

STEM Course Enhancement: Active Learning Through Cooperative Group Lab Experiences

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STEM Courses involved

Biology 1436 Foundations of Science

Enrollment- Spring 2020

I will be teaching four sections of approximately 80 students each.

Project Narrative

Rationale: To provide an interactive class experience merging lab activities within a lecture setting.

Topic: Geology and layers of the Earth: Density

Students often have difficulty visualizing the layers of the earth and understanding that density is the feature that creates the layers.

Materials

Clear Food Grade Plastic Juice Bottles 8oz with Cap

Vegetable Oil

Food Coloring

Kosher Salt

(Water)

Isopropyl Alcohol

Density Cubes

Disposable Cups- Dixie 3oz

<https://www.exploratorium.edu/snacks/klutz-proof-density-column>

Students will be given liquids of different unknown densities. They will predict what will happen when each liquid is added to the container. They will pour the liquids into the clear bottles and record the order in which the liquids were added and the order of the liquids when the layers appear. They will repeat the process but choose a different sequence of adding the liquids. Groups will use their white boards to show their observations to the other groups. Students may be provided additional liquids to determine if this only applies to the original samples or any materials. Extension- What does density have to do with solid rock? Groups will be given a “solid rock” (density cube) to see how it forms a “layer” within the column.

<https://www.exploratorium.edu/snacks/klutz-proof-density-column>

The Department of Biological Sciences likely already has the materials needed for making the solutions. However, having access to the bottles is a limiting factor.

Topic: Astronomy, Physics, and Forces

Students often think of gravity as being a very strong force. However, this demonstration would show that the Electromagnetic Force is much stronger by the repulsion of the magnets “defying” gravity.

Materials

Floating Magnet Demo

Topic: Astronomy, Physics, and Forces

What does gravity do? How does gravity bring things together (accretion)? The Gravity Well will allow students to experience how massive objects impact the movement of other objects.

Students will hypothesize what will happen to the marbles when they are dropped, or put in an orbit around the large mass. Student groups will be given different tasks to complete at the gravity wells and share their experiences with the class. Groups will write their CER (Claim, Evidence, and Reasoning) on the group White Board.

Materials

Gravity Well

Topic: Water

Students often find the properties of water difficult to understand. A demonstration of the properties of water will allow students to observe how polarity and hydrogen bonding allows water to have so many different properties.

Materials

Pipettes- 3 ml disposable plastic transfer pipette

Wax Paper

Graduated Cylinder

Pennies (provided by students)

Disposable Cups

Expected Results

Students will engage in a more interactive class format allowing for group collaboration and presentation. This will enhance instruction and effectiveness of classroom time by experiencing science rather than just hearing about science.