practices and materials as described in the safety video.

¹ The students may return if proper attire is obtained and the instructor determines that sufficient time remains to complete the lab.

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 course pack. (Your instructor for each lab will give specific instructions.)

All observations, calculations and data should be recorded into your bound notebook using blue or black ink. No pencil or other colored inks. Write directly into your notebook during data collection. Do not record data in your manual to be transferred to the notebook later.

- a. No white out! All markings are permanent. If you need to correct a mistake, simply draw a single line through numeric data, the word or phrase in error.
- b. No pages may be torn or removed from the lab notebook.
- c. All pages should be numbered.

Prior to arrival in lab, you should read the lab and record the purpose and procedure in your notebook. The purpose and procedure should be in your own words and not merely copied from the manual. You should include enough detail that you could complete the experiment with your notebook alone, without the aid of your lab manual.

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!**

General Equipment Usage

1. You will be assigned a workstation containing glassware and additional equipment. You are responsible for the maintenance of this equipment and your station. You are responsible for the contents of your equipment drawer.
2. You must return all borrowed materials to the appropriate place and leave the lab clean of chemicals, spills, and paper waste.
3. You must wash and all glassware that you have used during the lab. Soap solution is provided on the lab bench.
4. In the event of glassware breakage, contact your instructor who will assist you in cleaning up the accident. All broken glassware should be placed in the broken glassware receptacle. . If possible, rinse any chemical residue from the glassware before adding it to the box.
5. Keep the work area free of debris. No trash or chemicals should be placed in the open area near the student hoods.
6. Clean up any spillage of dry chemicals on to the balances. Notify the instructor of other spills (liquids).
7. Any equipment taken from the cabinets should be returned to its appropriate place.
8. Hotplates should be close to room temperature before returning to the shelf. Cords should be wrapped around the hotplates and stir plates before returning to the drawer.
9. Check that the gas outlets and water faucets have been turned off after use.
10. You must clean any spills and trash before leaving the lab. Your instructor should check your workstation before signing you out.
- 11. Students may not enter the stockroom without permission from the instructor.**

Instructions for a Formal Written Lab Report²

The written lab report will count as two weekly assignments. (200 points)

- **The report must be typed and stapled.**
- YOUR NAME AND THE EXPERIMENT NAME SHOULD BE ON EVERY PAGE OF THE REPORT!
- The laboratory report is 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.
- A penalty of 10% off the report grade is assessed for each day the report is late.
- Do not use first person. The report should be in past tense, as you are reporting what has already been done.
- **You must cite any sources of information used to prepare your report including the lab manual and specific handouts in the course pack.**

Report Format

The following guidelines and the sample lab report seen on the web 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 the **appendix**, 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. Give 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. You should restate your results.

Pre-Lab and Post-Lab Questions (AT THE DISCRETION OF THE INSTRUCTOR): 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.

Appendix: Detailed hand written calculations

² A sample lab report is on the lab web page.

APPENDIX 1- 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.