



KASKASKIA COLLEGE
CHEM 101
SUMMER 2012 COURSE SYLLABUS

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Text: The World of Chemistry
Essentials
Authors: Joesten, Castellion & Hogg
(4th Edition)

Grading Policy:

Exams	700
Quiz	200
Discussions	100

Total	1000
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(EXAM I 200 points
EXAM II 150
EXAM III 150
FINAL 200)

Letter Grades will be given at the end of the semester:

900-1000	A
800-899	B
700-799	C
600-699	D
<600	F

Exams: There are 4 exams in this course. Each student must actively participate in the discussions in order to get discussion credits. The Final Exam is comprehensive.

Quizzes: Should be assigned every week.

Objectives of the course: OBJECTIVES OF THE COURSE

1. Appreciate the order in the universe demonstrated by the regularities in properties and structures.
2. Appreciate the scientific models and theories used to explain the behavior of matter.
3. Appreciate that every substance and system, living or inanimate, is chemical.
4. Question scientific models, which are tentative and depend on evidence.
5. Be curious about chemical structures and processes.
6. Appreciate the organizational pattern of the periodic table of elements.
7. Appreciate the usefulness of the molecular model of matter.
8. Be curious about the interpretation of making and breaking of chemical bonds given by the atomic theory.
9. Grasp that chemical equations are not only the shorthand of chemistry but convey other kinds of information about chemical processes.
10. Appreciate that accurate and precise measurement is basic to chemistry.
11. Appreciate that synthesis is at the heart of chemistry, in nature, in the research laboratory, and in industry.
12. Resolve to carefully analyze data by distinguishing between opinions, interpretations, and solid evidence.
13. Appreciate that the reserves of substances abundant in our planet Earth, such as water, air, oil, are not unlimited.
14. Appreciate the interplay between scientific research and industrial development.
15. Resolve to be knowledgeable about scientific processes in order to have informed opinions on matters affecting society.
16. Resolve to use Planet Earth's limited resources wisely.
17. Appreciate the ways in which chemistry and technology affect our daily lives.
18. Develop the ability to accept new evidences, and not to adopt the attitude: "Don't confuse me with the fact, I have my theories".
19. To appreciate that a given substance has the same structure whether it occurs naturally or is made synthetically.
20. Appreciate that natural, industrial, and environmental processes are controlled by an identifiable set of factors.
21. Use the Term "chemical" intelligently.
22. Be curious about the presence of acid-base and oxidation reduction reactions in everyday life.
23. Understand that societal impact of the chemical concepts studied.

Course descriptions:

Chapter 1: Why chemistry is important in our life? DNA and biotechnology, Fossil Fuel and Global Warming.

Chapter 2: What is Chemistry? How chemistry is important in the modern world? Scientific methods. What is Matter? What are elements and compounds? Differences between physical and chemical properties and changes. Units of measurements. Mass, weight, and volume. And temperature. Significant figures. Accuracy and Precision.

Chapter 3: The Atomic theory. The structure of atom. Atomic number, mass number, and isotopes. The periodic table. Molecules and ions. Molecular formulas and naming. Ionic and covalent or molecular compounds. Polyatomic anions. Bohr's theory of H atom. Quantum mechanics and Quantum numbers, Atomic Orbitals and Electronic Configurations.

Getting familiar with the periodic table and periodic trend or variation of periodic properties (atomic radii or size and ionization energy), classification of elements. quantum numbers, electronic configuration, Pauli-exclusion principles, Aufbau principles, Hund's rule of multiplicity, the octet rule. Valence electrons, electron dot structures, resonance structures.

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**Chapter 4:** The lower atmospheric regions and their composition. Air and source of pure gases, Air pollution, pollutants and smog, ozone as a pollutant, Hydrocarbon and Carbon monoxide.

**Chapter 5:** ionic and covalent compounds, cations and anions, naming and writing formulas, polyatomic anions and cations, hybridization, geometry, bond polarity and electronegativity, and bond angles and their variations (Valence Shell Electron Pair Repulsion Theory(VSEPR)). Intermolecular forces, Solid, Liquid and gases. Different types of solutions.

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Chapter 6 and 7: Greenhouse effect, Global Warming. Is it Good or Bad? Ozone Layer and Ozone Hole.

Chapter 8: Molecular Mass and Mole, Balancing Chemical Equations. Chemical Equilibrium, Activation Energy and Controlling Reaction Rates and Thermodynamics. _

Chapter 9 and 10: Acid-Base and Oxidation-Reduction Concept, Concentrations and Molarity, Acid-Base Titrations. Lowry-Bronsted Concept and Lewis Concept, pH and Acidity, buffer solutions. Acid-Base reactions.

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**Chapter 11:** The Unique Properties of Water, Measuring Water Pollution. Purification of water.

**Chapter 12:** Energy and Hydrocarbons, Energy from Fuels. Alkanes and their classifications.

**Chapter 13:** Radioactive isotopes. Nuclear stability and nuclear radiation. Nuclear

reactions and applications of radioactive isotopes.

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**The Learning outcomes of CHEM 101:**

**The Learning Outcomes**

- 1. understand that there are elements those constitute the whole universe.**
- 2. understand how scientific models, experiments and theories are used to explain the behavior of matter.**
- 3. understand how the periodic table is organized.**
- 4. understand how the periodic table is organized.**
- 5. understand how molecules are formed out of the elements and their structural/geometrical behavior. They should be able to write chemical formula and balancing chemical reactions.**
- 6. understand how energy related to the braking and making chemical bonds.**
- 7. understand how thermodynamics chemical equilibrium is related to the law of the universe and how chemistry is controlled.**
- 8. understand the oxidation-reduction process and applications of chemicals in our health related chemistry.**
- 9. understand the functions of acid, bases, and buffers, and their measurements.**
- 10. understand why water is a liquid and how others solvents are different from a polar solvent like water.**
- 11. identify the gaseous reactions and the gas laws.**
- 12. understand the difference between inorganic, organic, and biomolecules, and their interrelationship in our biological system.**
- 13. They should be able to distinguish this chemistry form nuclear chemistry with their applications.**
- 14. understand the ways in which chemistry and technology affect our daily lives.**

