

### Course Outline

**COURSE:** CHEM 30A      **DIVISION:** 10      **ALSO LISTED AS:**

**TERM EFFECTIVE:** Fall 2021      **CURRICULUM APPROVAL DATE** 12/14/2021

**SHORT TITLE:** ELEM CHEMISTRY L/L

**LONG TITLE:** Elementary Chemistry

| <u>Units</u> | <u>Number of Weeks</u> | <u>Type</u> | <u>Contact Hours/Week</u> | <u>Total Contact Hours</u> |
|--------------|------------------------|-------------|---------------------------|----------------------------|
| 4            | 18                     | Lecture:    | 3                         | 54                         |
|              |                        | Lab:        | 3                         | 54                         |
|              |                        | Other:      | 0                         | 0                          |
|              |                        | Total:      | 6                         | 108                        |

**COURSE DESCRIPTION:**

This is a first semester college chemistry course designed for majors preparing to take Chemistry 1A, nursing and allied health students, as well as general education. The course will cover the principles of chemistry including properties of matter, energy, atomic theory, the Periodic Table, stoichiometry, elements and compounds, the properties of bonding, molecular structure, chemical reactions, states of matter, acidity, solutions and gases, as well as an introduction to organic chemistry. (C-ID: CHEM 101) **PREREQUISITE:** Mathematics 430 or skills equivalent to those in an Elementary Algebra course.

**PREREQUISITES:**

- Completion of MATH 205, as UG, with a grade of C or better.
- OR
- (Completion of MATH 205A, as UG, with a grade of C or better.
- AND Completion of MATH 205B, as UG, with a grade of C or better.)
- OR
- Completion of MATH 206, as UG, with a grade of C or better.
- OR
- Completion of MATH 233A, as UG, with a grade of C or better.
- OR
- Completion of MATH 235, as UG, with a grade of C or better.
- OR
- Completion of MATH 430, as UG, with a grade of C or better.
- OR
- Completion of MATH 240, as UG, with a grade of C or better.
- OR
- Completion of MATH 242, as UG, with a grade of C or better.
- OR

Completion of MATH 5, as UG, with a grade of C or better.  
OR  
Completion of MATH 6, as UG, with a grade of C or better.  
OR  
Completion of MATH 8A, as UG, with a grade of C or better.  
OR  
Completion of MATH 12, as UG, with a grade of C or better.  
OR  
Completion of MATH 14, as UG, with a grade of C or better.  
OR  
Completion of MATH 1A, as UG, with a grade of C or better.  
OR  
Completion of MATH 1B, as UG, with a grade of C or better.  
OR  
Completion of MATH 1C, as UG, with a grade of C or better.  
OR  
Completion of MATH 2, as UG, with a grade of C or better.  
OR  
Score of 17 on Elementary Algebra  
OR  
Score of 15 on Intermediate Algebra  
OR  
Score of 2500 on Accuplacer Math  
OR  
Score of 2600 on MM CCCApply Math  
OR  
Score of 2600 on MM Placement Tool Math

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion  
03 - Lecture/Laboratory  
04 - Laboratory/Studio/Activity  
04B - Laboratory - LEH 0.75  
05 - Hybrid  
71 - Dist. Ed Internet Simultaneous  
72 - Dist. Ed Internet Delayed  
73 - Dist. Ed Internet Delayed LAB  
73B - Dist. Ed Internet LAB-LEH 0.75

**STUDENT LEARNING OUTCOMES:**

By the end of this course, a student should:

1. Analyze the fundamental features of chemistry including measurement, mathematical conversion of measured physical properties such as mass, volume, density, pressure, temperature, solutions, concentrations and dilutions.
2. Differentiate typical acid and base formulas and compare and contrast the behavior associated with acids and bases.
3. Describe the qualitative features of chemistry including physical and chemical properties, naming and writing chemical formulas of compounds, evaluating chemical reactions, and creating a Lewis structure and VSEPR shape to determine the polarity of a compound and its bonds.
4. Analyze chemical reactions to quantitatively determine theoretical yield.

**COURSE OBJECTIVES:**

By the end of this course, a student should:

1. Derive and apply the fundamental organization of the atom.
2. Develop strategies to approach, solve and comprehend problems that involve stoichiometry.
3. Identify the major classes of reactions, and predict their products.
4. Use the gas laws to quantitatively describe gaseous behavior.
5. Compare and contrast the concept of pH, and the quantitative aspects of acid-base strength.
6. Demonstrate proficiency in using scientific notation, significant figures, and measurement units.
7. Design strategies to approach and solve problems using dimensional analysis.
8. Describe the different classes and states of matter.
9. Distinguish between exothermic and endothermic reactions and relate to the heat flow in a chemical change.
10. Use the periodic table to gain information about the elements and predict their properties and reactivities.
11. Describe the formation and properties of ionic and molecular compounds.
12. Demonstrate knowledge of the formation and properties of solutions.
13. Evaluate the reactions and chemical properties of electrolytes, acids and bases.
14. Describe conceptually what the equilibrium state represents, and identify factors that affect equilibrium reactions.
15. Distinguish between chemical and nuclear reactions, and describe the various types of nuclear decay.
16. Compare and contrast simple organic molecules and functional groups.
17. Collect and analyze laboratory experimental data and solve related chemical problems.

**CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS**

Curriculum Approval Date 12/14/2021

**LECTURE CONTENT:**

3 Hours

Introduction to Chemistry

3 Hours

Measurement in Chemistry: accuracy and precision, scientific notation, dimensional analysis

4 Hours

Atomic Theory and the periodic table

6 Hours

Ionic compounds: naming, bonds, formulas, physical properties, simple acids

6 Hours

Covalent compounds: naming, bonds, octet rule, Lewis structures, VSEPR, polarity in bonds and compounds

6 Hours

Stoichiometry: balancing chemical reactions, Avogadro's number, molar mass calculations, theoretical yield

6 Hours

Solutions: concentration, % solutions, dilutions, colligative properties

6 Hours

Energy and equilibrium: thermochemistry, Hess' law, enthalpy, reaction rates, Le Chatelier's principle

6 Hours

Gases, liquids and solids: pressure, temperature, volume, ideal gas laws, heat of fusion and vaporization

6 Hours

Acids and Bases: names, reactions, pH, conjugate acids and bases, titrations, pH buffers

2 Hours

Final Exam

**LAB CONTENT:**

3 Hours

Locker Check-In and Safety

6 Hours

Measurement of Volume: graduated cylinders, pipettes, accuracy and precision

6 Hours

Measurement of Mass: using a balance, density of liquids and solids

6 Hours

Mole Ratios and Limiting Reactants

6 Hours

Soluble and Insoluble salts

6 Hours

Acid-Base Titration: standardizing HCl and NaOH solutions

6 Hours

Molar volume of a Gas: room temperature, STP, Dalton's Law

6 Hours

Chromatographic separation of Cations: chromatography

6 Hours

Charles Law

3 Hours

Lab Exam and Locker Check-Out

**METHODS OF INSTRUCTION:**

Instruction is by lecture, class discussion, lecture demonstration, small group problem solving, laboratory work projects, homework and exams.

**OUT OF CLASS ASSIGNMENTS**

Required Outside Hours: 78

Assignment Description:

Lecture homework and online equivalent assignments

Required Outside Hours: 30

Assignment Description:

Lab reports or online equivalent

**METHODS OF EVALUATION:**

Writing assignments

Percent of total grade: 25

Percent range of total grade: 20 % to 30 % Written Homework Lab Reports Other: Extra credit report on a chemistry topic.

Problem-solving assignments

Percent of total grade: 75

Percent range of total grade: 70 % to 80 % Homework Problems Lab Reports Quizzes Exams

**REPRESENTATIVE TEXTBOOKS:**

Fundamentals of General, Organic, and Biological Chemistry, 8th ed., McMurry, J., Ballantine, D.S., Hoeger, C.A., Peterson, V.E., Pearson/Prentice Hall Publishing, 2017.

ISBN: 9780134261393

12 Grade Verified by: D. Clark

D. Clark, G. Burce, E. Kilby. Gavilan College Chem 30A Laboratory Manual. Premium Source Publishing. Updated periodically. ISBN 9781634341417

**RECOMMENDED MATERIALS:**

Study Guide & Solution Manual, 8th ed., J. McMurry, D.S. Ballantine, C.A.Hoeger, V.E Peterson, Pearson/Prentice Hall Publishing, 2016.

ISBN: 9780321776167

12 Grade Verified by: D. Clark

## **ARTICULATION and CERTIFICATE INFORMATION**

Associate Degree:

GAV B1, effective 201370

GAV B3, effective 201370

CSU GE:

CSU B1, effective 201370

CSU B3, effective 201370

IGETC:

IGETC 5A, effective 201370

IGETC 5C, effective 201370

CSU TRANSFER:

Transferable CSU, effective 201370

UC TRANSFER:

Transferable UC, effective 201370

## **SUPPLEMENTAL DATA:**

Basic Skills: N

Classification: Y

Noncredit Category: Y

Cooperative Education:

Program Status: 1 Program Applicable

Special Class Status: N

CAN: CHEM6

CAN Sequence: CHEM SEQ B

CSU Crosswalk Course Department: CHEM

CSU Crosswalk Course Number: 101

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y

In-Service: N

Occupational Course: E

Maximum Hours:

Minimum Hours:

Course Control Number: CCC000288847

Sports/Physical Education Course: N

Taxonomy of Program: 190500