

**J. Sargeant Reynolds Community College
Course Content Summary**

Course Prefix and Number: ENV 195

Credits: 4

Course Title: Topics in Environmental Science: The Environment and Its Chemistry

Course Description: Introduces chemical principles and applies them to environmental issues. Covers the fundamental principles, concepts, and language of general, organic, inorganic, and biochemistry. Addresses topics associated with matter/energy, nuclear chemistry, air and water quality, and wastes. Laboratories will include sampling, analysis, and generation of statistically-valid data while preparing students to think like environmental scientists. Environmental Sustainability Description: Course content related to the study of sustainable development. Prerequisite: MTE 4 or equivalent. Lecture 3 hours. Laboratory 3 hours. Total 6 hours per week.

General Course Purpose: The Environment and Its Chemistry is designed to introduce general chemistry concepts and principles as they pertain to topics related to the environment.

Course Prerequisites and Co-requisites:

Prerequisite: MTE 4 or equivalent

Student Learning Outcomes:

Upon completing the course, the student will be able to

- a. Explain why chemistry is the central science, particularly with regard to the biological and physical sciences relative to the environment;
- b. Recite the fundamentals of chemical composition in terms of matter and energy, atoms and elements, and chemical bonding;
- c. Explain principles pertaining to atmospheric pressure, air composition, and air pollution;
- d. Explain greenhouse gases and their effects on the environment;
- e. Describe the effects of chlorofluorocarbon on the ozone layer;
- f. Explain the concepts of chemical reactivity, including acid-base reactions and effects of corrosive chemicals on the environment;
- g. Describe the properties of water and the effects of pollution on water quality;
- h. Identify sources of energy through learning the nature of hydrocarbons and nuclear chemistry; and
- i. Discuss conductivity impact on water chemistry.

Major Topics to Be Included:

- a. General chemistry concepts
 1. Matter and energy
 2. Scientific measurements
 3. Elements, atoms, and radioactive nuclides

4. Laws of thermodynamics
 5. Compounds – ionic, covalent, molecular geometry, and shapes
 6. Chemical equations and quantities – stoichiometry
 7. Gases and solutions
 8. Organic nomenclature
- b. Pollution
1. Water
 2. Waste water
 3. Solid and HAZMAT wastes
- c. Emerging issues
1. Climate change
 2. Green energy
 3. Disasters

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