



CHEM 1405 - Introductory Chemistry I CHEM 1405L.041 Online Lab Course Syllabus

Description

Survey course introducing chemistry. Topics may include inorganic, organic, biochemistry, food/physiological chemistry, and environmental/consumer chemistry. Designed for allied health students and for students who are not science majors.

Credits 4

Lecture Hours 3

Lab Hours 3

Extended Hours 0

Contact Hours 96

State Approval Code 40.0501.51 03

Instructor Name Earnest Spencer

Semester/Year Fall 2024

Meeting Time and Location

Online—students are expected to spend at least 3 hours per week reading, reviewing and participating in assigned activities for successful completion of this course.

Alternate Operations During Campus Closure

In the event of an emergency or announced campus closure due to a natural disaster or pandemic, it may be necessary for Panola College to move to altered operations. During this time, Panola College may opt to continue delivery of instruction through methods that include, but are not limited to: online learning management system (CANVAS), online conferencing, email messaging, and/or an alternate schedule. It is the responsibility of the student to monitor Panola College's website (www.panola.edu) for instructions about continuing courses remotely, CANVAS for each class for course-specific communication, and Panola College email for important general information.

Student Basic Needs

Unexpected circumstances may arise, but Panola College offers various resources to support students. If you need mental health services or are facing challenges with transportation, affording class materials and supplies, or accessing food regularly—issues that may impact your class performance—please visit panola.edu/resources.

Class Attendance

Regular and punctual attendance of classes and laboratories is required of all students. When a student has been ill or absent from class for approved extracurricular activities, he or she should be allowed, as far as possible, to make up for the missed work. If a student has not actively participated by the census date, they will be dropped by the instructor for non-attendance. This policy applies to courses that are in-person, online, hybrid, and hyflex.

Attendance in online courses is determined by submission of an assignment or participation in an activity. According to federal guidelines, simply logging into a distance learning course without participating in an academic assignment does not constitute attendance. Distance learning is defined as when a majority (more than 50%) of instruction occurs when the instructor and students are in separate physical locations. Students must engage in an academic activity prior to the course census date.

When an instructor feels that a student has been absent to such a degree as to invalidate the learning experience, the instructor may recommend to the Vice President of Instruction that the student be withdrawn from the course. Instructors may seek to withdraw students for non-attendance after they have accumulated the following number of absences:

Fall or spring semesters:

3 or more class meeting times per week - 5 absences

2 class meeting times per week - 3 absences

1 class meeting per week - 2 absences

The student is responsible for seeing that he or she has been officially withdrawn from a class. A student who stops attendance in a class without officially withdrawing from that class will be given a failing grade; consequently, the student must follow official withdrawal procedures in the Admissions/Records Office.

Please note: Health Science and Cosmetology courses may require more stringent attendance policies based on their accreditation agencies. Please see the addendum and/or program handbook for further information concerning attendance.

Pregnant/Parenting Policy

Panola College welcomes pregnant and parenting students as a part of the student body. This institution is committed to providing support and adaptations for a successful educational experience for pregnant and parenting students. Students experiencing a need for accommodations related to pregnancy or parenting will find a Pregnancy and Parenting Accommodations Request form in the Student Handbook or may request the form from the course instructor.

Artificial Intelligence (AI) Course Policy

No use of Generative AI permitted.

This option assumes that all work submitted by students will be generated by the students themselves, whether they are working individually or in groups. Students should not have another person or entity do the writing of any portion of an assignment, which includes hiring a person or a company to write assignments and/or using artificial intelligence (AI) tools like ChatGPT. Use of any AI-generated content in this course qualifies as academic dishonesty and violates Panola College's standards of academic integrity.

Student Learning Outcomes

Critical Thinking Skills – to include creative thinking, innovation, inquiry and analysis, evaluation and syntheses of information

- CT2: Gather and assess information relevant to a question
- CT3: Analyze, evaluate, and synthesize information

Communication Skills – to include effective development, interpretation, and expression of ideas through written, oral, and visual communication

- CS1: Develop, interpret, and express ideas through written communication

Empirical and Quantitative Skills – to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

- EQS2: Manipulate and analyze observable facts and arrive at an informed conclusion

Teamwork – to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

- TW2: Work with others to support and accomplish a shared goal

Instructional Goals and Purposes

The purpose of this course is to provide the first semester of a two semester introductory course in chemistry for non-science majors. The first part of the course includes mastery of topics in measurement, dimensional analysis, classification of matter, chemical structure, chemical formula and equation writing, and stoichiometry. The remainder of the semester is spent in a survey of physical applications to chemical

systems including gas laws, kinetic theory, solutions, equilibrium, acids and bases, and nuclear chemistry with emphasis world applications. Chemistry 1405 has a required laboratory component that forms an important portion of this study. Most of the experiments for the lab will be selected from the manual available on Canvas. Experiment results will be reported via documents found in the lab manual. The goal is for the following general objectives to be achieved:

1. Understand and be able to explain the general principles, laws, and theories of chemistry that are discussed and presented throughout the semester
2. Use critical thinking and logic in the solution of problems
3. Apply learned chemistry skills to new situations
4. Demonstrate an understanding of chemistry through technological advancement
5. Apply chemical principles in the laboratory setting
6. Develop independent and cooperative learning skills
7. Recognize and acquire attitudes that are characteristic of the successful worker regardless of the major field of study
8. Develop an awareness of the value of chemistry in our daily living

Learning Outcomes

After studying all materials and resources presented in the course, the student will be able to:

1. Define the fundamental properties of matter.
2. Classify matter, compounds, and chemical reactions.
3. Determine the basic nuclear and electronic structure of atoms.
4. Identify trends in chemical and physical properties of the elements using the Periodic Table.
5. Describe the bonding in and the shape of simple molecules and ions.
6. Solve stoichiometric problems.
7. Write chemical formulas.
8. Write and balance equations.
9. Use the rules of nomenclature to name chemical compounds.
10. Define the types and characteristics of chemical reactions.
11. Use the gas laws and basics of the Kinetic Molecular Theory to solve gas problems.
12. Determine the role of energy in physical changes chemical reactions.
13. Convert units of measure and demonstrate dimensional analysis skills.
14. State the characteristics of liquids and solids.
15. Articulate the importance of intermolecular interactions and predict trends in physical properties.
16. Identify the characteristics of acids, bases, and salts, and solve problems based on their quantitative relationships.
17. Identify oxidation-reduction equations.
18. Discuss rates of chemical reactions and the dependence on concentration, time, and temperature.
19. Apply the principles of equilibrium to aqueous systems using LeChatelier's Principle to predict the effects of concentration, pressure, and temperature changes on equilibrium mixtures.
20. Define nuclear decay processes.

Course Content

A general description of lecture/discussion topics included in this course are listed in the Learning Outcomes section of this syllabus.

Students in all sections of this course will learn the following content:

1. Describe the scientific method.
2. Describe good laboratory behavior.
3. Describe the safety criteria and safety features of your lab.
4. Identify from the lab drawer any specific item of glassware and its proper use and function.
5. Describe the proper use of an analytical balance.
6. Define and distinguish between the terms precision, uncertainty, and accuracy.
7. Make and record measurements to the proper instrument precision.
8. Conduct laboratory experiments safely and accurately.
9. Report on laboratory findings using proper methods.

10. Give the metric units for mass, length, and volume.
11. Perform english to metric conversion equivalents (and vice versa) for mass, length, and volume.
12. Give the exponential numerical equivalents for the metric prefixes:
 - a. nano, micro, milli, centi, deci, deca, hecta, kilo, and mega
13. Distinguish between mass and weight.
14. Distinguish between heat and temperature.
15. Use the unit analysis (factor-label) method in good written form to perform conversion calculations.
16. Define, distinguish, and correctly classify examples of:
 - a. Physical and chemical properties of matter
 - b. elements, compounds, and mixtures
 - c. metals, nonmetals, and metalloids
 - d. solid, liquid, and gaseous phases of matter
 - e. atoms, ions, and molecules
 - f. homogeneous and heterogeneous materials
17. Write the names, symbols and charges for common chemical elements and polyatomic compounds. (See list provided by instructor)
18. Give the correct symbols for the seven common elements that exist as diatomic molecules.
19. Identify the purpose and broad organization of the chemical periodic table.
20. Write the symbols for the common monoatomic ions, recognizing the ion charge from the periodic chart.
21. Explain the use of the formula $E = m \times \text{sp.ht.} \times \text{Dt.}$ Clearly define the quantity represented by each symbol and the proper units of measurement for the quantity. Use the formula to compute information from a calorimetry experiment.
22. Write a thorough description of the development of thought shaping early theory of atomic structure.
23. Describe the present day simple electron-proton-neutron model for a many electron atom.
24. Explain how an atom acquires a net charge to become an ion.
25. Define: isotope, atomic number, atomic mass (weight), and atomic mass unit.
26. Give the name, symbol, and charge for some common polyatomic ions. See list.
27. Write the correct formulas for compounds, given the names; write the correct names for compounds, given the formulas.
28. Define and distinguish between:
 - a. Binary and ternary compounds
 - b. common and systematic chemical names
29. Describe the energy level nature for the electrons in many-electron atoms.
30. Describe the historical discovery of electron energy levels and give an overview of the theoretical development, Define atomic orbital.
31. Write electron configurations (spdf) for the first twenty elements of the periodic chart.
32. Relate the electron configurations of elements to their position in the periodic chart (row and column).
33. Draw Lewis dot diagrams for representative elements.
34. Define electronegativity.
35. Describe the periodic trends in the properties of elements in the periodic chart.
36. Define and give examples of ionic and covalent bonds. Identify compounds as ionic or covalent.
37. Draw Lewis structures for simple molecules.
38. Define: atomic mass, formula mass, molar mass, empirical formula molecular formula, Avogadro's number.
39. Use the unit analysis method to convert between grams, molecules, atoms, and moles of a substance.
40. Describe what a "chemical equation" is and explain why it is an important tool in the study of chemistry.
41. Explain what we mean by each of the following: reactants, products, coefficients, balanced equation, word equation, skeleton equation.
42. Name and describe four types of chemical reactions.
43. Explain what is meant by a "combustion reaction". Explain why we say that hydrogen is combustible but will not support combustion. Cite experimental evidence.
44. Calculate related amounts in chemical reactions from balanced chemical equations
 - a. Given reactant moles, find product mass or moles.
 - b. Given reactant mass, find product mass or moles.
 - c. Given one reactant or product amount, find related reactant or product amount.
 - d. Given two or more reactant amounts, determine and correctly use limiting reactant information.

- e. Given percent yield, determine related reactant or product amount.
45. State and solve problems using Boyle's Law, Charles Law, Guy-Lussac's Law, Avogadro's Law and the Combined Gas Law. .
 46. State and apply Dalton's Law of Partial Pressures.
 47. State and solve problems using the Ideal Gas Law
 48. Recognize the values for STP and molar volume at STP.
 49. Compare ideal gases and real gases.
 50. Using the Kinetic Molecular Theory distinguish among gases, liquids, and solids.
 51. Define: evaporation, vapor pressure, surface tension, boiling point, freezing point, and melting point.
 52. Describe the importance of hydrogen bonding.
 53. List important sources of air and water pollution.
 54. Define solubility and describe the solvation process; define saturated and unsaturated.
 55. Define molarity; solve problems computing moles, mass, and concentrations of solutions.
 56. Define acids and bases. Give typical reactions, especially neutralization reactions.
 57. Describe the titration process.
 58. Given concentration of acids or bases, calculate the pH and the pOH..
 59. Use the collision theory to explain how the rate of a chemical reaction is influenced by temperature, catalyst, concentration, and particle size of reactants.
 60. Define chemical equilibrium in terms of a reversible reaction and predict the equilibrium position of a reaction from a given K value.
 61. State LeChatelier's principle and use it to predict changes in the equilibrium position due to changes in concentration and temperature.
 62. Describe how buffer solutions control pH in biological systems.
 63. Define oxidation and reduction reactions; describe an oxidizing agent and a reducing agent.
 64. Describe alpha, beta, and gamma rays.
 65. Differentiate between fission and fusion.
 66. Describe the biological effects of radioactive substances.

Methods of Instruction/Course Format/Delivery

This course is offered in the following formats:

- **FACE-TO-FACE:** Lecture, flipped and semi-flipped formats, video/screencast lecture, class discussion, lecture activities, reading assignments, homework, quizzes, research, presentation, pre-laboratory activities, laboratory experimentation, laboratory reports
- **ONLINE:** Video/screencast lecture, online discussion and collaboration, lecture activities, reading assignments, homework, quizzes, research, presentation, pre-laboratory activities, laboratory experimentation and laboratory reports. The manner in which material is presented, assignments are assigned and collected, and grading may change or vary from face to face class methods.

Major Assignments/Assessments

The following items are assigned and assessed during the semester and used to calculate the student's final grade.

Assignments

The following categories, containing assignments and assessments, will be used to calculate the student's final grade. At the instructors' discretion, the following components may or may not be used or modified, extra points may to be earned and assignment grades may adjusted, dropped and/or replaced.

LATE OR MAKE-UP WORK (homework, quizzes, participation and lecture activities, assignments, laboratory experiments, exams, service learning project and all other assignments made by the instructor):

To receive a grade the work must be turned in within 7 days of the original assignment due date and your grade will be reduced by 30 percent. If the reason for the late or make-up assignment is because of your participation in an approved Panola College activity, your grade will not be reduced by 30 percent; however, the assignment must be turned in within 7 days of the original assignment due date.

- 1. Homework, Quizzes, Application Assignments, Participation and Lecture Activities:** These assignments may vary in points.
 - **Homework (in Mastering Chemistry)** - completed and turned in using the online system called Mastering Chemistry (also known as MyLab and Mastering) and/or other methods of delivery, which is designed to accompany the textbook. The Mastering Chemistry code may be purchased as a bundle with the book in the Panola College Bookstore. It may also be purchased separately online. The tab or menu button to get to this system is located in Canvas on the left side of the screen on the course homepage.
 - For homework to be most useful in preparing for in class work and exams, it must be submitted by the date due. There is ample time allowed for completion and you have access 24/7. Registration instructions for MyLab and Mastering are located in Canvas. Make sure you have the latest free download of adobe flash player and any other required free software.
 - **Homework (not in Mastering Chemistry)** – may be assigned at the discretion of the instructor, such as, exercise questions and key terms found at the end of each chapter in the textbook and etc., to address special study needs.
 - **Application assignments** – These assignments may be assigned periodically and are completed and turn in separately from mastering chemistry. These assignments are designed to help the student see the real world applications of chemistry and understand how to research/present scientific information from an article.
 - **Participation and Lecture Activities** – exercises/activities performed in class or online as participation in the lesson, quizzes in class or online. These activities are given as needed and possibly without prior notice.
- 2. Laboratory Experiments: FOR LAB STUDENTS WHO ATTEND LABS AT PANOLA COLLEGE** – Laboratory experiments will be performed in order to apply the general principles, laws and theories of chemistry learned during lecture. Experimental results will be recorded and submitted on the form provided in lab.
 - The laboratory course information and specific procedures will be provided and discussed in the mandatory laboratory orientation by your lab instructor. **No student will be allowed to begin any experiments in the lab without going through lab orientation AND without the pre-lab reports-assignments being completed.** The lab instructor has the authority to remove 10 points from your laboratory report for each expectation in the laboratory guidelines that is not followed by the student. Removal of points or removal of the student from class is by instructor discretion and based on previous warning or the gravity of the infraction. **NO ONE WILL BE ALLOWED TO PUT YOU OR OTHERS AT RISK IN THE LAB.** Students must follow all expectations as described in the Lecture and Laboratory course information document in order to remain in lab class. This section specific syllabus is located in Canvas. One copy will be given to all face to face students. Safety is most important.
 - The grade of 100 possible points for each laboratory experiment is broken down as follows:
 - **20 possible points for showing up on time with the pre-lab assignment complete;** as assigned in Canvas or otherwise by your instructor. The pre-lab assignment may include a **pre-lab report assignment** , a **pre-lab quiz** and **MSDS information**. This is your ticket in the door and you will not begin an experiment without having met all of the requirements. This also includes conducting the experiment, adhering to all safety and equipment use rules, completing the experiment, cleaning up your lab station, and disposing of all waste/trash according to instructions given. All of these items must be complete before leaving lab, if incomplete, 10 points will be removed.
 - In order to receive the above 20 points in the grade book, the required documentation must be turned in with lab instructor initials.
 - **80 possible points for the Lab Report Sheet(s) you turn in.** It must be complete, legible, and information must be properly presented and clearly explained when necessary. All work must be shown when necessary to receive full credit.
 - Missing a lab
 - No more than 2 missed labs may be made up. No exceptions, reason doesn't matter.
 - **The missed lab must be made up within 7 days of the original lab date.** It is the student's responsibility to make arrangements, time and date, with the lab instructor to make up the missed lab. **No additional make up lab times will be available.** Once the new lab is set up, previous labs will not be offered for make-up.

- Cell phones in lab- **NO CELL PHONES IN LAB!!!!** If you have a situation where you may need to take a call, then you will leave the phone at the instructor table to be answered by you when/if it rings. If you have your phone out or are using your phone without permission for any reason, you will lose all points of your participation grade but are required to complete the experiment. This is a violation of safety rules and putting others or you at risk will not be tolerated.
3. **Laboratory Experiments: FOR ONLINE STUDENTS WHO COMPLETE LABS AWAY FROM PANOLA COLLEGE** – Laboratory experiments will be performed in order to apply the general principles, laws and theories of chemistry learned during lecture. Experimental results will be recorded and submitted online.
 - Online Virtual Labs are provided by the HANDS ON LABS Company at <https://myhol.holscience.com>. Student Enrollment Instructions are provided in your Canvas Course.
 - 100 possible points will be received for each lab completed and all labs must be completed.
 4. **Unit Exams** – the chapters that make up each unit exam will be posted in your Canvas course. Unit exams will be given throughout the semester and are worth 100 points each.
 - **Face to Face Students:** Each exam will be given in class on the date set by the instructor. The time limit of 55 minutes may require extra time or the test may be taken in parts. You need a pencil/pen and your calculator for each exam. Other testing aids may be provided by the instructor as appropriate.
 - **Online Students:** Each exam must be taken in a Panola College Testing Center or other testing centers approved by the Panola College.
 - **Absences on exam days:** Absences on exam days are not excused for ANY reason other than approved Panola College activities. Students with excused absences may take a make-up exam similar to the one given at a time convenient to the instructor. **The makeup exam may be in a different format than the original exam e.g. comprehensive, all essay/problems and etc.**
 5. **Service Learning Mandatory Project:** Each student will complete the following project during the regular semester. **There is a module in canvas with the specific instructions and due date.** The point value will be assigned by your instructor. Participate in a service learning project by volunteering in an area that relates to chemistry. (Everything relates to chemistry.) You are responsible for finding the place of service, but assistance will be provided about ideas of what you can do. You will also be in contact with the organization for additional information if available. Please note the following requirements:
 - All volunteer work must be approved by the instructor in advance. There will be a submission of your plan in canvas.
 - You will serve in whatever capacity they need you.
 - You will write a reflection page about the experience that will be turned in to me.
 - All volunteer work and reflections should be completed by the due date.
 6. **Final Exam** – may be comprehensive, therefore you should prepare for this exam throughout the semester. Additional information will be posted in Canvas towards the end of the semester.

Course Grade

The grade for this course will be based on...

1. Homework and lecture activities 20%
2. Labs 25%
3. Unit Exams 40%
4. Final Exam 15%

Letter Grades are as Follows:

A	90 – 100
B	80 - 89
C	70 – 79
D	60 – 69
F	Below 60

There are always parts of grading that are subjective. Attendance, timely completion of assignments, and efforts are taken into consideration in all grading categories.

Texts Materials, and Supplies

(Students are required to purchase these items unless exceptions are noted)

- Modified Mastering Chemistry w/ etext - Textbook, code bundle (Introductory Chemistry Essentials 6th Ed. By Nivaldo J. Tro) ISBN: 9780134565620
- Online lab students: HANDS ON LABS KIT (HOL) by Hands on Labs Science Company Kit Number: SP-3005-CK-02
- On-campus lab students: Lab Exercises are available on Canvas – No purchase required
- Scientific Calculator (no cell phones) (it does NOT need to be graphing)
- Composition notebook (or other bound notebook)
- Safety glasses

Required Readings

May include, but not limited to:

- Textbook, journal articles, and other relevant scientific material

Recommended Readings

May include, but not limited to:

- Textbook, journal articles, and other relevant scientific material

Other

- Courses conducted via video conferencing may be recorded and shared for instructional purposes by the instructor.
- For current texts and materials, use the following link to access bookstore listings: <https://www.panolacollegestore.com>.
- For testing services, use the following link: <https://www.panola.edu/student-services/student-support/academic-testing-center>.
- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Charles C. Matthews Student Center or go to <https://www.panola.edu/studentservices/student-support/disability-support-services> for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook: <https://www.panola.edu/> (located on at the bottom under student)