CASE WESTERN RESERVE UNIVERSITY
Leonard Gelfand STEM Center

Introduction to Innovation

Roger E. Susi Laboratory
Bingham Building
Case Western Reserve University
July 14-18, 2025

INSTRUCTIONAL STAFF 2025

Terri Wade-Lyles, Ed.D, Cleveland Metropolitan School District
Erman Ayday, Ph.D., Assistant Professor, Department of Computer and Data Sciences
Max Pennington, Co-Founder & CEO, CLEANR
Sarah Diamond, Ph.D., Associate Professor, Department of Biology
Michael Fu, Ph.D., Timothy E. and Allison L. Schroeder Assistant Professorship in Computer and Data Sciences, Assistant Professor, Department of Electrical, Computer, and Systems Engineering
Luis Mesias Flores, Ph.D. candidate, Department of Electrical, Computer, and Systems Engineering
Akif Gormez, Ph.D., Department of Electrical, Computer, and Systems Engineering
Shane Parker, Ph.D., Assistant Professor, Department of Chemistry
Saudagar Dongare, Ph.D., Research Associate, Department of Chemical and Biomedical Engineering
Jim Bader, Department of Biology and Executive Director, Leonard Gelfand STEM Center

SCHEDULE

Monday July 14 (Jim, Terri)

Driving Question: How do weather and climate affect our lives?

Learning Goals

- Make observations and measurements to identify failure points that serve as evidence to compare two solutions.
- Obtain and combine information from books, videos, and websites to describe how patterns in data collected by weather tools can be used to predict future weather
- Apply scientific ideas to design a roof with structures that function to reduce the impact of rainy and windy weather on a roof and building
- Make claims about the merits of roof structures based on how they function to reduce the impact of wind and rain on the roof and the building it protects below it.

Activities

- Welcome, introductions, background, and context
- Pre-workshop assessments
- Smithsonian Science for the Classroom unit
- Daily assessment/reflection

Tuesday July 15 (Jim, Terri, Max, Erman)

Driving Questions: Can I be an engineer? How can engineers help me understand artificial intelligence?

Learning Goals

- Identify and describe key qualities demonstrated by innovators in various contexts, and explain how these qualities contribute to successful engineering design and innovation.
- Derive an engineering design process
- Explain the core concepts of artificial intelligence, identify common applications of AI in everyday life, and articulate at least two ethical considerations related to AI development and deployment.

Activities

- Panel discussion with CWRU engineering entrepreneurs
- Derive a simple engineering design process
- Engineering design challenge
- Education and AI

Wednesday July 16 (Shane)

Driving Question: Construct, use, and revise models to explain and predict phenomena, evaluating the limitations and strengths of each model in representing complex natural and designed systems.

Learning Goals

- Distinguish between a model and the actual object it represents
- Build and revise a simple model and use it to represent an event and design solution.
- Evaluate the limitations of models.

Activities

- Model fabrication in think[box]
- Daily assessment/reflection

Thursday July 17 (Michael, Luis, Akif - Meet at Human Fusions institute Academic Hub, 11000 Cedar Ave, Cleveland)

Driving Question: How can we, as biomedical engineers, use fundamental concepts of electricity and human physiology to restore limb functions for humans who have sustained injury?

Learning Goals

- Model the interdisciplinary, team-based approach necessary to address big problems
- Apply scientific and engineering practices to design, test, and refine a device that converts energy from one form to another

Activities

- Handgrip muscle test
- Introduction to neuro rehabilitation
- Neuroprosthetic hand lab
- Daily assessment/reflection

Friday July 18 (Sarah, Saudagar)

Driving Question: Are organisms' traits changing as a consequence of a changing environment? How can we, as engineers, mitigate the effects of carbon on our environment?

Learning Goals

- Use evidence to support the claim that CO2 is impacting the environment
- Use evidence to support the claim traits can be influenced by the environment
- Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

Activities

- Materials for CO_2 capture and conversion
- Investigations into the effects of size and temperature on respiration
- Daily assessment/reflection
- Post-workshop assessments

Introduction to Innovation is funded through multiple NSF CAREER awards