# Syllabus for Chem 3A: Intro Gen Chemistry

Reedley College Section 56734 Summer 2022

## COURSE INFORMATION

Class times: Lab: MTWTh 8:30–11:50 am in MSCI 201
Lecture: MTWTh 12:00 –3:20 pm in MSCI 204

Required Books and Materials:

Tro, *Introductory Chemistry Essentials*, 6th edition [Note: you may use an earlier edition of the textbook]

The experiments provided as a free downloads from Canvas. Experiments and worksheets must be printed out and brought to class.

Approved safety goggles and lab coat (knee length)

Scientific calculator (I recommend the TI-36X Pro; cell phone calculators are **not** acceptable)

4 Scantrons (882-E)

## FACULTY INFORMATION

Instructor: Kirk Kawagoe

Office phone: none

Cell phone: (559) 393-2121 (text only)

email: kirk.kawagoe@ReedleyCollege.edu

Office hours: After Lecture

Office: MSCI 222

## ACADEMIC DISHONESTY

**Academic dishonesty (cheating, plagiarism) is unacceptable and will not be tolerated.** Because cheating, plagiarism and collusion in dishonest activities erode the integrity of Reedley College, each student is expected to exert an entirely honest effort in all academic endeavors. Academic dishonesty in any form is a very serious offense and will incur serious consequences. Working together on homework and labs is encouraged, but **your individual work must be evident**. Do not allow others to copy directly from your work.

CHEATING is the act or attempted act of taking an examination or performing an assigned, evaluated task in a fraudulent or deceptive manner, such as having improper access to answers, in an attempt to gain an unearned academic advantage. Cheating may include, but is not limited to: copying from another's work, supplying one's work to another, giving or receiving copies of examinations without an instructor's permission, using or displaying notes or devices inappropriate to the conditions of an examination, allowing someone other than the officially enrolled student to represent the student, failing to disclose research results completely, or encouraging, permitting, or assisting another to do any act that could subject him or her to discipline.

PLAGIARISM is a specific form of cheating: the use of another's words or ideas without identifying them as such or giving credit to the source. Plagiarism may include, but is not limited to: failing to provide complete citations

and references for all work that draws on the ideas, words, or work of others, failing to identify the contributors to work done in collaboration, submitting duplicate work to be evaluated in different courses without the knowledge and consent of the instructors involved, or encouraging, permitting, or assisting another to do any act that could subject him or her to discipline.

POSSIBLE PENALTIES: Incidents of cheating and plagiarism shall constitute good cause for discipline, including but not limited to the removal, suspension, or expulsion of the student (California Education Code Section 66300, Accreditation Standard II.A.7.b, AR5500, SCCCD BP5500). Instructors may also impose a variety of sanctions and penalties, which may range from a constructive dialogue with the student, a point deduction, a failing grade of "F" or a zero (0) on the particular examination, paper, project, or assignment in question, to a failing grade in the course at the discretion of the instructor depending upon the severity and frequency of the incidents.

## ACCOMMODATIONS

It is our policy not to discriminate against any student. If you suspect that you have any type of physical disability or learning disability that is relevant to your performance in the course, please stop by the disabled student services office and discuss it with them as they may be able to provide services and support that could help you succeed.

If you have a verified need for an academic accommodation 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 me as soon as possible.

## ATTENDANCE

Attendance in lecture and lab is essential for success in this course. Official RC policy states "There are no institutionally approved excused absences for any reason." You will be dropped if you miss the first or second day, or miss two consecutive days before the census date, June 9. Please make every effort to be on time for class. If you are late, it is your responsibility to make sure you are not listed as absent. No attendance changes will be made after the class period in question ends.

## CANCELLED CLASSES

If I have to cancel a class, there will be a notice on the door and on Canvas stating that the class is cancelled.

## CANVAS

You should make a habit of checking Canvas and your school email account every day. An email will be sent to you when I post items. You can find announcements, the course syllabus, lecture and lab schedules, lecture slides, worksheets, and experiments on Canvas. Some students may find it helpful to print the handout version of the lecture slides to bring to class. Please see me if you need help with Canvas.

## CLASSROOM VISITORS

In accordance with RC policy, only students currently enrolled in the course will be allowed in the classroom during lab and lecture.

## SIGNIFICANT DATES

First Day of Classes, May 23 – Make sure you show up for lab at 8:30 AM!

Memorial Day, May 30 – No classes held

Last Day to drop from class, May 25 (no W on transcript)

Last Day to Withdraw from class, June 6 (W shows on transcript)

Final Exam, June 16, 12 PM (Study time prior to exam to ask questions)

## ELECTRONIC DEVICES

Technology is wonderful in its place. Please silence your cell phone during class and refrain from texting or surfing the internet. Remove headphones and turn off iPod/MP3 players. Cell phones must be placed in your backpack/bag during exams. If your cell phone rings during an exam you will lose 5% on the exam grade; if your cell phone is **seen** during an exam you will receive a zero for that exam. **You may NOT use the calculator on your cell phone during an exam.**

## EXAMS

Four multiple choice exams will be given in this class. In chemistry, topics build on one another; therefore, all exams are comprehensive. Make up exams will generally not be given. Scantrons will be required for each exam. **Grade corrections for incorrectly marked or incompletely erased answers will not be made.** You are not allowed to use notes of any kind during exams. Certain constants, conversion factors and equations will be provided on exams.

## EXTRA CREDIT

Extra credit assignments will not be given.

## GRADING

A summary of your grades, including a projected course grade, will be available on Canvas. You should keep all returned graded work until you receive your final grade. Grading discrepancies will not be corrected without the original graded work. To receive a passing grade, you must have at least a 70% lab average and a 65% exam average regardless of your success in the rest of the course.

The grading scale will be based on a straight percentage:

A = 90% - 100%
B = 80% - 89%
C = 70% - 79%
D = 60% - 69%
F = 0% - 59%

The final grade will be calculated using weighted categories:

| | |
|---|---|
| 70% | Exams |
| 10% | Homework |
| 20% | Lab reports/worksheets |

## HOLIDAYS

There are no holidays during the 4-week summer session.

## HOMEWORK

Homework assignments will be due the day of the exam for that section.

## LAB

Lab work will follow as closely as possible the material discussed in the lectures. There is no published lab manual for this course. All the lab assignments and experiments are available on Canvas. It is your responsibility to print the assigned experiment or worksheet and bring it with you to class. Prelab are due at the beginning of the lab period. Late prelabs will not be accepted. Some days we will have worksheets instead of, or in addition to, experiments. Lab reports are due before leaving lab each day unless otherwise instructed. You may not leave lab early unless you have completed and turned in the lab assignment. Late labs will be penalized 25%. No labs will be accepted after I have graded that lab. The lowest lab report score of the semester will be dropped. Any missed labs will receive a grade of zero. More than two missed labs will result in a failing grade for the course. **Missed labs may be made up only at the discretion of the instructor. Arrangements must be made before the lab is due.**

Proper attire is required for participation in lab. This includes a long-sleeved, knee-length lab coat, approved safety goggles, and closed-toe shoes (no flip flops or sandals). Students without proper attire will be asked to leave. You can lose points or be removed from lab for not wearing your safety attire, eating or drinking in the lab, playing in the lab, not using appropriate waste containers, repeatedly breaking glassware/equipment, leaving a mess, improperly performing lab techniques, being unprepared for lab, etc.

If you are more than 5 minutes late for lab, you will not be allowed to participate and will be asked to leave. This is mostly due to safety risks for you and for other students,

## LAB PRACTICAL

The lab practical is a test of laboratory skills. Details will be given later in the semester. The lab practical is mandatory to pass the class.

## LATE WORK

I do accept late work, provided the work is received before the assignment has been graded and scores given. Work turned in after the due date is penalized 25%.

## PUNCTUALITY

Please make every effort to be on time for class. If you are late, please come in quietly and take a seat. Do not walk across the front of the classroom while the instructor is lecturing.

## READING

The reading assignments are listed on the schedule. You are expected to finish the reading before coming to class each day.

## SUCCESS IN CHEMISTRY

- Do not underestimate the time required for this class.
- Do not fall behind. Chemistry is cumulative and builds upon earlier concepts.
- Read the text before and after lecture. Work through the examples in the text. Take notes in lecture and while reading.
- Don’t miss class.

- Study for understanding. Critical thinking is a requirement for success in Chem 3A.
- Always show your work, including all units and considering significant figures.
- Complete and turn in all assignments. Work extra problems.
- Consider forming a study group.
- Ask for help. Ask questions in class. Text or email me with questions any time (literally). I will reply at my earliest convenience.

The following information is provided for transfer of courses to other colleges. It contains the official course description and other information that the college provides upon transfer.

**Subject and Course Number**

CHEM-3A

**Course Title:**

Introductory General Chemistry

**Course Description:**

This is a survey course in the principles of inorganic chemistry covering the composition of matter, physical and chemical changes, atomic and molecular structure, inorganic nomenclature, chemical formula and reaction calculations, gas laws, bonding, solutions, net-ionic equations, acid-base theories, pH, oxidation-reduction reactions, thermodynamics, nuclear chemistry and equilibrium. The course emphasizes problem solving and chemical calculations. Both qualitative and quantitative theory and techniques will be covered. It is intended for applied science and non-science majors or for students preparing to take Chemistry 1A. PREREQUISITES: Mathematics 103 or 3A or 5A or equivalent. ADVISORIES: English 1A or 1AH, Chemistry 10 or high school chemistry. (A, CSU-GE, UC, I) (C-ID CHEM 101)

**Units and Hours**

Minimum Credit Units: 4
Total Course In-Class (Contact) Hours: 108
Total Student Learning Hours: 216
Maximum Credit Units: 4
Total Course Out-of-Class Hours: 108

**Math Prerequisite:**

Intermediate Algebra (Math 103) or College Algebra (Math 3A) or Math Analysis I (Math 5A)

**Student Learning Outcomes:**

- Construct and balance a chemical reaction and use the reaction to predict stoichiometric quantities.
- Describe acid-base reactions and how to calculate pH.
- Explain concepts from the periodic table and the use the periodic table to solve chemical problems.
- Name and draw Lewis diagrams of inorganic and molecular compounds from the formula and vice versa.
- Safely conduct laboratory experiments implementing concepts and principles learned in lecture.
- Use dimensional analysis to solve for an unknown parameter of density, volume, mass, pressure, temperature, molar mass, concentration, or an empirical formula.

## Course Objectives

1. apply solution properties and stoichiometry to calculate quantities (e.g. moles, volume, grams) of reactants and products in a reaction;
2. develop techniques to write Lewis electron-dot formulas and identify the shape using the VSEPR theory;
3. identify the nature and applications for electron exchange reactions;
4. prepare and solve simple mathematical problems involving formula calculations related to gas laws;
5. calculate molarity, mass percentage concentration and density of solutions and apply the molarity in dilution calculations.
6. identify types of matter, recognize physical properties and chemical properties, and apply the Law of Conservation of Mass and the Law of Conservation of Energy;
7. describe the impact of chemistry on modern society and the relationship between chemistry and other disciplines including agriculture, the medical field, and industry;
8. distinguish and identify metals, non-metals, metalloids, alkali metals, alkaline earth metals, halogens, noble gases, transition metals, and of the lanthanide and actinide series;
9. identify the principles of equilibrium in reversible reactions, saturated solutions, solutions of weak electrolytes and solutions of gases in solving related problems;
10. use the periodic table to identify physical and chemical properties of elements and calculate molar masses of compounds and molecules;
11. explain, write and balance chemical equations, and use these equations along with stoichiometry and the mole concept to convert quantities (e.g. grams or moles) of a given substance into quantities of an unknown substance;
12. identify different types of intramolecular and intermolecular forces of attraction present in various substances based on chemical formulas and structures;
13. define and identify acids and bases and perform math calculations involving pH measurements;
14. explain colligative properties of solutions (e.g. boiling point elevation, freezing point depression, and osmotic pressure);
15. calculate empirical formulas, and mass percentage composition given the appropriate data;
16. explain state and energy changes accompanying heating and cooling curves;
17. recognize the electromagnetic spectrum and explain the basic principles of the quantum mechanical model of the atom;
18. diagram heating and cooling curves;
19. perform unit conversions using the correct significant figures; between the English and metric systems, temperatures in different units, density, energy, and with SI units;
20. understand the structure of the atomic nucleus;
21. explain the fundamental types of nuclear radiation and the effects they have on biological systems
22. predict the physical behavior of gases to pressure, temperature, and volume changes;
23. apply gas laws and stoichiometry to calculate quantities (e.g. moles, volume, grams) of gas produced or consumed during a reaction;
24. perform calculations involving a limiting reactant and determine the percent yield;
25. name inorganic compounds given their formulas, and write formulas given names;
26. complete, identify type and balance chemical equations of reactions;
27. demonstrate laboratory skills which include operating an analytical balance; calibrating and/or use fundamental lab equipment such as a thermometer, barometer, buret, pipette; recognizing use and limitations of laboratory glassware; recording and report writing.

## Course Outline

A. Introduction to chemistry
the Scientific Method

B. Matter and energy
classifying matter: solid, liquid and gas
elements, compounds, and mixtures
physical and chemical properties
physical changes and chemical changes
conservation of matter
energy and heat capacity

C. Metric system
scientific notation
significant figures
basic units of measurement
converting units
density

D. Elements, atoms, and the periodic table

atomic theory
the nuclear atom
properties of subatomic particles
the Periodic Law and the periodic table
ions and isotopes
atomic mass

E. Atomic structure: atoms and ions
molecular view of elements
chemical formulas
writing formulas for ionic and molecular compounds
formula mass

F. Nomenclature of inorganic compounds
naming ionic compounds (salts, acids, and bases)
naming molecular compounds

G. Periodic properties of elements
trends of the periodic table (size of atoms and ions, electronegativity, and ionization energy)
groups and periods
similarities in groups
Bohr's model of an atom
the Quantum-Mechanical Model
orbital shapes
electron configuration

H. Chemical bonds: ionic, covalent, and metallic
intermolecular bonding
electronegativity
Lewis structures

I. Chemical Composition
mole concept
Avogadro's number
chemical formulas and conversion factors
formula stoichiometry
empirical formula and molecular formula
limiting reactants

J. Chemical Reactions
equation stoichiometry
solubility rules
types of reaction
double replacement
single replacement
neutralization
precipitation
oxidation reduction

K. Gas laws and Kinetic Molecular Theory
Boyle's Law
Charles's Law
the Combined Gas Law
Avogadro's Law
the Ideal Gas Law
Dalton's Law
gas stoichiometry

L. Liquids and Solids
solutes and solutions
units of concentrations (molarity, molality, normality, percent by mass, percent by volume, ppm, and ppb)
heat of reactions and enthalpy (heating and cooling curves, heat of fusion, heat of vaporization and specific heat)
reaction rates and chemical equilibrium
intermolecular and intramolecular bonding
dipole-dipole, dispersion, hydrogen bonding
types of crystalline solid: molecular, ionic, metallic, covalent network

M. Acids-base theory, acidity constants, and pH
definition of acids and bases
acid-base titrations
strong and weak acid and bases
the pH scale
buffers

N. Chemical equilibrium
dynamic equilibrium
the rate of a chemical reaction
Le Châtelier's Principle

O. Oxidation and reduction reactions
definition of oxidation and reduction
oxidation states
balancing an oxidation reduction reaction

P. Nuclear Chemistry
radioactivity and the atomic nucleus
the effects of radiation on biological systems

## Lab Outline

1. Orientation, safety
2. Quantitative separation of a mixture
3. Measurement
4. Density
5. Calorimetry
6. Atoms and spectra
7. Formula of a hydrate
8. Heat of neutralization
9. Models and shapes
10. Molar mass of unknown gas
11. Titration to determine the percentage of acetic acid in vinegar
12. Acids, bases and pH
13. Ionic reactions
14. Melting points of solids
15. Preparation of Alum
16. Titration of acid of unknown acid concentration