

**PALOMAR COLLEGE**  
**COURSE OUTLINE OF RECORD FOR**  
**DEGREE CREDIT COURSE**

Transfer course    A.A. degree applicable course  
(check all that apply)

**COURSE NUMBER AND TITLE:** CHEM 100 – Fundamentals of Chemistry

**UNIT VALUE:** 4

**MINIMUM NUMBER OF SEMESTER HOURS:** 96

**BASIC SKILLS REQUIREMENTS:** Appropriate language and computational skills.

**ENTRANCE REQUIREMENTS**

**PREREQUISITE:** One year of high school algebra

**COREQUISITE:** None

**RECOMMENDED PREPARATION:** None

**SCOPE OF COURSE:**

Introductory study of the principles and laboratory techniques of general chemistry. Laboratory must be taken concurrently with lecture.

**SPECIFIC COURSE OBJECTIVES:**

Critical thinking will be required of students in such assignments and activities as written and oral analysis and evaluation of text readings and problem solving, both in lecture and laboratory. In particular, upon successful completion of this course, the student will be able to:

1. Identify and acquire a background in the major concepts of basic chemistry at a level suitable for more advanced college level chemistry (CHEM110 and 110L) as well as satisfy general education science requirements. This would include:
  - a. Development of the use and understanding of significant figures and units in calculations.
  - b. To be able to write symbols of elements and know their respective names.
  - c. To have an understanding of the order of the periodic chart and its use.
  - d. To know the names and uses of basic laboratory glassware and equipment.
2. Use basic mathematics central to chemistry at this level as well as its application to problem-solving skills. This would include:
  - e. To have the basic algebraic skills to solve for an unknown in an equation.
  - f. To be able to manipulate exponents or powers.
3. Demonstrate the use of basic laboratory devices, instruments, and problem-solving techniques involved at this level of investigation.

**CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:**

1. Measurement, Units & Unit Conversion
  - a. Significant figures
  - b. SI Units and metric systems

- c. Conversions
  - d. Density
2. Classification of Matter
  - a. Elements, compounds and mixtures
  - b. Metals, nonmetals, metalloids
  - c. Chemical formulas
3. Properties of Matter
  - a. Physical properties and changes
  - b. Chemical properties and changes
  - c. Heat and energy
4. Atomic Structure
  - a. Dalton's Atomic Theory
  - b. Subatomic particles
  - c. Electron energy levels and sublevels
  - d. Electron configurations
  - e. Orbital diagrams
5. Periodic Table
  - a. Groups and periods
  - b. Families
  - c. Electron configurations using the Periodic Table
  - d. Periodic properties
6. Bonding
  - a. Lewis Dot Structures
  - b. Ionic bonding
  - c. Covalent bonding
7. Nomenclature
  - a. Oxidation numbers
  - b. Polyatomic ions
  - c. Metal-nonmetal
  - d. Nonmetal-nonmetal
  - e. Acids
8. Chemical Formula Calculations
  - a. Mole concept
  - b. Molar mass
  - c. Percent composition
  - d. Empirical formulas
  - e. Molecular formula
9. Types of Chemical Reactions
  - a. Oxidation-reduction
  - b. Combination
  - c. Decomposition
  - d. Single Replacement
  - e. Double Replacement
10. Chemical Equation Calculation: Stoichiometry
  - a. Writing & balancing chemical equations
  - b. Mole concept
  - c. Mole-mole calculations
  - d. Mole-mass & mass-mole calculations
  - e. Mass-mass calculations
  - f. Limiting reactant

11. Thermochemistry
  - a. Heat Capacity and Calorimeters
  - b. Thermochemical Equations
  - c. Heat of Formation
12. Gas Laws
  - a. Kinetic-Molecular Theory
  - b. Dalton's Law
  - c. Boyle's Law
  - d. Charle's Law
  - e. Gay-Lussac's Law
  - f. Combined gas Law
  - g. Ideal gas Law
  - h. Avogadro's Law
13. Liquids and Solids
  - a. Intermolecular forces
  - b. Water
  - c. Phase diagram
14. Solutions
  - a. Saturated, unsaturated and supersaturated solutions
  - b. Solubility
  - c. Concentration units and calculations
  - d. Colligative properties
15. Acids, Bases, and Salts
  - a. Arrhenius, Bronsted-Lowry, and Lewis Definitions
  - b. Properties of
  - c. Titrations
  - d. pH concept

#### LABORATORY:

1. Observations
2. Measurements
3. Density
4. Basic Laboratory Techniques
5. Separation Techniques
6. Substances and their Changes
7. Nomenclature
8. Periodic Trends
9. Empirical Formula
10. Double Displacement Reactions
11. Quantitative Precipitation
12. Volume-Pressure Relationship of a Gas
13. Molecular Mass of a Gas
14. Boiling Points and Melting Points

#### REQUIRED READING:

##### LECTURE:

Hein, Morris and Susan Arena. Foundations of College Chemistry. 10<sup>th</sup> edition. Pacific Grove: Brooks/Cole Publishing Company, 2000.

##### LABORATORY:

Wynn, Charles M. and Gary A. Joppich. Laboratory Experiments for Fundamentals of Chemistry. Custom edition. Belmont: Thomson Learning, 2000.

**SUGGESTED READING:** None

**REQUIRED WRITING:**

Problem-solving skills are utilized by tests and homework assignments of chapter problems or handouts, depending on lecturer. Problems are selected to develop skills of analytical and deductive reasoning. A minimum of five pages of writing.

**OUTSIDE ASSIGNMENTS:**

**Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short-term classes.**

Assignments to include careful reading of text, study of lecture and lab notes, and working of problem skills. Practice in problem solving essential is to development of skills and passing exams.

**INSTRUCTIONAL METHODOLOGY:**

**Check all that apply:**

- lecture
- laboratory
- lecture-laboratory combination
- directed study

**This course may be offered as a distance learning course and meets Title 5 regulations 55370, 55372, 55374, 55376, 55378, and 55380.**

Yes  No

**If yes, check all that apply.**

- Television Course (Video one-way, e.g. ITV, video cassette, etc.)
- Online Course (Text one-way, e.g. newspaper, correspondence, electronic file, etc.)
- Two-Way Video Conferencing (Two-way interactive video and audio)
- One-Way Video Conferencing (One-way interactive video and two-way interactive audio)
- Computer Assisted Instruction (A specialized form of mediated instruction relying primarily on student access to information and prepared lessons or teaching materials through a computer terminal, but not under immediate supervision of a qualified instructor.)

**GRADING POLICY AND STANDARDS** (include methods of determining whether the stated objectives have been met by students):

Course grade composed of:

Lecture exams, quizzes, and final	= 75%
Lab	= 25%

The components of the laboratory grade are:

Lab quizzes, tests, and final exam	50% +/- 10%
Lab reports (or equivalencies)	30% +/- 10%
Unknowns	20% +/- 10%

Note:

Participation in individual data gathering leading to a completed lab report is required.

Non-completion of 4 experiments results in a course grade of F.

Non-completion of 3 experiments results in a D in the laboratory portion of the grade.

**IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?**

Yes \_\_\_ No X

Number of times course may be taken for credit: 1.

If yes, identify specific provision of Title 5 Division 2 section(s), 55761-55763 and 58161 which qualifies course as repeatable:

**CONTACT PERSON:** Ronald Phillips

**SIGNATURES:**

SIGNATURES ON FILE
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