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CHEMICAL PRINCIPLES 1 50:160:115

Rationale:

Chemistry is the *molecular* science. Chemists believe that the best understanding of the properties of matter comes from study at the molecular level.

For example, boiling points, acidity, chemical reactivity, taste, smell, drug efficacy, colour, toxicity, etc., can all be understood/predicted/explained by a consideration of the relevant atoms/ions and the bonds connecting them.

This course provides the basic principles that govern the structure (and therefore the behaviour and reactivity) of atoms, ions and molecules.

(Recommended) Textbook:

Chemistry: The Molecular Nature of Matter, 7th Edn, Jespersen and Hyslop.

Or

Chemistry, 10th Edn Chang and Goldsby.

The following textbooks are also good, and acceptable:

General Chemistry, 4th Edn by McQuarrie, Rock and Gallogly
Chemistry, the Central Science, 10th Edn, Brown, LeMay and Bursten.
Chemical Principles, Atkins and Jones.

Openstax.org offer two great **FREE** Chemistry textbooks, at
https://openstax.org/subjects/science

More detailed information, including Chapter Notes can be found at:
http://roche.camden.rutgers.edu/cp1/

Exams will be only be on material actually in my notes, or covered in class.

Grading
3 exams 3x50pts = 150
1 final (cumulative) = 150
Total /300.

There is no extra credit.

Grade Scheme

90% +	=	A
85%	=	B+
80%	=	B
75%	=	C+
70%	=	C
60%	=	D
-60%	=	F

The following concepts are taught in Chemical Principles 1 lecture:

- Matter & Measurement
- Chemical Reactions & Stoichiometry
- Solution Chemistry
- The Gas Laws
- Thermochemistry
- Quantum theory and Electronic Structural Models
- Periodicity
- Bonding Theories
- Molecular Geometries

Course Objectives:

Upon successful completion a student will be proficient at:

-Explanations at the atomic/molecular level,
-Qualitative explanations (illustrations / examples / words),
-Quantitative explanations using math,
-Simple algebraic calculations.

More precisely, the student will be able to:

- Identify the subatomic particles in an atom that differentiate one isotope of an element from another and one type of element from another;
- Predict formulas of molecules and ions, and name common chemical compounds.
- Use dimensional analysis, the metric system and the mole concept to calculate empirical and molecular formulas given basic information for chemical reactions, and further apply these concepts to more complicated limiting reagents and yields.
- Predict qualitative outcomes of chemical equations in solution (e.g. acid/base and redox reactions, etc.), using known patterns (solubility rules), and complete quantitative calculations (molarity).
- Quantitatively manipulate the gas laws, and qualitatively predict gas behavior based upon the tenets of the kinetic molecular theory of gases, including deviations from ideality.
- Understand the nature of energy and energy changes in reactions, and calculate calorimetry, and standard enthalpy changes.
- Identify the electronic structure of atoms and ions (e.g. quantum numbers, orbitals, oxidation states, etc.) as well as the periodic relationships among the elements and associated physical properties (e.g. ionization energy, atomic radius, etc.).
- Differentiate between the basic concepts of chemical bonding (ionic and covalent bonding, bond enthalpy, etc.), and use the accepted bonding theories (of Lewis structures, Valence Bond Theory, VSEPR, etc.) to predict the relationships between chemical structure and physical properties (dipole moment, etc.).

Academic Integrity Policy: Students are required to abide by the Rutgers Academic Integrity Policy detailed at: http://academicintegrity.rutgers.edu/

***Tentative* Timetable of a *Typical* Semester**

Ch1	Week 1
Ch2	Week 2
Ch3	Week 3
EXAM 1	Week 5
Ch4	Week 5
Ch5	Week 6
Ch6	Week 7
EXAM2	Week 9
Ch7	Week 10
Ch8	Week 11
Ch9	Week 12
Ch10	Week 13
EXAM3	Week 14

FINAL EXAM