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Climate & Chemistry- An Introductory Course for First Year Students

Catrena Lisse
Georgia College

Chavonda Mills
Georgia College

Julia Metzker
Georgia College

Climate & Chemistry – an introductory course for first year students

…a thematic exploration of the role of chemistry in understanding climate change. Through this exploration, students will learn the basic principles of chemistry as applied to ozone depletion, the greenhouse effect, smog, acid rain and other important climate concerns.

Activities

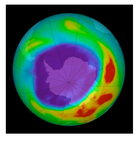
Climate Change

Taxing Bonds: Do Pollution Taxes Work?

Climate Change Scenario and Technical Report

Students respond to a fictional scenario asking them to devise a scheme for choosing a pollution to tax in Baldwin County. This scenario involves putting together a review board and developing a rubric for evaluating potential pollutants. The activity culminates with a technical report.

Ozone Depletion

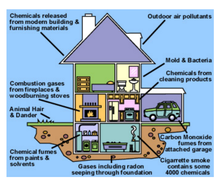


Save The Ozone Layer!

Stratospheric Ozone Depletion Case Study

Students are presented with a dialog between a skin cancer patient and her physician. The conversation ultimately leads to questions regarding causes and effects of ozone depletion. Students are expected to conduct literature research regarding ozone depleting agents, chemical mechanisms behind ozone depletion, current regulatory measures, and current solutions. An important case study outcome is that students will suggest novel strategies to preserve stratospheric ozone. The activity culminates with an oral presentation.

Air Chemistry



What Are You Breathing?

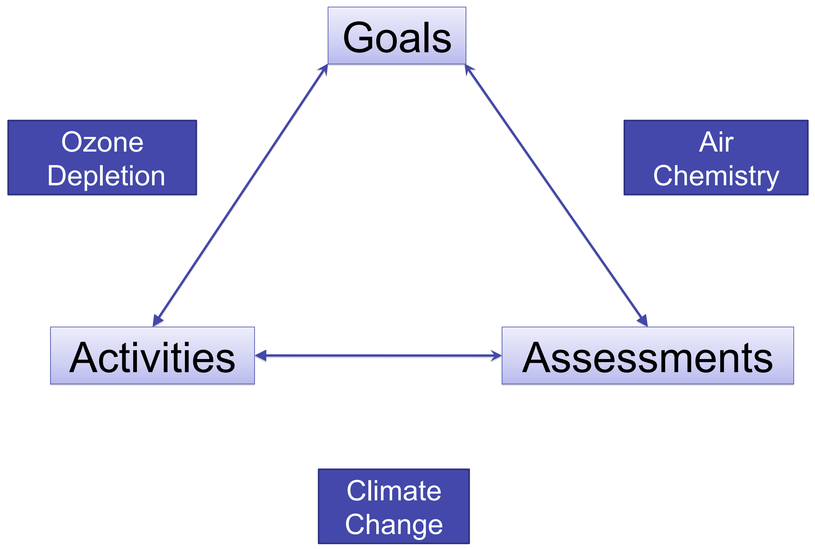
Indoor Air Pollution
Presentation and Research Paper

According to the EPA, indoor air pollutants that release particles and gases into the air are the primary cause of indoor air quality problems in homes and businesses. There are many sources of indoor air pollutants. Some of which include: tobacco smoke, asbestos, mold, building materials, radon, and pesticides. Students will work in groups to investigate an indoor air pollutant, conduct literature research, and prepare an oral presentation. The groups will also prepare written research papers on their selected indoor air pollutant, its causes, potential health effects, and remediation measures.

Student Learning Outcomes

Students will be able to ...

- explain multiple approaches that respond to problems in chemistry
- implement effective search strategies and evaluate sources of chemical information for relevance and authority.
- explain and analyze scientific evidence.
- form logical conclusions from the chemical information presented.
- understand the chemical properties of atoms, molecules, ions and gases.
- understand the chemical principles of stoichiometry, reactions in solutions, thermochemistry, atomic structure, periodicity and bonding.
- construct strategies to solve problems with integrated concepts and evaluate solutions



Assessments

Technical Report Rubric

Written

Written work will be assessed with a technical report rubric tailored to the Taxing Bonds activity. This rubric evaluates the student on their ability to

(1) identify and describe stake-holders,
(2) analyze pollutants using an evaluation rubric they devised
(3) use tables and other visual aids effectively
(4) use and cite high quality sources,
(5) write scientifically.

Oral Presentation Rubric

Oral

Oral presentations will be assessed with a presentation rubric tailored to the "Save the Ozone Layer!" activity. This rubric evaluates the student on their ability to

(1) present high-quality scientific information,
(2) effectively incorporate visual aids,
(3) respond appropriately to audience questions,
(4) use and cite scholarly sources,
(5) demonstrate confident and clear oral communication skills.

Standardized Exam

Content

Content knowledge will be assessed through pre- and post exams developed by the American Chemical Society. These exams are standardized and normed over a large population of general chemistry students.

All students in general chemistry at Georgia College complete this exam, which provides a method to compare content gains in this course to those in more traditional chemistry courses.

Course Capstone

The course will end with a major research project and presentation that will provide students with an opportunity to apply the skills and content knowledge they have learned over the semester. In groups students will research an environmental issue with local significance and develop an action plan to address that issue. The action plan will be presented to the community as part of their final assessment.