LANEY COLLEGE COURSE OUTLINE

COLLEGE:	LANEY COLLEGE	**STATE APPROVAL DATE:**	09/19/2007
ORIGINATOR:	Pinar Alscher	**STATE CONTROL NUMBER:**	CCC00037 2507
		BOARD OF TRUSTEES APPROVAL DATE:	
		CURRICULUM COMMITTEE APPROVAL DATE:	03/17/2017
		CURRENT EFFECTIVE DATE:	06/19/2017

DIVISION/DEPARTMENT: Laney - Mathematics and Sciences / L - Chemistry

1. REQUESTED CREDIT CLASSIFICATION:

D - Credit - Degree Applicable
N - Not Basic Skills
1 - Program Applicable

2. DEPT/COURSE NO:

CHEM 030A

3. COURSE TITLE:

Introductory General Chemistry

4. COURSE: Laney Course Updating

TOP NO. 190500 - Chemistry, General

5. UNITS: 4.000

HRS/WK LEC: 3.00 **Total:** 52.50
HRS/WK LAB: 3.00 **Total:** 52.50

6. NO. OF TIMES OFFERED AS SELETED TOPIC: **AVERAGE ENROLLMENT:**

7. JUSTIFICATION FOR COURSE:

Satisfies Associate Degree General Education requirement for Natural Science Satisfies requirement for Associate in Science Degree Acceptable for credit: CSU Prerequisite for Nursing Schools

8. COURSE/CATALOG DESCRIPTION

Fundamental principles of general chemistry: Metric measurements, matter and energy, atomic structure, chemical nomenclature, chemical bonding, chemical reactions, stoichiometry, gas laws, nuclear chemistry, properties of liquids, solids, solutions, acids and bases.

9. OTHER CATALOG INFORMATION

a. Modular: No If yes, how many modules:
b. Open entry/open exit: No
c. Grading Policy: Letter Grade Only
d. Eligible for credit by Exam: No
e. Repeatable according to state guidelines: No
f. Required for degree/certificate (specify):
Science, California State University General Education (CSU GE Breadth), Intersegmental General Education Transfer Curriculum (IGETC), Associate In Arts Degree In Kinesiology For Transfer
g. Meets GE/Transfer requirements (specify):
Acceptable for credit: CSU, UC
h. C-ID Number: CHEM 101 Expiration Date:

i. Are there prerequisites/corequisites/recommended preparation for this course? Yes
j. Acceptable for Credit: CSU/UC

10. LIST STUDENT PERFORMANCE OBJECTIVES (EXIT SKILLS): (Objectives must define the exit skills required of students and include criteria identified in Items 12, 14, and 15 - critical thinking, essay writing, problem solving, written/verbal communications, computational skills, working with others, workplace needs, SCANS competencies, all aspects of the industry, etc.)(See SCANS/All Aspects of Industry Worksheet.)

Students will be able to:

1. Solve numerical problems involving the topics listed in the course content: unit conversions, density, heat, stoichiometry, gas laws, solution concentrations, pH, and titrations.
2. Calculate numerical answers and round the results to the appropriate number of significant figures.
3. Discuss the differences between the states and types of matter.
4. Discuss and diagram the structure of the atom and electron configurations.
5. Apply rules of nomenclature to name different types of compounds and write formulas.
6. Predict the products and write equations for double-displacement reactions.
7. Balance and classify chemical equations.
8. Determine electron-dot structures and overall geometry of small molecules.
9. Explain the origin of the properties of gases at the molecular level.
10. Discuss types of intermolecular forces present in various substances, and evaluate the relative strengths of those forces.
11. Compare and contrast the properties of acids and bases.
12. Work safely and efficiently in the laboratory. Accurately measure quantities in the laboratory.
13. Analyze the results of laboratory experiments.
14. Realize the value of studying every day, accept the responsibility for the learning process, and expressed that understanding in discussions
15. Write clear, well organized lab reports; critically analyze and evaluate the results of lab experiments.

11A. COURSE CONTENT: List major topics to be covered. This section must be more than listing chapter headings from a textbook. Outline the course content, including essential topics, major subdivisions, and supporting details. It should include enough information so that a faculty member from any institution will have a clear understanding of the material taught in the course and the approximate length of time devoted to each. There should be congruence among the catalog description, lecture and/or lab content, student performance objectives, and the student learning outcomes. List percent of time spent on each topic; ensure percentages total 100%.

LECTURE CONTENT:

1. Measurements 10%
    a. Scientific notation
    b. Significant figures
    c. Unit conversions
    d. Density
2. Atoms and Elements 8%
    a. Elements
    b. Introduction to the periodic table
    c. Isotopes and their symbols
    d. Orbitals and electron configurations
3. Compounds and Their Bonds 14%
    a. Valence electron s and the octet rule
    b. Naming and writing ionic formulas
    c. Covalent bonds
    d. Lewis structures
    e. Naming and writing formulas of covalent compounds
    f. Molecular geometry and polarity
4. Energy and States of Matter 10%
    a. Specific heat
    b. Energy and nutrition
    c. States of matter
    d. Intermolecular attractive forces
    e. Phase changes
    f. Heating and cooling curves
5. Chemical Reactions 10%
    a. Writing and balancing chemical equations
    b. Classifying types of reactions
    c. Oxidation-reduction reactions
    d. Reaction energy
    e. (Optional: rate of reaction and chemical equilibrium)
6. Chemical Quantities 10%
    a. The mole and molar mass
    b. Conversions between grams, moles, and number of molecules

c. Percent composition and empirical formulas
d. Stoichiometry problems
e. Percent yield

7. Gases 10%
   a. Kinetic-molecular theory
   b. Pressure
   c. Boyle's, Charles', Gay-Lussac's, and the Combined Gas Law
   d. The ideal gas law
   e. Partial pressures
8. Solutions 10%
   a. Properties of water
   b. Predicting relative solubility of various compounds
   c. Equivalents of electrolytes
   d. Concentration units: Molarity and percent composition
   e. Dilutions
   f. Osmosis
9. Acids and Bases 10%
   a. Properties
   b. Conjugate acid-base pairs
   c. Relative strengths
   d. pH
   e. Acid-base reactions and titration problems
   f. Buffers
10. Nuclear Radiation 8%
    a. Natural radioactivity
    b. Nuclear equations
    c. Detection and Measurement of radiation
    d. Half-life
    e. Nuclear fission and fusion

11B. LAB CONTENT:

Laboratory experiments that support the above topics, including quantitative and qualitative experiments and analysis of data

Laboratory topics include:

1. Metric measurements and density 6%
2. Physical properties 6%
3. Paper chromatography 5%
4. Separation of mixtures 6%
5. Molecular modeling 6%
6. Specific heat 6%
7. Chemical and physical changes 6%
8. Determination of empirical formulas 6%
9. Stoichiometry 5%
10. Double replacement and single replacement reactions 6%
11. Gas laws 6%
12. Line emission, flame tests 6%
13. Periodic properties 6%
14. Solubility and structure 6%
15. Concentration of solutions 6%
16. pH of solutions 6%
17. Titration 6%

12. METHODS OF INSTRUCTION (List methods used to present course content.)

1. Lecture
2. Lab
3. Other (Specify)
4. Distance Education
5. Discussion
6. Experiments
7. Individualized Instruction

8. Multimedia Content
9. Threaded Discussions

13. ASSIGNMENTS: 6.00 hours/week (List all assignments, including library assignments. Requires two (2) hours of independent work outside of class for each unit/weekly lecture hour. Outside assignments are not required for lab-only courses, although they can be given.)

Out-of-class Assignments:
1. Homework assignments from the textbook involving calculations and explanations 2. Laboratory reports including calculations, observations, and conclusions 3. Quizzes and exams that require students to show their problem solving methods 4. Comprehensive final exam

ASSIGNMENTS ARE: (See definition of college level):
Primarily College Level

14. STUDENT ASSESSMENT: (Grades are based on):
COMPUTATION SKILLS
NON-COMPUTATIONAL PROBLEM SOLVING (Critical thinking should be demonstrated by solving unfamiliar problems via various strategies.)
SKILL DEMONSTRATION
ESSAY (Includes "blue book" exams and any written assignment of sufficient length and complexity to require students to select and organize ideas, to explain and support the ideas, and to demonstrate critical thinking skills.)
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OTHER (Describe):
short answer quizzes, lab practicals for skills demonstration

15. TEXTS, READINGS, AND MATERIALS

A. Textbooks:

Alscher, Fossum, et al. 2017. *Chemistry 50/30A Laboratory Manual* 9th. Laney
Rationale: -

McMurry,Castellion, Ballantine, Hoeger & Peterson . 2014. *Fundamentals of General, Organic & Biological Chemistry* 7th. Pearson

Stoker, H. Stephen. 2015. *General, Organic, and Biological Chemistry* 7th Edition. centage

*Date is required: Transfer institutions require current publication date(s) within 5 years of outline addition/update.

B. Additional Resources:

Library/LRC Materials and Services:

The instructor, in consultation with a librarian, has reviewed the materials and services of the College Library/LRC in the subject areas related to the proposed new course

Are print materials adequate? Yes

Are nonprint materials adequate? Yes

Are electronic/online resources available? Yes

Are services adequate? Yes

Specific materials and/or services needed have been identified and discussed. Librarian comments: Library requests list of recommended supplementary titles (non-textbook) to support this course. if possible, a subscription to Journal of Chemical Education and/or Chem Matters

C. Readings listed in A and B above are: (See definition of college level):

Primarily college level

16. DESIGNATE OCCUPATIONAL CODE:
E - Non-Occupational

17. LEVEL BELOW TRANSFER:
Y - Not applicable

18. CALIFORNIA CLASSIFICATION CODE:
Y - Credit Course

19. NON CREDIT COURSE CATEGORY:
Y - Not Applicable, Credit course

20. FUNDING AGENCY CATEGORY:
Y - Not Applicable (funding not used to develop course)

SUPPLEMENTAL PAGE

Use only if additional space is needed. (Type the item number which is to be continued, followed by "continued." Show the page number in the blank at the bottom of the page. If the item being continued is on page 2 of the outline, the first supplemental page will be "2a." If additional supplemental pages are required for page 2, they are to be numbered as 2b, 2c, etc.)

1a. Prerequisites/Corequisites/Recommended Preparation:

- **PREREQUISITE:**
  MATH 201: Elementary Algebra
  or
- **PREREQUISITE:**
  MATH 208: Mathematics for Laboratory Sciences
  or
- **PREREQUISITE:**
  MATH 210D: Elementary Algebra (Lab)

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STUDENT LEARNING OUTCOMES

1. **Outcome:** Use dimensional analysis to solve quantitative problems and evaluate the results of calculations to make sure they are physically reasonable.
   Assessment: Analysis of selected test questions involving quantitative problem solving.

2. **Outcome:** Clearly explain qualitative chemical concepts and trends at the molecular level.
   Assessment: Analysis of selected test questions involving explaining chemical concepts and/or trends.

3. **Outcome:** Perform laboratory techniques correctly using appropriate safety procedures.
   Assessment: Observations of student performance in laboratory sessions.

4. **Outcome:** Calculate experimental values from laboratory data and interpret the results.
   Assessment: Analysis of student laboratory reports.