

General Chemistry II Laboratory

Syllabus

Chem 121L

Spring 2020

Instructors and Hours	PreLab:	Monday 4-5 pm	PLAZA BPC 188, 189, remote stream
	General Chemistry Lab Office:	Dr. David Green,	RAC 128
	Phone:	Ext. 4355	
	Laboratory:	Dr. David Green	(david.green@pepperdine.edu)
		Dr. Joe Fritsch	(joseph.fritsch@pepperdine.edu)
		Dr. Kelsey Brereton	(kelsey.brereton@pepperdine.edu)
		Ms. Cecile Santos	(cecile.santos@pepperdine.edu)

URL: seaver-faculty.pepperdine.edu/dgreen

REQUIRED MATERIALS

Laboratory manual: *Experiments and Investigations in General Chemistry 3rd Ed.*, Green, Ganske, Fritsch. The same lab manual is used in Chemistry 120.

The Official Laboratory Research Notebook (Jones and Bartlett) – all procedures, data, results, calculations, and solutions to problems will be recorded in the laboratory notebook. **The side-bound version is required.** A new laboratory notebook is preferred, but not required. If sufficient pages remain, you may continue using the notebook from General Chemistry I.

Scientific calculator

Approved laboratory safety goggles (available in bookstore or through the SAACS)

Lab coat (available in bookstore; a limited quantity may be available through the SAACS)

STUDENT LEARNING OUTCOMES

The specific *Student Learning Outcomes* aligned to the *Chemistry Program Learning Outcomes* are that at the completion of this laboratory course participants should be able to successfully utilize, under the supervision of the laboratory instructor, proper chemical apparatus and instrumentation including: preparation of reagents, set the operating parameters of different instruments, and successfully execute a self-designed procedure.

OBJECTIVES

This course is a continuation of General Chemistry I laboratory. The overall goal of the laboratory course is to provide students with a practical understanding of some of the principles, laws, and theories of chemistry. Each student should gain competence in solving chemical problems of varying difficulty utilizing problem solving strategies such as dimensional analysis, application of standard formulae, and synthesis of new formulae and algorithms from prior knowledge obtained in this and other courses. In addition, every student should increase their competence in the use of basic laboratory equipment, electronic data collection apparatus, manual and spreadsheet analysis of data, and overall comfort in designing and performing laboratory procedures.

While the major foci are on the basic principles of chemistry and the analytical methods necessary to explore these principles, the specific goals are that every participant will...

- ✓ recognize that chemistry is an experimental science and, as such, cannot be completely mastered without also experiencing personally the “hands-on” aspects of science.
- ✓ recognize and appreciate that there may be multiple approaches to the solution of a problem and that there may be a “best” approach which is different from that learned in the past.
- ✓ understand that success in this course depends, in part, upon a working knowledge of the mathematics of chemistry as well as the chemical concepts underpinning the problem at hand.
- ✓ understand that success in this course also depends, in part, upon the dedication and commitment of each participant to work cooperatively with their laboratory team.

This course is nearly entirely introductions to and applications of topics from a largely limited body of chemistry. Because of this characteristic, students must come to the lecture prepared with the foundational knowledge expected to have been obtained from previous courses and augmented by reading the textbook chapter in advance. Likewise, knowledge and experience gained in the laboratory can not be extricated from the material presented in lecture. Theoretical and practical topics will also be discussed which will expand on areas introduced in General Chemistry lecture, lab, and textbook. While coursework beyond the lecture is not required to succeed in this course, it is essential for mastery that participants not be intimidated from pursuing background or ancillary information necessary to fully understand a topic. On the other hand, reasonable mastery and recall of material from the first semester of this sequence course is crucial to success in this course.

Upon successful completion of this course every course participant should be able to:

- ✓ Use common and specialized laboratory equipment properly, safely, and efficiently.
- ✓ demonstrate the skills necessary to solve chemical problems, paying careful attention to achieving adequate and appropriate accuracy and precision.
- ✓ show mastery of material by confidently demonstrating a solution to a colleague.
- ✓ recognize, in a list of data given for a problem, information which is required for obtaining a solution to a problem and that which is superfluous.
- ✓ solve a variety of problems dealing with physical and chemical properties of substances
- ✓ write in scientific format reports of the theory, experimental method, and results of an analysis.

PHILOSOPHY

Because chemistry is an experimental science, the opportunity for hands-on experience is integral to understanding the material and the way in which chemistry is done. **The laboratory course is independent of the lecture so some divergence from lecture should be anticipated and, indeed, expected.** You will be expected to study for lab just as you would for lecture. Your instructors believe that it is in the laboratory where you learn the practice of chemistry; that is, techniques, methods, observation, etc. The laboratory augments and is augmented by the lecture.

RELATIONSHIP TO THE SEAVER COLLEGE MISSION

From The Mission of Seaver College of Pepperdine University: *“Seaver College exists to provide a link between the knowledge and wisdom of the past and present with the challenges of the future. The college is essentially a community...[of] teachers committed to a life of instruction and scholarship [and] students preparing to assume responsible roles in contemporary society....”*

This course is designed to provide the framework on which hangs a significant portion of the body of basic chemistry knowledge, allowing the perceptive participant to glance into the richness of the microscopic world from a macroscopic point of view, and to provide the foundation for further studies in the sciences. Over the course of the semester, the successful participant will develop new and expand upon existing skills in critical thinking, mathematics, and the scientific method. Since chemistry is by its very nature an experimental science, honesty and integrity in the acquisition and analysis of data is at the very core of the scientific process. It is part of our role as practicing scientists to defend the nature of scientific discourse and to expose pseudoscience and scientific dishonesty.

ATTENDANCE

This is a laboratory course and, as such, completion of the experiments, investigations, problem sessions, are required. Failure to attend a laboratory session will result in a grade of zero for that lab period and failure to complete 3 or more labs may result in withdrawal from the course and a failing grade. Note that the required pre-laboratory meeting is scheduled for Monday afternoon 5-6 PM. Consistent with other chemistry courses, there will be multiple modes to attend Pre-Lab:

- 1) Traditional in-seat, live presentation in Plaza BPC 188
- 2) In-seat live-streaming in Plaza BPC 189
- 3) Live-streaming (using Zoom Video Conferencing) from anywhere with a good internet connection.

No Pre-Lab quizzes will be given; however, failure to attend pre-lab will make the laboratory investigation exceedingly difficult, will affect your in-lab quiz scores, and severely affect your laboratory competency scores!

Arriving to lab after the first 10 minutes of the scheduled start time is considered an absence and is subject to the absence policy.

EXCUSED ABSENCES

The following are the only accepted excused absences for missing a quiz, lab experiment or test, or submitting lab reports late without penalty:

- A serious illness requiring medical attention. Confirmation of medical attention is required.
- Death of an immediate family member.
- Travel as a part of a recognized University organization. Arrangements must be made PRIOR (at least one week) to the time of travel.
- Specifically, club, sorority, and fraternity activities, Song Fest, Dance in Flight, and similar extracurricular activities are excluded from excused absences.

PREPARATION FOR LABORATORY

You are expected to attend pre-lab each week. You are expected to have read the laboratory investigation before attending pre-lab. No laboratory procedure proposals are required in General Chemistry II.

QUIZZES

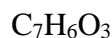
Unlike in General Chemistry I, there will be no Pre-Lab quizzes. Laboratory sessions will begin with a strictly timed quiz that covers the current investigation with emphasis on information delivered during Pre-Lab, material and information from the laboratory report being turned in that week and, possibly, prior labs. It is your responsibility to ensure that you understand the material and procedures from the each week's laboratory experience. Your lab reports are submitted as a group, but the quizzes and exams are individual.

LABORATORY REPORTS

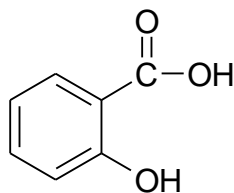
A written report of the results of your laboratory work is due at the beginning of the first laboratory period following the completion of the work unless otherwise informed. One report is due from each group. Late reports will receive a penalty of not less than 50% per day. The laboratory manual has complete instructions on writing your laboratory reports. All reports must be typed. Handwritten chemical formulae, chemical structures, and mathematical equations will be accepted. However, we recommend the following software:

Chemical Structure Drawing:

Accelrys Draw (Accelrys), ACD/ChemSketch (Advanced Chemistry Development Laboratories), or KnowItAll (KnowItAll Informatics System, BioRad). Knowing the rules of writing structures, you can convert



into

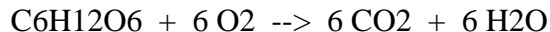


quickly with a very professional appearance.

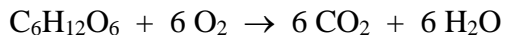
The best thing about these three chemical drawing packages is that they are free. Links to Accelrys/Draw, ACD/ChemSketch, and KnowItAll are available at the "Cool Links" area of the course website.

Chemical Formula Formatting:

Christopher King's *Chemistry Formatter* add-in for MS Word and MS Excel is an excellent macro add-in if you use the Microsoft Office suite. There are no versions of the add-in for other word processor or spreadsheet programs. The intelligent chemistry formatter, when properly installed, eliminates the need to select 'format|font|subscript' for the formula stoichiometry in a chemical formula and usually gets the charge placement correct on ions. You can also get excellent looking chemical equations quickly. For example, consider the chemical equation



Simply highlight the entire equation, apply the chemistry formatter add-in with one mouse click, and the equation becomes



Additionally, showing a number in proper exponential notation is easy. Perhaps, because of textual context, a result such as 0.00115 g needs to be presented in exponential notation. Since typing the value in proper exponential notation syntax is time consuming, there is a temptation to simply type 1.115E-3 since, after all, that's the way the value is displayed on the calculator. However, with the *Chemistry Formatter*, the unconventional (and incorrect) presentation is easy to correct. By highlighting the value and applying the formatter, 1.115E-3 g in one mouse click becomes 1.115×10^{-3} g.

King's *Chemistry Formatter* is free to download and use. A link to the *Chemistry Formatter* can be found in the Cool Links area of the course website.

Equation Writing and Editing:

The Microsoft Office suite comes packaged with a good equation editor (aptly named *Equation Editor* but it is not activated during a normal installation of the suite. Simply run the install CD, customize the installation, and add the Equation Editor.

A better equation editor is *MathType* (Design Science, Inc.) for Windows and Mac. It is actually the full version of MS *Equation Editor* and is extremely powerful.

Using the MathType add-in, you can easily make

$$k = A \exp[-E_a/RT]$$

or the handwritten

$$k = A e^{-E_a/RT}$$

look like a typeset equation:

$$k = A \cdot e^{-\left(\frac{E_a}{RT}\right)}$$

Equation Editor is included with Microsoft Office Suite if you have the installation CD. *MathType* can be purchased with an academic discount directly from Design Science, Inc.

Preparing and Grading of Laboratory Reports:

The laboratory report should be prepared by the laboratory team working cooperatively. However, the report will be graded in sections and the separate section scores distributed to the individual group members. Each week the individual group members will be responsible for a different section of the laboratory report with, ideally, the team working together and convening prior to the due date of the report to assemble the completed report.

Additionally, each team member will prepare and turn in a handwritten abstract of the completed laboratory investigation. A successful abstract will require each team member to have understood the investigation as well as contributed to and read the completed laboratory report. Some key results of preparing an abstract of the report include 1) each team member contributes to the “quality control” of the completed report and 2) each team member reviews the essential concepts and calculations of the investigation in preparation for quizzes and the laboratory practical exam. Abstract scores will be assigned individually and the proper form of the abstract will be discussed in Pre-Lab.

Finally, when assigned in the investigation, the laboratory group will cooperatively complete and turn in the answers to the “Post-Lab Questions”. The questions will be graded and the team will receive a group grade.

EXAMS

There will be one practical examination at the end of the semester. It will be administered during the last week of classes. **You should make sure that you understand the material covered and procedures used in each lab exercise even if your group has divided the experimental and reporting work.** Summarizing the material for each laboratory well in advance of the exam will make review and study for the lab test more productive. The lab exam must be taken seriously — it counts for an appreciable amount of the laboratory grade.

NOTEBOOKS

You are required to maintain a scientific notebook throughout the semester. Specific guidelines for the notebook can be found in the laboratory manual. Your notebook is a legally-binding document, admissible in courts of law, of the work you have performed in the laboratory. Notebooks will be graded rigorously. You can continue to use your General Chemistry I notebook if sufficient pages remain unused.

LAPTOP COMPUTERS

You are welcome to bring a laptop computer or tablet to PreLab and lab to take notes and collect data. However, please show the rest of the class, instructors, and the professor the respect of not checking e-mail, Facebook, etc. or instant messaging during class or lab.

COURSE GRADING

You are naturally concerned how you will be graded in this course. There are many ways to accrue points; thus, a poor performance one time in a single category will not have a devastating effect on your lab grade. However, you should strive to excel in all aspects of your lab scores, thereby insuring the highest possible lab grade. By virtue of the nature of chemistry lab investigations, reports, and problem sessions it is impossible to successfully “cram” or otherwise condense the overall laboratory process into the day before or day of which assignments are due.

The semester laboratory grade will be approximately weighted as follows:

Laboratory Reports	35%
Laboratory Notebook	10%
Quizzes	20%
Data Accuracy	10%
Practical Exam	15%
Laboratory Competency	10%

Absence from a laboratory period will result in a grade of zero. Material turned in late will receive a penalty of not less than 50% per day. **The laboratory grade is independent of the Chemistry 121 lecture grade.**

Having completed General Chemistry I, it is expected that each participant is becoming technically skilled in the laboratory. Managing the apparatus and chemicals used in the investigation is only one aspect of the *Laboratory Competency* score. Answering questions, demonstrating in-depth knowledge of the details of the investigation, completing investigations in a timely manner without “hurrying to get it done,” and maintaining a professional demeanor in the laboratory are additional characteristics of an active scientist. It is the laboratory professor's discretion and perception of each student how competency in the laboratory will be evaluated across the throughout the semester.

SCIENTIFIC ETHICS AND TEAR-OUT SHEETS

As a scientist you have certain ethical responsibilities with respect to data collection, recording, and analysis. Data that has been collected in the laboratory can never be changed to suit your expected outcomes. To help train you in the inviolate nature of your recorded data, a copy of your data and procedures will be collected at the end of lab each week. Changes that are found in your original data to artificially improve results are considered a serious breach of scientific ethics and will be dealt with accordingly.

You are expected to conduct yourselves per the terms of the Seaver College Code of Academic Ethics. Any cheating (including plagiarism) will be punished as severely as allowed under University guidelines. Please see the laboratory instructor or the Seaver College Student Handbook for any questions about this policy. For assignments in which collaboration with your peers and other faculty is considered acceptable, you are encouraged, perhaps even expected, to do so provided you include a list of collaborators when submitting your assignments.

SAFETY IN THE LABORATORY

Safety Goggles

Safety goggles or safety glasses must be worn in the laboratory at all times when any chemical procedures are underway. Safety eyewear may be purchased at the bookstore or through SAACS. Any student who is not wearing safety eyewear will be asked to leave the laboratory, will not be allowed to make up the laboratory, and will receive a grade of zero for that experiment. The use of safety eyewear in the laboratory is a zero-tolerance policy and is governed by university regulations and local, state, and federal laws.

Appropriate Dress

Students must dress appropriately for laboratory work. This means wearing a lab coat at all times. Open-toed shoes and sandals are unacceptable in lab. **You will be asked to leave and change clothes or shoes, if needed.** Make sure you come prepared, especially if you live off campus. Appropriate laboratory attire is a zero-tolerance policy and is governed by university regulations and local, state, and federal laws.

Hair

If your hair is longer than shoulder length you should tie it back in order to avoid accidental contact with open flames, hot plates, or chemicals that might be on the lab bench.

Electronic Equipment

Music and video players, and other audiovisual or electronic equipment (except for calculators) are not allowed in the laboratory unless the instructor is using such equipment for educational purposes.

Food and Beverages

You may not eat, drink, or bring food in the laboratory.

SAVING GRADED MATERIAL

It is your responsibility to save all graded materials (exams, homework, etc.) for this class. As per university policies, all grade disputes must be settled by the midpoint of the next non-summer semester which immediately follows this course.

CELL PHONES and SOCIAL MEDIA

If you bring a cell phone to prelab or lab, please TURN IT OFF. It is very impolite and unsafe to have incoming calls during lab. You are encouraged to bring your laptop computer to lab to analyze data or operate some of the instruments used in lab. Internet messaging and engaging in social media during lab is prohibited.

INTELLECTUAL PROPERTY STATEMENT

Course materials prepared by the instructor, together with the content of all lectures and review sessions presented by the instructor, are the property of the instructor. Video and audio recording of lectures and review sessions without the consent of the instructor is prohibited. Unless explicit permission is obtained from the instructor, recordings of lectures and review sessions may not be modified and must not be transferred or transmitted to any other person. Electronic devices other than calculators (e.g., laptops, cell phones, PDAs, calculators, and recording devices) are not to be used during lectures or exams without prior permission of the instructor.

WITHDRAW POLICY

Despite the independent nature and course number of the chemistry lecture and lab, except under extreme and unusual circumstances, you may not withdraw from lab and remain in lecture, or *vice versa*.

A WORD ON SORORITY, FRATERNITY, SPORTS, ETC.

Extracurricular activities such as debate, volunteering, community service, sororities, fraternities, athletics, drama and other artistic endeavors, etc. are important parts of your total education at Pepperdine. However, these activities require a very significant time commitment. Except for the narrow definitions described above, most absences for these activities are not excused. **It is your responsibility to keep up in class while involved in extracurricular activities.**

COUNSELING CENTER and DISABILITY SERVICES

Students who feel that they may suffer from “test anxiety” or other academic obstacles despite exercising reasonable study and social habits may benefit by speaking to one of the staff in the Counseling Center.

Any student with a documented disability (physical, learning, or psychological) needing academic accommodations should contact the Disability Services Office (TCC264, x6500)

as early in the semester as possible. All discussions will remain confidential. Visit www.pepperdine.edu/disabilityservices/ for additional information.

ONE LAST NOTE

If you are having any troubles with this class, or have any questions (in-class or out-of class problems) please come by and talk with the laboratory instructor. We are here for you. Even though it is a terrible cliché, there are no stupid questions. Please feel free to ask anything and we will do our best to assist you.

IMPORTANT DATES TO REMEMBER

1/17/2020	Last day of add/drop period
1/20/2020	Martin Luther King Day (Lab is affected)
1/28/2020	Last day to change CR/NC status
3/2/2020	Spring Break
3/16/2020	Last day to withdraw with a grade of W
4/17/2020	Last day to withdraw with a grade of WP/WF
4/20/2020	Practical Exam: In Prelab
4/27/2020	Finals Week

Disclosure Statement Required by the State of California

Warning: Natural Science's laboratories contain and certain class experiments or procedures will expose you to chemicals known to the state of California to cause cancer, birth defects, and other reproductive harm at levels which require a warning. For more information, contact your instructor or the Office of Insurance and Risk Management at extension 4410.