

South Plains College
Common Course Syllabus: CHEM 1406
Revised 08/18/26

Department: Science

Discipline: Chemistry

Course Number: CHEM 1406

Course section: 152 and 472

Course Title: Introductory Chemistry I

Available Formats: Online (Lecture and Lab)

Campuses: Online

Instructor: Dr. Bangshing Wang. **Email:** bwang@southplainscollege.edu

Course Description: CHEM1406: INTRODUCTORY CHEMISTRY 1. (4:3:3) 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. Basic laboratory experiments supporting theoretical principles presented in lecture; introduction of the scientific method, experimental design, data collection and analysis, and preparation of laboratory reports. Note: This course may not be substituted for CHEM 1411.

Prerequisite: None

Credit: 4 **Lecture:** 3 **Lab:** 3

Textbook: N/A

Supplies: Required

- Home Lab Kit from Carolina Distance Learning (Purchase information below).
- Personal computer with internet access.
- Scientific calculator. Usage of cell phones *WILL NOT BE* allowed on exams!
- Device to take pictures of lab (Phone, camera, etc.)

This course partially satisfies a Core Curriculum Requirement:

- Life and Physical Sciences Foundational Component Area (030)

Core Curriculum Objectives addressed:

- **Communications skills**—to include effective written, oral and visual communication
- **Critical thinking skills**—to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information
- **Empirical and quantitative competency skills**—to manipulate and analyze numerical data or observable facts resulting in informed conclusions
- **Teamwork**—to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

Student Learning Outcomes:*From Lecture:*

1. Convert units of measure and demonstrate dimensional analysis skills
2. Define the fundamental properties of matter and classify matter, compounds, and chemical reactions.
3. Determine the basic nuclear and electronic structure of atoms.
4. Distinguish between ionic and covalent compounds and name the different compounds.
5. Identify trends in chemical and physical properties of the elements using the periodic table.
6. Determine the role of energy in physical and chemical reactions.
7. Use the mole concept to determine the number of atoms, moles, grams, and solve elementary stoichiometry-based calculations.
8. Determine the concentrations of solutions using percentage and molarity designations.
9. Use various characteristics of a solution to identify it as an acid or base.
10. Identify and name various organic compounds.
11. Identify and explain the functions of carbohydrates, lipids, and proteins.

From Lab:

1. Use basic apparatus and apply experimental methodologies used in the chemistry laboratory.
2. Demonstrate safe and proper handling of laboratory equipment and chemicals.
3. Conduct basic laboratory experiments with proper laboratory techniques.
4. Make careful and accurate experimental observations.
5. Relate physical observations and measurements to theoretical principles.
6. Interpret laboratory results and experimental data, and reach logical conclusions.
7. Record experimental work completely and accurately in laboratory notebooks and communicate experimental results clearly in written reports.
8. Design fundamental experiments involving principles of chemistry.
9. Identify appropriate sources of information for conducting laboratory experiments involving principles of chemistry.

Student Learning Outcomes Assessment:

Few topics/questions from the exams will be selected to assess the students learning outcomes at the end of semester.

Chapter contents:

Chapter 1:

- Scientific methods
- Scientific notation
- Units of Measurements
- Reliability of measurement (Significant figures)
- Exact numbers
- Precision and accuracy
- Prefix multipliers
- Dimensional analysis
- Density
- Specific gravity

Chapter 2:

- Classification of matters
- States of matter
- Physical & chemical changes/properties
- Temperature Scales
- Fundamental of energies
- Evaporation, boiling, condensation, sublimation and deposition
- Specific heat capacity
- Heat of fusion and heat of vaporization
- Heat and cooling curve
- Combined heat determination

Chapter 3:

- Elements and symbols
- Metals, nonmetals and metalloids
- Groups, periods and common names
- Atoms (Discovery, theory and structure)
- Subatomic particles
- Atomic numbers and mass numbers
- Isotopes
- Electron energy levels
- Trends in periodic properties (Atom size, Ionization energy and metallic character)
- Electron-dots/Lewis structures

Chapter 4

- Ionic and covalent bonds
- Cations and anions
- Naming and writing formula for two types of ionic compounds
- Polyatomic ions
- Naming and writing formula ionic compounds with polyatomic ion
- Molecular compounds
- Polar and nonpolar covalent bonds

- Formation of molecular compounds
- Types of bonds (Single, double and triple)
- Drawing Lewis structures
- Naming and writing formula for molecular/covalent compounds
- Electronegativity and bond polarity
- Nonpolar and polar bond determination
- VSEPR Theory
- Electron vs molecular geometry

Chapter 5

- Chemical quantities and reactions
- Concept of mole
- Avogadro's number
- Chemical formula and mole
- Molar mass and conversions
- Understanding chemical equations
- Balancing chemical equations
- Types of chemical reactions
- Concept of stoichiometry
- Stoichiometry calculation using balanced chemical equation
- Limiting vs excess reactants
- Percent yields
- Energy in chemical reactions
- Exothermic and endothermic reactions
- Reaction rate, temperature, catalyst, activation energy

Chapter 6

- Concept/properties of gas
- Units of pressure, volume, temperature and amount
- Simple gas laws: Boyles', Charles' Avogadro's and Gay-Lussacs' law
- Combined Gas law
- Ideal Gas law
- STP, standard condition
- Concept of molar volume
- Stoichiometry using molar volume
- Concepts of mixture of gases: (Dalton's Law of Partial pressure)
- Kinetic molecular theory

Chapter 7

- Concept of solutions: Solute and solvent
- Formation of solutions and properties of water
- Electrolytes (strong and weak) and nonelectrolyte
- Solubility: Unsaturated vs saturated
- Solubility Rules
- Concentration of solutions

- Percent mass, volume, mass-volume concentrations
- Molarity
- Dilution of solutions
- Properties of solutions: solutions, colloids, and suspensions
- Osmosis
- Isotonic, hypotonic and hypertonic solutions and dialysis

Chapter 8

- Arrhenius acids and bases
- Naming and writing formula for binary acid and oxyacid
- Naming and writing formula for bases
- Bronsted-Lowry acid, base, conjugate acid and conjugate base
- Strength of acids and bases

Chapter 9:

- Organic vs Inorganic compounds
- Naming hydrocarbons
- Alkanes, alkenes and alkynes
- Structural formulas: molecular, condensed, expanded, skeletal and ball and stick model
- Conformations and isomers: Structural isomers
- Naming cycloalkanes
- Substituents on hydrocarbons
- Naming and drawing hydrocarbons with substituents
- Aromatic compound: benzene

Chapter 10

- Carbohydrates: mono, di and polysaccharides
- Aldehydes and ketones
- Chirality of molecules
- Fischer projections: D and L notation
- Haworth structures
- Lipids: Fatty acids and steroids
- Types of fatty acids: mono vs polyunsaturated, cis vs trans,
- Waxes and triacylglycerols
- Fats and oils
- Phospholipids: Sphingomyelin, Cholesterol
- Amino acids: polar and nonpolar
- Proteins: Primary, secondary, tertiary and quaternary structures
- Concepts of enzymes

Course Evaluation:

CHAPTER EXAMS: There will be TEN-chapter exams and they will be taken on Blackboard;
Exams will open from 10:00 AM Friday (week prior) to 10:00 AM Wednesday. Students have the above time window to complete the exam, it is a 1-hour timed exam, once a student starts, they must complete the exam. These exams will cover the materials in the lecture notes, and

the schedule of the exams are on the course schedule. Exams will be in a multiple-choice format and worth 50 points. Only the materials discussed in the lecture notes will be on the exam, and you will have time to finish it. ***The exams are open for roughly 6 days, if you miss the exam, there will be no make-up for the missed lecture exams, and you will receive ZERO for the exams you missed.***

- Chapter 1 exam 20 points
- Chapter 2 exam 20 points
- Chapter 3 exam 20 points
- Chapter 4 exam 20 points
- Chapter 5 exam 20 points
- Chapter 6 exam 20 points
- Chapter 7 exam 20 points
- Chapter 8 exam 20 points
- Chapter 9 exam 20 points
- Chapter 10 exam (Final Exam) 20 points

The materials scheduled for each lecture exam by subject to change, this change will be announced in advance if necessary.

CHAPTER HOMEWORK: There will be EIGHT-chapter homework and they will be on Blackboard. **All the homework's will be open from 10:00 AM Friday (week prior) to Tuesday 10:00 AM.** It will be multiple choice questions. Each homework will be worth 10 points. These homework will cover the materials in the lecture notes, and the schedule of the homework are on the course schedule. ***The homework is open for roughly 5 days, if you miss the homework, there will be no make-up for the missed homework, and you will receive ZERO for the homework you missed.***

- Chapter 1 Homework: 10 points
- Chapter 2 Homework: 10 points
- Chapter 3 Homework: 10 points
- Chapter 4 Homework: 10 points
- Chapter 5 Homework: 10 points
- Chapter 6 Homework: 10 points
- Chapter 7 Homework: 10 points
- Chapter 8 Homework: 10 points

HOME LAB EXPERIMENTS: Students are required to purchase a Home Lab experiments experiment kit from Carolina Distance Learning. These will be submitted for grading before its due date. Students will complete the lab experiments and email them to the instructor before the due date to receive credits. **All the home lab experiments are due Monday at 10 AM** (Please look at course schedule at the end of syllabus for specific due dates).

Submit the labs by taking pictures; picture of your lab set up, data table and data analysis.
Email them to bwang@southplainscollege.edu to receive full credit (Please submit each lab per email, you can submit any time before Monday's deadline).

- Home lab safety agreement form: 10 points
- Home lab experiment 1: 10 points
- Home lab experiment 2: 10 points
- Home lab experiment 3: 10 points
- Home lab experiment 4: 10 points
- Home lab experiment 5: 10 points
- Home lab experiment 6: 10 points
- Home lab experiment 7: 10 points
- Home lab experiment 8: 10 points
- Home lab experiment 9: 10 points

Carolina Distance Learning Home Lab Kit Purchase Information:

There are two ways to purchase the home lab kit.

1. You can purchase the lab kit directly from the Carolina website with your credit card for 80.00 + ~25.00 shipping and handling, you can use the link (<https://www.carolina.com/catalog/detail.jsp?prodId=581836>) to purchase the kit directly from the website.
2. You can purchase a voucher for the lab kit from SPC Levelland bookstore using scholarship or financial aid for ~135.00 with shipping. You will still need to visit Carolina distance learning website to order the kit using the information on your purchased voucher.

NOTE: Kits are non-refundable, please purchase one only after you are sure you will be taking the course.

EXAM PRACTICE REVIEW: There will be exam practice assignments, sole purpose of exam practice review is to help prepare for the exam and it does not count towards the total grade. Highly recommend students spend quality time with the exam review as it will prepare you for the exam.

Grading Policy:

Grading based on percentage:

A = 90 – 100%
B = 80 – 89%
C = 70 – 79%
D = 60 – 69%
F = below 60%

The grade distribution:

Total Chapter Exams:	200 points
Total Home Labs:	100 points
Total Chapter Homework:	80 points
Total Possible Points:	380 Points

Attendance Policy:

It is vitally important that you plan your time and study lectures notes and attend all the laboratory experiments to do well in this course. ***To be considered being actively attending the course, student must log into Blackboard regularly and complete the lab assignments before the census date. If the student does not log into course Blackboard and did not turn in assignment before the census date, the student will be listed as "Never Attended" and drop from the course.*** Students who enroll in a course but have "Never Attended" by the official census date, as reported by the faculty member, will be administratively dropped by the Office of Admissions and Records.

Students are expected to attend all classes in order to be successful in a course. The student may be administratively withdrawn from the course when absences become excessive as defined in the course syllabus. When an unavoidable reason for class absence arises, such as illness, an official trip authorized by the college or an official activity, the instructor may permit the student to make up work missed. It is the student's responsibility to complete work missed within a reasonable period of time as determined by the instructor. Students are officially enrolled in all courses for which they pay tuition and fees at the time of registration. Should a student, for any reason, delay in reporting to a class after official enrollment, absences will be attributed to the student from the first-class meeting.

It is the student's responsibility to verify administrative drops for excessive absences through MySPC using his or her student online account. If it is determined that a student is awarded financial aid for a class or classes in which the student never attended or participated, the financial aid award will be adjusted in accordance with the classes in which the student did attend/participate and the student will owe any balance resulting from the adjustment.

Syllabus Statements:

This is required. For information about Artificial Intelligence, Disabilities, Non-Discrimination, Intellectual Exchange, Title IX Pregnancy Accommodations, CARE (Campus Assessment, Response, and Evaluation) Team, Campus Concealed Carry, and COVID-19, please use this link: <https://www.southplainscollege.edu/syllabusstatements/>.

Plagiarism and Cheating:

Students are expected to do their own work on all projects, quizzes, assignments, examinations, and papers. Failure to comply with this policy will result in a grade of ZERO for the assignment and can result in an F for the course if circumstances warrant.

Plagiarism violations include, but are not limited to, the following:

1. Turning in a paper that has been purchased, borrowed, or downloaded from another student, an online term paper site, or a mail order term paper mill;
2. Cutting and pasting together information from books, articles, other papers, or online sites without providing proper documentation;
3. Using direct quotations (three or more words) from a source without showing them to be direct quotations and citing them; or
4. Missing in-text citations.

Cheating violations include, but are not limited to, the following:

1. Obtaining an examination by stealing or collusion;
2. Discovering the content of an examination before it is given;
3. Using an unauthorized source of information (notes, textbook, text messaging, internet, apps) during an examination, quiz, or homework assignment;
4. Entering an office or building to obtain unfair advantage;
5. Taking an examination for another;
6. Altering grade records;
7. Copying another's work during an examination or on a homework assignment;
8. Rewriting another student's work in Peer Editing so that the writing is no longer the original student's;
9. Taking pictures of a test, test answers, or someone else's paper.

Student Code of Conduct Policy:

Any successful learning experience requires mutual respect on the part of the student and the instructor. Neither instructor nor student should be subject to others' behavior that is rude, disruptive, intimidating, aggressive, or demeaning. Student conduct that disrupts the learning process or is deemed disrespectful or threatening shall not be tolerated and may lead to disciplinary action and/or removal from class.

Email:

When you have questions, problems, or comments, you can e-mail me directly to bwang@southplainscollege.edu. Please refrain from using the BlackBoard Course Messages tool to message me. I will respond to your email in a timely manner (within 24 hours), emails received after 10:00 PM on Monday through Thursday will receive a response next morning. Emails received on Friday through Sunday will get a response usually same day email received, unless email was sent after 10:00 PM. I will not check my email often during the weekend, but I will reply to your email in a timely manner when I see them.

Expectations when Corresponding:

Please be polite, courteous, and respectful when communicating. Do not use profanity under any circumstances. Do not write disrespectful, insulting, mean, rude, profane, insensitive, or other hurtful messages or comments under any circumstances. Failure to abide by this policy will result in the appropriate disciplinary actions.

Online Disclaimer:

This is to notify you that materials you may be accessing in chat rooms, e-mails, discussion forums or unofficial web pages are not officially sponsored by the instructor or South Plains College. The United States Constitution rights of free speech apply to all members of our community regardless of the medium used. The instructor and South Plains College disclaim all liability for data, information or opinions expressed in these forums.

Minimum Computer Requirements:

1. Personal computer
2. Web Browser: Google Chrome works best
3. A high-speed internet connection
4. Microsoft Word and Microsoft PowerPoint software (a recent version)
5. Software or Program to read PDFs
6. A good soundcard and functioning speakers
7. Knowledge of how to navigate web pages and how to deal with pop-up blockers and other devices and warnings on your browser
8. Knowledge of how to download files from the internet and find them on your computer once they are downloaded
9. Knowledge of basic operations of Microsoft Word and Microsoft PowerPoint
10. Knowledge of how to view and adjust videos
11. May need a printer

Copyright Notice: All material presented by the instructor in this online class is copyright protected. The material presented by the instructor may not be modified or altered in any way. You have permission to print out **one** copy of any material presented by the instructor in this online class (course syllabus, lecture notes, lab experiments and exam reviews). The one copy must only be used for your personal educational use during this semester. The material may not be altered or modified in any way. The material may not be distributed in any way. You have permission to download the same material to your computer hard drive or other medium in order to print out the material. Any material downloaded must only be used for your personal educational use. The downloaded material may not be altered or modified in any way. The downloaded material may not be distributed in any way.

Computer Problems or Blackboard Server Problems: If a student's internet connection goes down, or a student's computer crashes or otherwise becomes inoperable for Blackboard, it is the responsibility of the student to have their internet connection and/or computer repaired as soon as possible in order to avoid getting behind in the class. While the computer and/or internet connection is being repaired, the student should seek an alternate computer. It will be the student's responsibility to find an alternate computer to avoid getting behind in the class. Internet problems and/or the crash or inoperability of a computer will not be an acceptable excuse for being late with any assignments or getting behind with the chapter modules. *It is the responsibility of the student to have a backup plan in place.* If the Blackboard server goes down, the appropriate time extensions on any quizzes will be determined and announced by the instructor.

Logging into the Course: You are not allowed to give your user ID and/or password to anyone. You will be dropped and given an F for your final grade if someone besides you is caught logging into this course under your user ID and/or password.

General Safety Rule:

As a faculty member, I am deeply invested in the well-being of each student I teach. I am here to assist you with your work in this course. If you come to me with other non-course-related

concerns, I will do my best to help. It is important for you to know that all faculty members are mandated reporters of any incidents of sexual misconduct. That means that I cannot keep information about sexual misconduct confidential if you share that information with me. Dr. Lynne Cleavinger, the Director of Health & Wellness, can advise you confidentially as can any counselor in the Health & Wellness Center. They can also help you access other resources on campus and in the local community. You can reach Dr. Cleavinger at 716-2563 or lclevinger@southplainscollege.edu or go by the Health and Wellness Center. You can schedule an appointment with a counselor by calling 716-2529

<i>Course Schedule: CHEM1406.152</i>	Lab Experiments <i>Due Monday by 10 AM</i> <i>Submit by email with pictures attached.</i>	Homework <i>Open, Friday 10:00am</i> <i>Close, Tuesday 10:00am</i>	Exam <i>Open, Friday 10:00am</i> <i>Close, Wednesday 10:00am</i>
Week #1	-Read over lab safety manual.		
Week #2	-Sign "Distance learning laboratory safety agreement" <i>Due Monday, 08/31 at 10 am</i>	Chapter 1 Homework <i>Due Tuesday, 09/01 at 10 am</i>	Chapter 1 Exam <i>Due Wednesday, 09/02 at 10 am</i>
Week #3	-HL 1: Scientific methods (Dry Lab) <i>Due Monday, 09/07 at 10 am</i>		
Week #4	-HL 2: Measurement Uncertainty (Dry lab) <i>Due Monday, 09/14 at 10 am</i>	Chapter 2 Homework <i>Due Tuesday, 09/15 at 10 am</i>	Chapter 2 Exam <i>Due Wednesday, 09/16 at 10 am</i>
Week #5	-HL 3: Measurement (Hands on Lab) <i>Due Monday, 09/21 at 10 am</i>		
Week #6		Chapter 3 Homework <i>Due Tuesday, 09/29 at 10 am</i>	Chapter 3 Exam <i>Due Wednesday, 09/30 at 10 am</i>
Week #7	-HL 4: Naming Compound (Worksheet Lab) <i>Due Monday, 10/05 at 10 am</i>		
Week #8	-HL 5: Exploring Density (Hands on Lab) <i>Due Monday, 10/12 at 10 am</i>	Chapter 4 Homework <i>Due Tuesday, 10/13 at 10 am</i>	Chapter 4 Exam <i>Due Wednesday, 10/14 at 10 am</i>
Week #9	-HL 6: Balancing Chemical Equations (Dry Lab) <i>Due Monday, 10/19 at 10 am</i>	Chapter 5 Homework <i>Due Tuesday, 10/20 at 10 am</i>	Chapter 5 Exam <i>Due Wednesday, 10/21 at 10 am</i>
Week #10	-HL 7: Chemical and Physical Change (Dry/Virtual Lab) <i>Due Monday, 10/26 at 10 am</i>		
Week #11	-HL 8: Single Replacement Reaction Stoichiometry and Percent Yields (Hands on Lab) <i>Due Monday, 11/02 at 10 am</i>	Chapter 6 Homework <i>Due Tuesday, 11/03 at 10 am</i>	Chapter 6 Exam <i>Due Wednesday, 11/04 at 10 am</i>
Week #12		Chapter 7 Homework <i>Due Tuesday, 11/10 at 10 am</i>	Chapter 7 Exam <i>Due Wednesday, 11/11 at 10 am</i>

Week #13	-HL 9: Determination of Acetic Acid Concentration (Hands on Lab) <i>Due Monday, 11/16 at 10 am</i>	Chapter 8 Homework <i>Due Tuesday, 11/17 at 10 am</i>	Chapter 8 Exam <i>Due Wednesday, 11/18 at 10 am</i>
Week #14	<i>Thanksgiving Holidays</i>		
Week #15			Chapter 9 Exam <i>Due Wednesday, 12/02 at 10 am</i>
Week #16			Chapter 10 (Final Exam) <i>Due Wednesday, 12/09 at 10 am</i>