IMPERIAL COMMUNITY COLLEGE DISTRICT
IMPERIAL VALLEY COLLEGE

COURSE OUTLINE

DIVISION: Science, Mathematics, and Engineering **DATE**: October 12, 2005

COURSE TITLE: General Inorganic Chemistry I **COURSE NO.**: CHEM 200 **UNITS**: 5

LEC HRS: 3 . **LAB HRS**: 6 . **HRS. TBA**: 0 .

If cross-referenced, please complete the following:

COURSE NO.(s): _____ **COURSE TITLE**: _____.

I. COURSE/CATALOG DESCRIPTION:

Basic principles and calculations of chemistry with emphasis on stoichiometry and dimensional analysis applied to various problem types. Fundamental principles and theory of atomic and molecular structure as related to bonding and molecular geometry. Study of kinetic molecular theory, the first law of thermodynamics, periodic relationships of the elements, physical states of matter, solution chemistry, and oxidation-reduction. The laboratory is closely related to lecture topics and includes methods of classical experimentation as well as certain types of instrumental analysis.

II. A. PREREQUISITES, IF ANY:

CHEM 100 with a grade of "C" or better.

B. CO-REQUISITES, IF ANY:

None.

C. RECOMMENDED PREPARATION, IF ANY:

MATH 090 with a grade of "C" or better.

III. GRADING CRITERIA:

X . Course must be taken on a "letter-grade" basis only.

_____. Course may be taken on a "credit" basis or for a letter grade.

_____. Course must be taken on a "credit" basis only.

IV. MEASURABLE COURSE OBJECTIVES AND MINIMUM STANDARDS FOR GRADE OF "C":

1. Student will demonstrate ability to perform dimensional analysis calculations as they relate to problems involving percent composition and density.

2. Student will write chemical formulas, name inorganic compounds, and demonstrate a knowledge of basic atomic theory

3. Student will relate chemical equations and stoichiometry as they apply to the mole concept, molarity, and acid-base titrations. Student will derive formulas from percent composition.

4. Student will identify the basic types of chemical reactions including precipitation, neutralization, and oxidation-reduction.

5. Student will demonstrate knowledge of atomic structure and quantum mechanics and apply these concepts to the study of periodic properties of the elements.

6. Student will relate the general concepts of atomic structure to a study of ionic bonding.

7. Student will relate the general concepts of covalent bonding and molecular structure.

8. Student will demonstrate the first law of thermodynamics both in theoretical and practical contexts and apply the theory to the solution of Hess' Law.

9. Student will manipulate the various gas laws in both theory and practice to solve mathematical problems relating to the behavior of both ideal and non-ideal gases.

10. Student will describe the general properties of liquids and solids including intermolecular attractions and phase changes.

11. Student will relate the general properties of solutions and employ knowledge of concentration to explain colligative properties. Student will investigate the phenomenon of vapor pressure.

12. Student will demonstrate knowledge of computer-assisted methods of data acquisition, analysis, and presentation.

V. CORE CONTENT TO BE COVERED IN ALL SECTIONS:

	CORE CONTENT	APPROX % OF COURSE
1.	Dimensional analysis. 1. Significant Figures 2. Exponential Notation 3. Unit conversion 4. Density and percent composition	6%
2.	Basic Atomic Structure 1. Dalton's Laws 2. Subatomic particles 3. Isotopes and atomic mass 4. Inorganic nomenclature 5. Compounds and mixtures	9%
3.	Formulas, equations and the mole concept. 1. Balancing chemical equations 2. Avogadro's number and the mole 3. Stoichiometry calculations 4. Limiting Reactants and Yield Calculations 5. Percent composition and empirical formulas 6. Solution stoichiometry 7. Titration	9%
4.	Types of Chemical Reactions 1. Electrolytes and Net Ionic Equations 2. Solubility and Precipitation reactions 3. Neutralization 4. Oxidation-Reduction 5. Activity Series	7%
5.	Atomic Structure, Quantum Mechanics, and Periodicity 1. Electromagnetic Radiation and Atomic Spectra 2. Wave-Particle duality: Plank and de Broglie equations 3. Quantum Numbers 4. Orbital shapes and electron configuration 5. Electron spin 6. Atomic and ionic radii	9%
6.	Ionic Bonding 1. Ionization energy and electron affinity 2. Nature of the ionic bond 3. Octet Rule	3%
7.	Covalent Bonding and Molecular Structure 1. Nature of the covalent bond 2. Electronegativity and polar covalent bonds 3. Bond dissociation energies 4. Dot structures 5. Resonance and formal charge 6. Molecular Geometry: VSEPR and Valence Bond Theories 7. Orbital hybridization 8. Molecular Orbital Theory	10%

8.	Thermochemistry 1. Heat and Energy 2. First Law of Thermodynamics 3. Energy and Enthalpy 4. State functions and the thermodynamic standard state 5. Calorimetry and heat capacity 6. Hess's Law 7. Bond dissociation energies	8%
9.	Gases calculations 1. Laws of Boyle, Charles, Gay-Lussac, Avogadro, Graham and Dalton 2. Ideal Gas Equation 3. Gas stoichiometry 4. Kinetic Molecular Theory 5. Real Gases	8%
11.	Solution Properties 1. Units of concentration: molarity, molality, percent concentration, normality 2. Solubility 3. Colligative properties 4. Vapor Pressure and the Claperyon equation	8%
12.	Acid-Base equilibria 1. Arrhenius-Bronsted-Lewis concepts 2. pH 3. Strong acid-strong base vs. weak acid-weak base Common Ion 4. Buffer solutions 5. Titrations	12%
13.	Precipitation Reactions 1. Net ionic reactions 2. Solubilities of ionic compounds 3. Solubility equilibria 4. Precipitation reactions 5. Formation of complex ions	11%

VI. METHOD OF EVALUATION TO DETERMINE IF OBJECTIVES HAVE BEEN MET BY STUDENTS: (Check all that apply.)

Essay	X .	Class Activity	X .	Written Assignments	X .
Problem Solving Exercise	X .	Final Exam	X .	Oral Assignments	__ .
Skill Demonstration	X .	Objective	X .	Quizzes	X .
Other	_____ .				

INSTRUCTIONAL METHODOLOGY: (Check all that apply.)

Lecture	X .	Discussion	X .	Demonstration	X .
Audio Visual	X .	Group Activity	X .	Lab Activity	X .
Computer Assisted Instruction	X .	Individual Assistance	X .	Simulation/ Case Study	_____ .

Two (2) hours of independent work done out of class per each hour of lecture or class work, or 3 hours lab, practicum, or the equivalent per unit.

VII. TEXTBOOK(S) AND SUPPLEMENT(S):

Kotz, John C., Treichel, Paul M. ***Chemistry and Chemical Reactivity*. 5th edition.** Brooks & Cole Publishing, 2003

McMurray, John and Robert C. Fay. Chemistry. 2nd ed. Upper Saddle River, NJ: Prentice-Hall. 1998

Wentworth, R.A.D. Experiments in General Chemistry. 5th ed. Boston: Houghton Mifflin Co. 1999.

Gammon, Steven D. et al. Interactive Chemistry Journey. Upper Saddle River, NJ: Prentice-Hall. 1998

Hein, Morris and Susan Arena. Foundations of College Chemistry. 10th ed. Pacific Grove, CA: Brooks/Cole Publishing Co. 1999.

Ebbing, Darell D. and Steven D. Gammon. General Chemistry. 6th ed. Boston: Houghton Mifflin Co. 1999.

Brown, William H. and Christopher S. Foote. Organic Chemistry. 2nd ed. Fort Worth, TX: Saunders College Publishing. 1998.

Stanitski, Conrad, ed. Chemistry in Context: Applying Chemistry to Society. 3rd ed. New York: McGraw Hill. 2000.

Balling, Robert C. The Heated Debate. San Francisco: Pacific Research Institute for Public Policy. 1992.

Baggot,Jim. The Meaning of Quantum Theory: A Guide to Students of Chemistry and Physics. Oxford, England: Oxford University Press. 1992.

Gribbin, John. In Search of Shrodinger's Cat: Quantum Physics and Reality. New York: Bantam Doubleday Dell Publishers. 1985.