

**SAN DIEGO COMMUNITY COLLEGE DISTRICT
CITY, MESA, AND MIRAMAR COLLEGES
ASSOCIATE DEGREE COURSE OUTLINE**

SECTION I**SUBJECT AREA AND COURSE NUMBER:** Chemistry 152**COURSE TITLE:** Introduction to General Chemistry**Units: 3**
Letter Grade or Pass/No Pass Option**CATALOG COURSE DESCRIPTION:**

This is a one-semester preparatory course in chemistry consisting of an intensive study of some of the principles of inorganic and physical chemistry that are needed before taking Chemistry 200. Topics include but are not limited to atomic structure, chemical nomenclature, periodicity, chemical equations, stoichiometry, solutions, intermolecular forces, and gas laws. The course emphasizes problem solving and chemical calculations. It is intended for those students majoring in one of the natural sciences, engineering, or related curricula who do not meet the entrance requirements of Chemistry 200.

REQUISITES:**Prerequisite:**

MATH 096 with a grade of "C" or better, or equivalent or Assessment Skill Level M50

Corequisite:

CHEM 152L

Advisory:ENGL 049 with a grade of "C" or better, or equivalent or Assessment Skill Level W5
&
ENGL 048 with a grade of "C" or better, or equivalent or Assessment Skill Level R5**Limitation on Enrollment:**

This course is not open to students with previous credit for CHEM 151

FIELD TRIP REQUIREMENTS: May be required**TRANSFER APPLICABILITY:** Associate Degree Credit & transfer to CSU and/or private colleges and universities CSU General Education IGETC UC Transfer Course List CHEM 100, 100L and 152, 152L combined: maximum credit, 4 units. No credit for 100, 100L or 152, 152L if taken after CHEM 200.**TOTAL LECTURE HOURS:** 48 - 54**TOTAL LAB HOURS:****STUDENT LEARNING OBJECTIVES:**

Upon successful completion of the course the student will be able to:

1. Diagram and explain the scientific method.
2. Using dimensional analysis, solve problems related to measurement, metric conversions, density and

- calorimetry and express the answer to the correct number of significant figures and with correct units.
3. Explain key concepts and terminology related to the properties and classification of matter.
 4. Write formulas for ionic compounds, covalent compounds and acids from names and names of compounds from formulas.
 5. Describe the model of the atom including subatomic particles, isotopes and electron configurations.
 6. Describe the periodic table, including trends such as atomic radii, ionization energy, electronegativity and reactivity.
 7. Perform mole, stoichiometric and concentration calculations.
 8. Write balanced chemical equations from words and predict products of double replacement, single replacement, hydrocarbon combustion, and ionic equations.
 9. Compare and contrast covalent and ionic bonds and compounds.
 10. Draw Lewis structures of simple compounds and determine molecular structure.
 11. Explain concepts and solve problems related to gases.
 12. Describe chemical equilibrium including Le Chatelier's Principle.
 13. Explain concepts and solve problems related to acids and bases.
 14. Explain intermolecular forces.

SECTION II

1. COURSE OUTLINE AND SCOPE:

A. Outline Of Topics:

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

- I. Scientific Method
 - A. Definition of science
 - B. Description of method
- II. Measurement
 - A. Scientific Notation
 - B. SI Units
 - C. Accuracy v. Precision
 - D. Significant Figures
- III. Problem solving
 - A. Dimensional Analysis
 1. Metric
 2. Cubic
 3. Squares
 - B. Algebra
 - C. Examples
 1. Density
 2. Calorimetry
- IV. Properties of Matter
 - A. Physical v. Chemical
 - B. Changes
 - C. Laws of Conservation
 - D. States of matter
 - E. Classification
 1. Elements
 2. Compounds
 3. Mixtures
- V. Inorganic Chemical Nomenclature
 - A. Ionic
 - B. Molecular
 - C. Acids
- VI. Model of the Atom
 - A. Subatomic particles
 - B. Isotopes
 1. Concept

- 2. Calculations involving percent abundances
- C. Rutherford experiment
- D. Electromagnetic radiation
- E. Electron configuration
- F. Lewis Dot Structures
- VII. Periodic Table
 - A. Organization
 - B. Trends
 - 1. Atomic radii
 - 2. Ionization energy
 - 3. Electronegativity
- VIII. Mole Concept
 - A. Avogadro's Number
 - B. Molar mass
 - C. Conversions
 - 1. To and from mass
 - 2. To and from particles
- IX. Stoichiometry
 - A. Mass
 - B. Solutions
 - C. Gas
 - D. Limiting Reactants
- X. Solutions
 - A. Concentration
 - B. Preparation
 - C. Dilutions
 - D. Molarity of ions
- XI. Chemical Equations
 - A. Types
 - B. Balancing
 - C. Predicting products
 - 1. Combustion of hydrocarbons
 - 2. Single Replacement
 - 3. Double Replacement
 - D. Ionic Equations
- XII. Bonds
 - A. Ionic
 - B. Covalent
 - C. Polarity
- XIII. Molecular Structure
 - A. Lewis structures
 - B. Geometry through tetrahedral
- XIV. Gases
 - A. Pressure
 - B. Ideal v. real
 - C. Gas Laws
 - 1. Boyle's
 - 2. Charles'
 - 3. Avogadro
 - 4. Ideal
- XV. Introduction to Chemical Equilibrium
 - A. Equilibrium Constants
 - B. Le Chatelier's Principle
- XVI. Acids and Bases
 - A. Definitions
 - B. Strong v. Weak
 - C. pH Calculations
 - 1. Strong acids
 - 2. Strong bases
 - D. Buffers

1. Definition
 2. Function
 3. Reactivity
- XVII. Intermolecular Forces
- A. Dipole-dipole
 - B. Hydrogen Bonds
 - C. Dispersion forces

B. Reading Assignments:

Reading assignments are required and may include but, are not limited to, the following:

I. College level textbooks such as:

- A. Hein, Morris; Foundations of College Chemistry, Alternate 11th edition; Pacific Grove, CA.; Brooks/Cole; 2003
- B. Zumdahl, Steven; Introductory Chemistry, A Foundation, 5th edition; New York, New York; Houghton Mifflin; 2003
- C. Bishop, Mark; An Introduction to Chemistry; San Francisco, CA; Benjamin Cummings; 2002
- D. Tro, Nivaldo Jose; Introductory Chemistry, 2nd edition; Upper Saddle River, NJ; Prentice Hall; 2006

II. Instructor packets containing handouts and/or articles clarifying course objectives; for example, a handout describing the system of chemical nomenclature or stoichiometry.

C. Appropriate Assignments that Demonstrate Critical Thinking:

Critical thinking assignments are required and may include, but are not limited to, the following:

- I. Problem sets involving algebraic manipulation of variables and appropriate calculations; for example calorimetry or specific heat problems.
- II. Assignments requiring determination of quantitative relationships in chemical formulas, chemical equations, solutions, gases and acids and bases.
- III. Comparison of the physical properties of elements and their relationship to structure using the periodic table.
- IV. Comparison of the similarities and differences among elements, compounds and mixtures, as well as similarities among types of intermolecular forces and chemical bonds.

D. Appropriate Outside Assignments:

Outside assignments may include, but are not limited to, the following:

I. For the course, a minimum of two hours of outside preparation time for every one hour of class time will be needed per week to satisfactorily meet the objectives. Outside class assignments may include, but will not be limited to activities such as:

A. Problem solving exercises assigned from the textbook, study guide, and/or instructor packets; for example, exercises such as advanced multi-step unit conversions, stoichiometry problems involving a limiting reagent, gas law problems using the ideal gas equation, electromagnetic radiation problems, and various types of concentration problems.

B. Several short answer homework assignments in which students are asked to describe chemical phenomena; for example an exercise requiring students to describe how chemical trends relate to the periodic table.

E. Writing Assignments:

Writing assignments are required and may include, but are not limited to, the following:

I. Completion of short answer homework assignments covering each topic in the course. For example, an assignment in which a student writes balanced chemical equations from sentences and indicates whether or not the reaction will occur spontaneously.

2. METHODS OF EVALUATION:

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

I. Multiple measures of performance reflecting the level of the objectives set forth above. A final grade of "C" or better should indicate the student has the ability successfully to apply the principles and techniques taught in this course in subsequent courses and can, therefore, perform satisfactorily. The assessments will also measure critical thinking skills. These methods may include, but are not limited to the following:

II. 1. Successful and accurate completion of homework problems covering each unit.

III. 2. Objective unit examinations that reflect the material covered in that unit. The examinations will ask both quantitative and qualitative questions.

IV. 3. A comprehensive final examination.

3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

- * Lecture
- * Distance Education
- * Other (Specify)
- * 1. Instructor Lecture
- * 2. Guest lectures
- * 3. Videotapes
- * 4. Collaborative learning
- * 5. Use of the Internet

4. REQUIRED TEXTS AND SUPPLIES:

Textbooks may include, but are not limited to:

TEXTBOOKS:

1. Bishop, Mark. An Introduction to Chemistry, Benjamin Cummings, 2002, ISBN: 0131495135
2. Morris Hein and Susan Arena. Foundations of College Chemistry, 11th Alternate ed. Brooks/Cole, 2003, ISBN: 0471933013
3. Steven Zumdahl. Introductory Chemistry, A Foundation, 5th ed. Houghton Mifflin, 2003, ISBN: 0618304991
4. Tro, Nivaldo Jose. Introductory Chemistry, 2nd ed. Prentice Hall, 2006, ISBN: 0131495135

MANUALS:

PERIODICALS:

SOFTWARE:

SUPPLIES:

1. Study guides or solution manuals to accompany textbooks
2. Supplementary packets prepared by instructors.
3. Scientific calculator.
4. Brain

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