

SYLLABUS FOR CHEMISTRY 1A-55033 – Fall 2021

Lectures: Online, Asynchronous

Labs and Exams: Every T and Th 11:00-1:30pm in new Math/Science building 201.

Instructor: Veronica Cornel

Contact info: e-mail Veronica.Cornel@reedleycollege.edu (using “Chem1A” as the subject or I will delete it) or through the Canvas Inbox

Canvas Website: Fill-in notes, fill-in lab reports, videos of the lectures, grades, links to submit pdfs of your homework, due dates etc. are all posted under “Modules” on Canvas. <https://sccd.instructure.com>

Zoom Office Hours: MW 11am-12:30pm in MSE 223, and Fridays on zoom (see Canvas for times and link)

Tutoring: Free tutoring available in person and on Zoom. Go to www.tutormatchingservice.com/reedley, sign up for a free account, and begin searching for RC chemistry tutors. We will have an embedded tutor and I will give you his/her email soon. Here is a tutorial video on how to use Tutor Matching service: <https://youtu.be/xvRD7kSjNhs>

Course Objectives: Chemistry 1A is a general course in chemistry designed not only for chemistry majors, but also for biology, physics, chemical engineering, pre-medical and pre-pharmacy majors.

Prerequisites: students need to have passed CHEM10, or High School chemistry with a lab component, or CHEM3A, or the equivalent, as well as basic algebra (Math 3, Algebra II or the equivalent, not Stats).

Advisories: English 1A

Textbook: Nivaldo J. Tro: Chemistry: A Molecular Approach (1st, 2nd, 3rd or 4th Edition).

Lab Manual: CHEM 1A Lab Book by V. Cornel. Print the labs as they are posted on Canvas and complete the prelab before coming to lab!

Other Supplies: A scientific calculator is required TI-30XA or TI-30XII (needs exponents, SCI mode and logs, but not a programmable calculator nor one designed for STATS) (You will not be allowed to use a programmable calculator or cell phone on exams). Approved safety glasses (Z87 in the stem of the glasses), mask (until covid restrictions lifted), labcoat and closed shoes for lab.

Canvas Modules

There will be a Module for each week-day. Work through the Module in order, do not go straight to the assignment or it will be locked. Print the fill-in notes, fill them in as you watch the pre-recorded video, read the section in your textbook and complete the homework. Take a photo of your homework and upload it on the correct assignment on Canvas by the due date.

Lecture Notes: **Download** from my Canvas website and **fill in** the notes while watching the lecture video. Homework from your textbook is assigned at the end of each day’s notes. **The more effort you put into your homework, the better you will do in exams.** I will write out the questions for the first week in case you don’t have your textbook yet.

Homework: Homework will be assigned every lecture at the end of the lecture notes. Take a photo of your homework (less than 1 MB) and upload it on Canvas by the due date. Turn your phone off “live” mode or the phone takes a short video instead of a single photo and its over 1MB and won’t upload. It is

essential to your success in this class that you do all the assigned homework and read the relevant sections in your Textbook. There will be no make-up homework assignments. Do not just copy somebody else's homework or you will not be able to do the problems for yourself in the exams. You can ask another student or tutor to help you with the problems, but then you need to redo them by yourself. Even if you get all the problems wrong, you will still get 70% for the assignment for attempting all the problems yourself and showing all your work and writing most of the question as well as the answer. I will grade selected problems and write the problems you made a mistake on next to your grade on Canvas. You then need to check the correct calculation and answer when I post the answer key. I will only accept late homework until I post the answer key and you will lose 10% for the homework being late. You need to write out the important parts of the homework questions as well as the answers so you can study your homework before the exam. You can also do the corresponding odd number problems for extra practice and check the answers at the back of the book.

Covid-19 Precautions:

Students should complete the online health screening before coming to the campus:

https://scccd.az1.qualtrics.com/jfe/form/SV_3IO880HybZg7ajX

If you have any of the following symptoms, you should not attend class. Students are encouraged to contact the nurse or healthcare provider for further guidance. Common COVID-19 symptoms include, but are not limited to:

- cough
- sore throat
- shortness of breath
- runny nose (not due to seasonal allergies)
- fever (100.4 degrees or more)
- and/or chills

Students should also not attend class if they have had close contact with anyone who has had these symptoms in the last 14 days. Email me if you need to miss class for a Covid-19 reason. If you have to miss too many in-person meetings you may need to take a W or Incomplete for the course.

Attendance: Attendance for the face to face labs and exams is mandatory. Attendance for online lectures and online labs will be done by checking if you submit the assignments by the due date (you can always submit assignments ahead of time and still be marked as present on the day they are due). Students may be dropped if they don't attend the first lab, without contacting the instructor. If a student misses more than 25% of the assignments, or three assignments in a week, without contacting the instructor with a valid excuse, they may also be dropped. If you miss an exam and have a valid, written excuse, I will give you one make-up exam. If you miss a second exam you will not be allowed a make-up exam and you will receive a zero. If a student is disruptive (using cell-phones, interrupting the instructor continuously) they may be asked to leave the exam/lab and recorded as "absent". No make-up labs will be given, but a student may email me the prelab and postlab for partial credit. If a student misses more than 3 labs they will not pass the class.

Cancelled Classes: If for some reason a face to face lab/exam is cancelled, an official yellow cancellation form will be posted on the door of the classroom. We will make every effort to inform the students via Canvas, or on the Reedley College Website in a timely manner.

Grading : There will be 4 lecture exams, equally weighted and counting 65% of your grade. The final exam is not cumulative. Homework will count 10% and your lab work will count 25% (12.5% lab reports and 12.5% lab quizzes which will be part of the exams).

General Grading break-off : **A** 90-100%, **B** 80-89%, **C** 70-79%, **D** 60-69%, **F** 0-59%

Please be aware of the following rules:

- Arriving late or leaving early during face to face labs/exams will result in the student having less time for the lab/exam. We have to leave the room by 1:30pm.
- Fraudulent behavior during exams is graded with a (0) zero.
- Copying of homework, experimental data, and lab reports is considered fraudulent behavior for both the copier and the originator and points (10-100%) may be deducted from both the copier and the originator. **DO NOT HAND IN IDENTICAL HOMEWORK.**
- No homework may be submitted after I have posted the answer key. No alternative homework will be given. I will drop the lowest two homework assignments though.
- No extra credit will be given. You need to work consistently from the beginning.
- No cell phones, i-pods, i-watches will be allowed during exams, no programmable calculators, no restroom breaks and no talking.

LABS

- Cloth or surgical masks must be worn at all times in the lab (until covid restrictions are lifted), even for exams. If you absolutely cannot wear a cloth mask you may wear a face shield over your safety glasses.
- Safety glasses need to be worn whenever you or somebody near you is conducting an experiment.
- No experiments may be conducted without the instructor or teaching assistant present
- No horseplay or unauthorized experiments. Do not taste any chemical or smell any chemical directly.
- Dangerous behavior in the lab will result in the student being asked to leave the lab.
- No visitors inside the lab. You need to go outside to meet with them.
- No food or drinks allowed in the lab.
- Backpacks should not be left on the floor where others can trip over them.
- Closed shoes and buttoned up lab coats must be worn in the lab at all times when you are conducting experiments.
- Long hair should be tied back so it will not fall into chemicals or flames.
- If any accident occurs in the lab, inform your instructor and follow safety procedures. (To be discussed during first lab)
- Clean up any spills promptly, even water spills
- Do not point the open end of a test tube towards anybody
- Turn off flames when working with organic solvents. Dispose of them in waste bottles in the fume hood, not down the sink.
- At the beginning of each lab your instructor will inform you of any special safety precautions and how to dispose of used chemicals. You need to be on time for the lab so that you hear these instructions.
- Do not dispose of matches, paper or solid chemicals in the sink.
- Put broken glassware in the “broken glassware box”, not in the trash.
- Before leaving the lab, wipe the desktop and your chair and wash your hands with soap and water.
- Turn in your prelab as you walk into lab or you will lose points for it being late. Turn in your lab report before leaving the lab.
- Wash your mask, safety glasses and lab coat when you get home.

If you have a verified need for an academic accommodation (especially in labs) or materials in alternate media (i.e., Braille, large print, electronic text, etc.) per the Americans with Disabilities Act (ADA) or Section 504 of the Rehabilitation Act, please contact the Disabled Student Services as soon as possible.

Chemistry 1A Fall 2021 Cornel

Week	Date	Labs (T/Th)	Lectures (M/W/F) Online
1. Aug 9-13	Aug 10	Introduction to Laboratory Safety, and Inventory Check-in.	Syllabus and Periodic Table 1. Matter
	Aug 12	Lab 2: Properties and Changes in Matter	1. Scientific Notation and Significant Figures
2. Aug 16-20	Aug 17	Lab 3: Measurements	1. Dimensional Analysis
	Aug 19	<i>Significant Figures and Dimensional Analysis Worksheet</i>	2. Atoms 2.9 Mole
3. Aug 23-27	Aug 24	Lab 7: The Mole	3.5 Ionic Compounds
	Aug 26	Exam 1	3.6 Molecules and Polyatomic Ions
	Aug 27	Last day to add a class. Last day to drop a class to avoid a "W"	3.8-9 Percent composition and Empirical Formulas
4. Aug 30- Sept 3	Aug 31	<i>Online Lab: Nomenclature Worksheet</i>	3.6 More Polyatomic Ions and Hydrates
	Sept 2	<i>Online Lab 6: Empirical Formulas: Oxide of Tin</i>	3.10, 4.6 Writing and Balancing Reactions 4.2 Stoichiometry
5. Sept 6-10	Sept 6	Labor Day – no lecture	4.3 Limiting Reactions
	Sept 7	Lab Quiz 1 (Labs 2,3,7, Safety and Labware)	4.4 Solutions
	Sept 9	Lab 8: The Formula of a Hydrate	4.5 Electrolytes and Net Ionic equations
6. Sept 13- 17	Sept 14	Lab 9: Stoichiometry	4.8 Acid-Base reactions and Titrations
	Sept 16	Exam 2	4.7 Reaction Types 5. Gas 1
7. Sept 20-24	Sept 21	Lab 10: Alum Crystallization. Recycling Aluminum	4.9 and 18.2 Balancing Redox Reactions
	Sept 23	Lab 16: Reactions of Copper	18.2 Redox Titrations and Activity Series 5. Gas 2
8. Sept 27- Oct 1	Sept 28	Lab 15: Redox Reactions- The Burning of Magnesium	5. Gas 3
	Sept 30	Lab 21: Charles' Law	4. Gas 4 6. Thermo 1
9. Oct 4-8	Oct 5	Lab Quiz 2 (Labs 5, 6, 8, 9, 15, 16)	6. Thermo 2-3
	Oct 7	Exam 3	
	Oct 8	Last Day to drop class to get a "W"	
10. Oct 11- 15	Oct 12	Lab 22: Molecular Mass of a Volatile Liquid	7. Light 1
	Oct 14	Lab 23: Atomic Mass of an Unknown Divalent Metal	7. Light 2 8.4 Electron Configuration
11. Oct 18- 22	Oct 19	Lab 27: Heat Flow, Calorimetry	7. Quantum Numbers and
	Oct 21	Lab 13: Acids and Bases	8. Periodicity 9. Lewis Diagrams
12. Oct 25- 29	Oct 26	Lab 19: Vitamin C in Fruit Juices	10. Geometry 1-2
	Oct 28	Exam 4	21. Alkanes
13. Nov 1-5	Nov 2	Titration Practical Exam	21. Alkenes, Alkynes
	Nov 4		9.8 Formal Charges and Polar Bonds 10.5 Dipoles
14. Nov 8-12	Nov 9	Lab 28: Molecular Geometry Part 1 and 2	10.7 Hybridization
	Thurs Nov 11	Veteran's Day (no classes)	9.8 Resonance 11.2 Intermolecular Forces
15. Nov 15- 19	Nov 16	Lab Quiz 3 (Labs 10, 19, 21-23, 27)	11.2-3 Liquids and 11.6-8/11-12 Solids
	Nov 18	Lab 17: Percent Iron (II) in an Unknown	12.5-6. Solutions and 12.6 Freezing Point Lowering
16. Nov 22- 26	Nov 23	Lab 30: Freezing Point Depression	pH and pOH
	Nov 25-26	Thanksgiving (No lecture or labs)	
17. Nov 29- Dec 3	Nov 30	Exam 5	
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With this statement on my course syllabus, I am referring each of my enrolled students in need of academic support to tutorial services. Referral reason: Mastering the content, study skills, and basic skills of this course is aided by the use of trained peer tutors

Course Outline: Each Topic takes 1-2 weeks

Matter and energy

The laws of conservation of mass and energy
States and classifications of matter, including elements, ionic compounds, molecules, homogeneous mixtures and heterogeneous mixtures
Chemical and physical properties of matter
Chemical and physical changes of matter
Scientific method

Measurements in chemistry

SI units and derived units of measurement: length, mass, volume, density, pressure
Temperature scales
Dimensional analysis and problem solving
Precision and accuracy in making measurements
Significant figures
Standard deviation

Atoms and elements

Laws of conservation of mass, of constant composition, and of multiple proportions
Modern atomic theory
Protons, electrons, and neutrons
Atomic number, atomic mass and atomic mass unit
Isotopes including isotopic abundance and determining atomic mass
Classification of elements, including metals, metalloids, non-metals and groups
Conversions between mass, moles and atoms using Avogadro's number and molar masses

Molecules, ions, ionic compounds and organic molecules

Chemical bonds: ionic and covalent bonds
Ionic compounds, including formulas, nomenclature and properties
Molecules, including formulas, nomenclature and properties
Acids, including formulas, nomenclature and properties
Organic Molecules
Recognizing alkane, alkene, alkyne, alcohol, aldehyde, ketone, carboxylic acid, amine and aromatic functional groups.
Nomenclature of alkanes
Formula mass and molar mass, including conversions between grams to molecules to atoms
Percent composition, empirical formulas, molecular formulas and combustion analysis

Chemical equations and stoichiometry

Writing and balancing chemical equations
Reaction classifications, including synthesis, decomposition, single displacement, double displacement, combustion, acid base neutralization and redox reactions.
Stoichiometry calculations including limiting reactant, theoretical yield, and percent yield.

Solutions

Concentration including percent by mass, percent by volume and molarity

Dilution of solutions

Solution stoichiometry

Aqueous Reactions

Strong, weak and non-electrolytes

Precipitation reactions, including prediction of products and solubility rules

Molecular, complete and net ionic equations

Acid-base reactions

Arrhenius acids, bases and salts

Bronsted-Lowry acids and bases

Properties of acids and bases

Acidity scale and pH

Gas-forming reactions

Redox reactions

Assigning oxidation numbers

Recognizing redox reactions by the change in oxidation state

Identifying oxidant and reductant

Balance redox reactions by the half-reaction method in acidic and basic conditions

Acid-base and redox titrations

Gases

Gas pressure

The relationship of pressure and volume; Boyle's Law

The relationship of volume and temperature. Charles' Law

Kelvin absolute temperature scale

Standard temperature and pressure (STP)

Combined gas law

Ideal gas law, including molar volume, determining the density and molar mass of a gas and stoichiometry calculations

Gas mixtures and partial pressure, including Dalton's law of partial pressures

Kinetic molecular theory

Diffusion and effusion, including Graham's law

Thermochemistry

Kinetic, potential, thermal and chemical energy

Exothermic and endothermic reactions

First Law of thermodynamics

Pressure-volume work

Enthalpy

Calorimetry, specific heat, and related calculations

State functions and Hess' law

Standard enthalpies of formation

Heat of reactions and stoichiometry

Atomic Structure

Nature of light, including electromagnetic radiation, wave properties, electromagnetic spectrum, interference, diffraction, Planck's equation, quanta and the photoelectric effect

Bohr's model of the atom
Atomic spectra and calculations of transition energies
Quantum numbers, orbitals, main shells, subshells, electron spin

Periodic properties and the relationship to atomic structure

The periodic arrangement of atoms
Electron configuration, Pauli's exclusion principle, Hund's rule
Orbital diagrams of atoms and ions
Valence electrons
The periodic table
Periodic properties and trends, including ionization energy, electron affinity, electronegativity, atomic and ionic size, metallic character

Chemical Bonding

Covalent, ionic and metallic bonds
Lewis structures
Octet rule
Incomplete octets, expanded octets and odd-electron structures
Organic molecules including degrees of unsaturation, constitutional isomers, *cis* and *trans* stereoisomers, chiral carbons and stereoisomers.
Line-bond structures of organic molecules
Formal charges
Bond length and bond energies
Resonance structures
VSEPR Theory and molecular geometry of molecules and polyatomic ions
Electronegativity and bond polarity
Molecular shape and polarity
Hybridization and molecular geometry, including organic molecules
Sigma and pi orbital overlap and bond rotation
Energy level diagram of orbitals
Homonuclear diatomic molecules
Heteronuclear diatomic molecules

Intermolecular forces, liquids and solids

Intermolecular forces
Hydrogen bonding, including organic molecule examples
Phase changes and phase diagrams, including boiling points, freezing points, vapor pressure, vaporization, condensation, sublimation, deposition, critical point, and heating curves.
Liquid state, including adhesion, cohesion, vapor pressure, viscosity and surface tension.
Solid state, including cubic crystal structures, molecular, ionic, metallic and covalent network solids.

Solutions

Solutions terminology
Solution concentration units, including molarity, molality, mole fraction, percent mass/volume, percent volume/volume, ppm, ppb and ppt.
Colligative properties, including freezing point depression, molecular mass determination, boiling point elevation, van't Hoff factor, osmosis

STUDENT LEARNING OUTCOMES:

(Specify the learning skills the student demonstrates through completing the course and link critical thinking skills to specific course content and objectives.)

Upon completion of this course, students will be able to:

- A. Collect and analyze data and have reasonable conclusions. Assessed by the lab practical.
- B. Competent knowledge of the periodic table, molecules, and compounds. Assessed from a pre-test administered at the beginning of the semester and the final exam administered at the end of the semester.
- C. Ability to apply skills to solve chemical problems especially math skills. Assessed from a pre-test administered at the beginning of the semester and the final exam administered at the end of the semester.

III. COURSE OBJECTIVES:

(Specify major objectives in terms of the observable knowledge and/or skills to be attained.)

In the process of completing this course, students will:

- A. Use systematic nomenclature to name and classify chemical species.
- B. Predict ionic and covalent bonding between species.
- C. Convert from the English to the metric system in weights, volume, and linear measurements.
- D. Calculate molecular weights, formula weights, gas volumes, temperature, pressure concentration of solutions, molarity, empirical and molecular formulas, and percentage composition.
- E. Define the structural periodicity of the elements and discuss the trends in all directions on the periodic chart and the terms for grouping elements, i.e., metalloids, transition elements, inner transition, etc..
- F. Use stoichiometric relationships to calculate quantities of reactants, products, limiting reactants, theoretical yields, percent yields, and chemical formulas.
- G. Describe covalently bonded structures using Lewis theory, valence bond theory (including hybrid orbitals), and molecular orbital theory of diatomic molecules.
- H. Define the theoretical and mathematical description of ideal gases, including the concepts of temperature and kinetic energy distribution.
- I. Identify types of reactions, predict the outcomes of chemical reactions, and write and balance chemical reactions.
- J. Apply the first law of thermodynamics, contrast internal energy and enthalpy, describe how energy changes are related to temperature, atomic motions, and change in chemical bonding and perform thermochemical calculations.
- K. Describe colligative properties of solutions of ionic and non-ionic substances and solve their numerical problems.
- L. Effectively collect, record, and analyze experimental data, recognize the limitations of measurements and identify sources of error, and interpret experimental results and correlate experimental results with the appropriate theory