Introduction to Innovation

Millis Science Center 328
Case Western Reserve University
July 17-21, 2023

INSTRUCTIONAL STAFF 2023

Bill Badders, Cleveland Metropolitan School District (retired), and former president, NSTA
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Luis Mesias-Flores, Ph.D. candidate, Department of Electrical, Computer, and Systems Engineering
Shane Parker, Ph.D., Assistant Professor, Department of Chemistry
Jim Bader, Department of Biology and Executive Director, Leonard Gelfand STEM Center

SCHEDULE

Monday July 17

Driving Question: What can fingerprints tell us about genetic variation within populations?
Learning Goals
- Model the integrations of science, engineering, and literacy.
- Explain how fingerprints are unique to an individual
- Draw together information from different sources and make logical deductions as a result

Activities
- Welcome, introductions, background, and context
- Pre-workshop assessments
- Science writing strategies
- Fingerprint science
- Daily assessment/reflection

Tuesday July 18

Driving Question: How can we use models to increase the efficiency of photo-chemical reactions?
Learning Goals
- Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- Make observations to provide evidence that energy can be transformed from one form to another.
- Recognize that models can be used to formulate explanations and generate predictions; specific types of models may even allow testing such predictions.

Activities
- Renewable energy experiments that include energy transformation
- Introduction to models and modeling
- Daily assessment/reflection

Wednesday July 19

Driving Question: What is in our genes and how do we make sure it stays safe?

Learning Goals

- Learn to use readily available materials to extract DNA from cells.
- Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in similar organisms
- Develop claims supported by evidence to defend an argument regarding the ethical use of genomic data

Activities

- DNA isolation
- Reebop reproduction
- Discussion – privacy and the ethical use of personal data
- Daily assessment/reflection

Thursday July 20 (Meet at Louis Stokes Cleveland VA Medical Center, 10701 East Blvd)

Driving Question: How can we, as biomedical engineers, restore limb functions for humans who have sustained injury?

Learning Goals

- Recognize the necessity for seamless integration of science and engineering to solve problems
- Apply scientific ideas to design, test, and refine a device that converts energy from one form to another

Activities

- Electromyography controlled foam hand
- Observation of stroke rehabilitation research study participants
- Daily assessment/reflection

Friday July 21

Driving Question: Is insect physiology changing as a consequence of contemporary range shifts?

Learning Goals

- Describe that organisms have unique and diverse life cycles but have in common birth, growth, reproduction, and death.
- Use evidence to support the claim that traits can be influenced by the environment

Activities

- Case quad scavenger hunt
- Closed system respirometry
- Daily assessment/reflection
- Post-workshop assessments