

Course Objectives:

Develop students' oral and written communication skills using the language of chemistry.
Develop the students' ability to integrate various technologies in collecting, recording, analyzing, evaluating, and presenting data and information.

Create in the students a culture of safety and integrity in the conduct of their laboratory experiments.

Foster students' engagement in their own learning.

Develop process skills that help the students become more competitive in the job market

Enable the students to identify and propose logical solutions to current, unresolved problems relevant to them or the society

General Education Goals Established by Truman College

Taking a course in Chemistry helps a student achieve all of the following general education goals. How this occurs is explained below.

- Communicate effectively in both written and oral forms

Students will keep a laboratory reports and learn to record careful observations, draw appropriate conclusions and reflect on what they have learned.

- Gather, interpret and analyze data

Students will learn to collect data in the laboratory, compare quantitative data and draw conclusions about the data obtained.

- Demonstrate the ability to think critically, abstractly and logically

The Scientific Method is predicated upon deductive and inductive logical reasoning. Students will study applications of the scientific method to information gathered by doing experiment. Abstract thinking is developed in many ways in chemistry from the use of symbols and models to the use of mathematics to solve a variety of problems.

- Work with a variety of technologies

Students use computers, the Internet, digital balances, and other technologies to pursue scientific knowledge.

- Exhibit social and ethical responsibility

This very serious goal is addressed on many levels in the chemistry course, from the discussion of the importance of careful and precise measurements that could affect the life of a patient to the discussion of what happened when the space ship Challenger exploded or a grain elevator explodes - we examine the role of responsible use of chemical knowledge.

- Perform productively in the workforce

Because Chemistry education is comprehensive in utilizing the body (kinesiology), the mind (both spatial and analytical reasoning) and the heart (looking at the connection of chemistry to the world) it is an excellent course to prepare individuals for the workforce.

- Demonstrate the ability to learn independently

Students are given multiple assignments to complete in the course. They are also given questions to research independently. Reporting these results to the class develops their ability to speak confidently to their peers.

- Gain awareness of their role in the global community

By discussing the way that chemistry is connected to other occupations and careers we develop student awareness about their career choice and its dependencies on a basic understanding of chemistry.

Physical Science and Engineering Departmental Learning Outcomes

Upon graduation with an Associate degree from Truman College a student should be able to:

- Organize, analyze and interpret information and use the scientific method to make inferences.
- Exhibit knowledge of scientific concepts through written and oral communication.
- Demonstrate excellent laboratory skills and techniques including the proper use of relevant instruments and related technologies.
- Use the lexicon of science to explain abstract scientific concepts.
- Relate concepts learned in Physical Science and Engineering Department classes to real world situations.

General Student Learning Outcomes for Chemistry 121

At the completion of this course, the successful student will be able to:

- Compare and contrast the chemical behavior and reactions of common substances.
- Convert quantities of mass, volume, temperature and length.
- Classify matter by its state and bonding behavior using the Periodic Table as a reference.
- Solve stoichiometry problems.
- Perform laboratory experiments using standard chemistry glassware and equipment.
- Record, graph, chart and interpret data obtained from experimentation.

Specific Student Learning Outcomes for Chemistry 121

At the completion of this course, the successful student will be able to:

- Describe processes and procedures used in the scientific method.
- Differentiate terms such as observation, hypothesis, data, conclusion, theory.
- Explain how the use of the scientific method furthers scientific knowledge.

- Convert numbers in decimal notation to scientific notation and vice versa.
- Convert temperature data to values in three scales: Celsius, Fahrenheit and Kelvin.
- Explain why the Kelvin scale does not use negative numbers.
- Convert quantities using common metric units: liters/milliliters, grams/milligrams and meters/centimeters/millimeters.
- Demonstrate the use of significant figures
- Differentiate between precision and accuracy.
- Calculate one of the three quantities: mass, volume, density given the values for the other two.
- Measure the density of a sample of a solid or a liquid using available laboratory equipment.
- List the names and chemical symbols of at least 44 elements.
- List the names and formulas of common polyatomic ions.
- Given a positive and a negative ion - construct the formula of the ionic compound formed.
- Compare and contrast the difference between covalent and ionic compounds
- Classify bonds in common compounds along the continuum of purely covalent to purely ionic.
- Differentiate between pure substances (elements and compounds) and mixtures (homogeneous and heterogeneous).
- Classify common elements as metals, non-metals and semi-metals and describe the properties of each class.
- Explain how the arrangement of electrons in an atom affects its bonding and chemical properties.
- Explain how the periodic table is arranged and what is indicated by rows, columns and various sections of the table.
- List electronic configurations for the first twenty elements.
- List the number of valence electrons for the first twenty elements
- Construct simple Lewis Dot structures.
- Identify the alkali metals, alkaline earth metals, transition elements, calcogens, halogens and noble gases on the periodic table.
- Convert between mass and moles.
- Convert between moles and molecules or atoms.
- Solve empirical formula problems.
- Classify chemical reactions into types: combination (synthesis), decomposition, single displacement (replacement) and double displacement (replacement)
- Perform the balancing of simple chemical reactions.
- Paraphrase the chemical properties of common ionic compounds and common covalent molecules.
- Recognize the formation of a precipitate or the evolution of a gas or heat during a chemical reaction performed in the laboratory.
- Construct chemical formulas for common compounds given the compound's name.
- Identify the name of compounds from its formula.
- Perform basic stoichiometric calculations to determine the quantity of products given various quantities of reactants.
- Solve limiting reactant problems.
- Solve percent yield problems.
- Compare and contrast the properties of the three basic states of matter: gas, liquid and solid.
- Explain the Kinetic Molecular Theory of Gases and list the assumptions of this theory.

- Calculate volume, temperature or pressure of a gas sample that undergoes changes in its initial conditions using the combined gas law.
- Use the ideal gas law in stoichiometric calculations.
- Compare the solubility of various common compounds.
- Define the terms: solution, solute and solvent.
- Calculate the molarity of solutions.
- Perform laboratory experiments that illustrate basic chemical principles.
- Demonstrate the careful recording of observations and data in the laboratory.
- Demonstrate knowledge of laboratory safety.
- Demonstrate effective laboratory procedures such as transfer of solids, weighing of solids, pouring of liquids, measurement of liquid volume.
- Organize and graph experimental data.
- Interpret experimental data and draw inferences from the data.
- Summarize the results of experimental observations and data.

Active Pursuit

Students are not actively pursuing the course objectives and will be administratively withdrawn (ADW) at midterm if at least two of the following apply:

1. Less than 70% of assignments up to the midterm have been completed.
2. Less than 70% of quizzes up to the midterm have been attempted.
3. Less than 50% of labs and reports up to the midterm have been done and submitted.
4. Less than 70% of class sessions up to the midterm have been attended.

It is student's responsibility to contact the instructor prior to the midterm date and indicate his/her serious intent to pursue the course by explaining any unusual circumstances. The teacher will then be able to determine whether the student can continue in the course. An ADW grade has consequences on a student's GPA, financial aid, and other aspects of attending Truman College. Simply attending classes, but not producing work does not constitute active pursuit.

Academic Integrity

“Academic dishonesty is a serious offence, which includes but is not limited to the following: cheating, complicity, fabrication and falsification, forgery, and plagiarism.

Cheating involves copying another student paper, exam, quiz or use of technology devices to exchange information during class time and/or testing. It also involves the unauthorized use of notes, calculators, and other devices or study aids. In addition, it also includes the unauthorized collaboration on academic work of any sort. Complicity, on the other hand, involves the attempt to assist another student to commit an act of academic dishonesty. Fabrication and falsification, respectively, involve the invention or alteration of any information (data, results, sources, identity, and so forth) in academic work. Another example of academic dishonesty is forgery, which involves the duplication of a signature in order to represent it as authentic. Lastly, plagiarism involves the failure to acknowledge sources (of ideas, facts, charges, illustrations and so forth) properly in academic work, thus falsely representing another's ideas as one's own” p. 39, CCC Student Policy Manual

(<http://www.ccc.edu/departments/Documents/studentpolicymanual.pdf>)

Cheating of any kind or taking of anyone else's work will not be tolerated.

Academic Support Services

Tutoring Center. For students who need help with their assignments: room 177 McKeon Building, 773-907-4785, www.trumancollege.edu/student-services/tutoring.

Student Success and Leadership Institute (SSLI). For students who need various other support services to achieve their educational goals. 773-907-4714, www.trumancollege.edu/student-services/ssli.

TRIO Student Support Services. For low-income students, first generation college students, or students with disabilities who need academic support: 773-907-4797, www.trumancollege.edu/trio. Registration is required at the start of each semester.

Disability Access Center. The Center verifies needs pursuant to the American Disabilities Act (ADA), determines student academic accommodations, and issues accommodation letters. Room 162, McKeon Building, 773-907-4725, www.trumancollege.edu/student-services/dac. Registration is required at the start of each semester.

FERPA

FERPA (Family Educational Rights and Privacy Act) is a federal law that protects the privacy of student educational records: www.ed.gov/policy/gen/guid/fpco/ferpa/index.html. Faculty cannot reveal information about students, or discuss student records over the phone or unsecure e-mail. CCC student e-mail meets FERPA requirements.

Topical Outline:

Topics

The Chemical World.

Measurement and Problem Solving

Classification and Properties of Matter.

Energy.

Atoms and Elements

Examination # 1

Chemical Compounds. Nomenclature of Inorganic Compounds.

Quantitative Composition of Compounds.

Chemical Reactions

Quantities in Chemical Reactions

Examination #2

Electrons in Atoms and Periodic Table.

Chemical Bonding.

The Gaseous State of Matter

Solutions

Examination # 3

Acid and Base

Exit Test

Reference (Nivaldo J. Tro)

Chapter 1

Chapter 2

Chapter 3

Chapter 3

Chapter 4

Appendix I and Chapters 1, 2, 3, 4

Chapter 5

Chapter 6

Chapter 7

Chapter 8

Chapter 5, 6, 7, 8

Chapter 9

Chapter 10

Chapter 11

Chapter 12

Chapters 9, 10, 11, 12

Chapters 14

Chapters 1,2,3,4,5,6,7,8,9,10,11,12,14

Evaluation: Your grade will be based on your performance in the following:

Quizzes (20pts each)	25%	(lowest two quiz grades dropped)
Experiments (15pts each)	20%	(lowest one lab grade dropped)
Exams(#1, #2, #3) (100pts each)	30%	(lowest exam grade dropped)
Exit Exam (100pts)	17%	
Homework and chapter exercises	5%	
Class participation	3%	

Letter grades will be assigned according to the **approximate** scale:

A	90 - 100%
B	80 - 89%
C	67 - 79%
D	55 - 66%
F	< 55%

You must get 17/30 or higher on the departmental exit examination in order to get "C" or better for these two courses. You must also pass BOTH the lecture and laboratory portions to pass the entire course.

Attendance: Exam, quiz and lab absences score 0. Excessive absences will result in your being dropped from the course or receiving an F. It is the responsibility of the student to contact the instructor regarding missed work. There are no make-up labs.

Quizzes: Quizzes will be given every week at the beginning of class and will have a time limit, usually 30 minutes. Answer keys will be available on Blackboard. No make-up quizzes will be given, instead the lowest 2 quiz grades will be dropped. In the event that you miss 2 quizzes, because of being late or absence, then those two quiz grades will be dropped; for any subsequent quizzes missed a grade of zero will be entered.

Exams: There will be three written exams (usually 100min each) and an exit exam. You **must bring** your own *calculator* (if you need one), *pencil* and *eraser* for exams. Cell phones may not be used at any time during the exam, even as calculators. The lowest of the three written exam scores will be dropped - this includes any missed exams for any reason.

Homework: Doing homework is essential to success in this class. You will have a problem set for each chapter covered. You must submit the homework in the beginning of the next class.

Labs: The procedure for each experiment is fully described in the laboratory manual. Therefore, you must have your own copy of the laboratory manual to perform the experiments. You are expected to read the experiment before coming to lab. The report is composed of the lab report sheets, including answers to post-lab questions. It must be clear and **written in ink**. The pages must be named and stapled together in **numerical order**. One week after completion of an experiment, you must submit the report sheets from each experiment you performed. Two (2) points will be deducted for each class day that report is late. Five (5) points will be deducted if you let someone copy your data or any part of the report. Same deduction will be given to those who copy someone's report. There are no make-up laboratory experiments, instead the one lowest experiment grade will be dropped. No post-lab, or data sheets will be accepted from students who miss the lab period.

Class Participation: Student participation in class discussion and activities, including oral responds and problem-solving exercises will result in automatic full credit in class participation.

Tentative Schedule:

<u>Date</u>	<u>Quiz #, Exam #</u>	<u>Chapter #</u>
1. August 25	Placement Test	Chapters 1, 2
2. September 1	Quiz #1 (chs1, 2)	Chapters 2, 3
3. September 8	Quiz #2 (ch 2, 3)	Chapter 4
4. September 15	Quiz #3 (ch 4) Home Quiz #4	Chapters 4, 5
5. September 22	Exam 1 (Chapters 1, 2, 3, 4)	Chapters 5
6. September 29	Quiz #5 (ch 5)	Chapter 6
7. October 6	Quiz #6 (ch 6)	Chapter 7
8. October 13		Chapters 7, 8
9. October 20	Quiz #7 (ch 7) Home Quiz #8 (ch 8)	Chapters 8
10. October 27	Exam 2 (Chapters 5, 6, 7, 8)	Chapter 9
11. November 3	Quiz #9 (ch 9)	Chapter 10
(November 12 is the last day for student initiated withdrawals)		
12. November 10	Quiz #10 (ch 10)	Chapter 11
13. November 17	Quiz #11 (ch 11) Home Quiz #12 (ch13, 14)	Chapters 13, 14 Course review
14. November 24	Thanksgiving Holiday	
15. December 1	Exam 3 (Chapters 9, 10, 11, 13, 14) Exit Exam.	

Tentative Laboratory Schedule:

Date Experiment

Aug. 25 - Safety and check-in.
Sep. 1 - Measurements. Identification of Unknown Metal.
Sep. 8 - Separation of Salt and Sand.
Sep. 15 - Energy and Specific Heat.
Sep. 29 - Analysis of alum.
Oct. 6 - Empirical formula.
Oct. 13 - Preparation and Properties of Oxygen.
Oct. 20 - Ionic reactions.
Nov. 3 - Single Displacement Reactions.
Nov. 10 - Lewis Structure and Molecular Models.
Nov. 17 - Clean-up. Check - out.