California State University, Sacramento

2021 Summer Program

CHEM 101 Introduction to Chemistry with Lab

Course Outline

Course Code: CHEM 101

Instructor: Todd A. Wells, Ph.D.

Home Institution: University of Denver

Office Hours: TBA & By Appointment

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Credit: 3

Course Description: This course is a study of the fundamentals of chemistry. A survey of atomic structure, periodicity, bonding, nomenclature, stoichiometry, gas laws, and solution chemistry is provided for those students with no background in these areas.

Lecture: The format of class meetings will be a combination of traditional lecture format, problem solving/ group activities, group discussions, and laboratory exercises. I will summarize new material and present illustrations and examples. In lecture, I WILL NOT identify and describe every detail you will read in the text and any supplemental materials. I will, however, emphasize the important topics covered in the reading as well as problem solving strategies when appropriate. You should stop me at any time if you have questions about the material being covered.

In the problem solving/group activities, material from the lecture will be explored in greater detail. We will work on specific "challenge problems" in small groups and any questions you have on the material covered in lecture or homework problems.

Reading: You are expected to complete the assigned reading prior to the class lecture. After lecture, you should reread the assigned text. I recommend that you understand the material and how to solve the sample problems before proceeding to the next section. At the end of each chapter, a summary of important equations and terms is provided that should prove helpful in the preparation for exams.

Course Learning Outcomes:

1. Apply significant figures correctly in measurements and calculations.

2. Use dimensional analysis to solve a variety of problems.
3. Use the periodic table to assist in explaining chemical bonding, polarity, and physical and chemical properties of elements.
4. Calculate amounts of chemical species using information from chemical formulas and chemical equations.
5. Correlate information from balanced chemical equations to the microscopic scale.
6. Explain atomic structure using the quantum mechanical model of the atom
7. Calculate the mathematical relationship between variables after graphing the experimental data.
8. Apply knowledge of chemistry principles to real world situations.

Required Textbooks: We will also use an online textbook found at OpenStax Chemistry (open
source e-book): https://openstax.org/details/books/chemistry-atoms-first-2e

Homework: Each lecture has a group of homework problems assigned to it. The problems are chosen to prepare you for the hour exams. If you understand and can do all the homework, you probably will do well on the exams. To get the most benefit from homework, you should **do the assignments on schedule**. It is important to keep up with these assignments!

Exams: There are two hour exams during the course, plus a cumulative final exam. Exam problems will be similar to the problems assigned as homework and the problems worked in class.

Grade	**Grade Points**
A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
D+	1.3
D	1.0
D-	0.7

F 0.0

Course Schedule:

Week1 (videos 1-6)

1. Matter and Energy
2. Atoms/elements
3. Light, electrons and atomic theory
4. Electronic configuration
5. Periodic Table
6. Periodic Trends

Lab1 – Atomic Spectra and Atomic Structure
Lab2 – Electron Configuration

Week 2 (videos 7-12)

7. Periodic Trends
7. Compounds
8. Chemical Bonds
9. Lewis structures
10. Molecules and shapes of molecules
11. Problem solving

Lab3 – Periodic Trends
Lab4 – Nomenclature & Empirical Formulas
Lab5 – Molecular Geometry and polarity

Week3 (videos 13-19)

13. Grams, Moles and Mass percent
14. Chemical Reactions
15. Balanced Chemical reactions
16. Solutions, Solubility and precipitation reactions
17. Acids and Bases
18. Acid Base reactions
19. Oxidations and reductions

Lab6 – Quantitative chemistry/Stoichiometry
Lab7 – Reactions in Aqueous solution
Lab8 – Acid/Bases and pH

Week4 (videos 20-25)

20. Balancing redox equations
21. Limiting reactant and yield
22. Intermolecular forces and water
23. Solutions-homogeneous and heterogeneous
24. mass percent, molarity
25. Dilutions

Lab9 – Redox Chemistry
Lab10 – Gas Law