

2006 PROM/SE SUMMER SCIENCE INSTITUTE

UNDERLYING PRINCIPLES

Summer Science Institute courses are developed around topics of greatest need as identified by data that was collected from PROM/SE districts including student performance measures and recent teacher surveys.

All of the courses are organized around an underlying structure of scientific inquiry and target specific subject matter. Each course engages participants in inquiry-based activities that promote deeper conceptual understanding and high cognitive demand. Time will be spent each day to reflect on what you learned, how you learned it, and how that might relate to your teaching.

The unifying theme of Systems (order and organization: biological, chemical, physical, universal) is a key theme across the PROM/SE summer courses. Systems are also an area where students consistently show a lack of comprehension and teachers identify as a need.

The unifying principle is Energy, a topic that has been shown to have many common misconceptions across the K-12 curriculum.

The strands of the PROM/SE Summer Institute that model the theme of **Systems** and the principle of **Energy** are:

Strand 1 • Life Science: Energy & the Environment- Supporting Life

Strand 2 • Earth Science: Earth Processes, Features & Its Place in the Universe

Strand 3 • Physical Science: Expressions of Energy- Light, Magnetism, & EM Radiation

ELEMENTARY COURSES

Food Webs: There's more to life than food

All organisms require energy and matter to live and grow. How do they get their energy? What happens to that energy in the organism? How does the energy flow through an ecosystem? Join us as we dive into these questions and investigate the life processes (photosynthesis, respiration, and digestion) behind food webs.

Earth Composition: Forming rocks, soil, and water

Rocks, soil, and water make up much of the Earth providing the structure for life. What are rocks? What is soil? How are these formed? What are systematic processes that create and sustain Earth's composition? These and other questions will be addressed through exploration of Earth's composition.

Light: Making sense of how we see our world

Light is all around us, but many people do not understand how light behaves to help us see objects and images. Participants will explore the behavior of light through a variety of investigations. Using ray, wave, and particle models, participants will push our understanding of light and its ability to illuminate our world.

MIDDLE SCHOOL COURSES

Life Processes and the Environment: The living world in our neighborhood

Participants will use ecological field studies of two local plots (one strongly affected by humans and the other less affected) to investigate the connections that tie these plots together from the cellular to the global level. As participants investigate the structure and function of the organisms in these plots, we will consider how they are tied together by matter, energy, and genetic information. The core life processes essential to sustaining the system will be explored in-depth to better understand the impact of changes due to natural selection and human influences.

Earth Processes: What on Earth is changing?

The Earth is constantly changing. Some of the changes are abrupt (e.g., tsunamis and earthquakes). Other changes on Earth happen slowly over thousands or millions of years (e.g., the uplift and erosion of mountains). This course focuses on exploring changes to the interior and the exterior of Earth.

Magnetism: What's the attraction?

In this course participants will explore magnetism through a series of investigations building and manipulating magnetic fields. The focus will be on the interplay between magnetism, electricity, and conductivity to get at the real attraction of magnets.

HIGH SCHOOL COURSES

Life Processes and Ecology: Connections in living systems

Participants will follow a similar path as the middle grades course, but will probe the processes at a deeper level. As we investigate the structure and function of the organisms in the two plots, participants will consider how they are tied together by matter, energy, and genetic information.

Universe: Measuring and Understanding the Whole Shebang

In this course participants will delve into evidence and investigate the big picture of the universe – the Big Bang, the evolution of galaxies and stars, eventually culminating in the formation of the solar system and Earth, the support system for life. Models will be used to make sense of data and clarify physical principles.

Electromagnetic Radiation: Influencing the spectrum of our world

Electromagnetic radiation permeates our world, both helping and harming life. It is a topic of importance in many science applications (e.g., NMR, weather analysis, space research). This course will examine the interrelations between magnetism and electricity, probe the wave-like and particle-like properties of electromagnetic radiation, consider the spectrum and levels electromagnetic radiation including visible light and how atoms can absorb and emit radiation.