THE CITIZEN SCIENCE LAB

Course Catalog

Choice of One or Two day experiments

GROUP RATES

$190.00 per hour for up to 25 students
(extra students will be an additional $25.00 per experiment)

When scheduling an experiment please include the module name and accompanying number, the number of students, and the dates the experiment will occur.

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Experiment Selection List

General Biology:

BIO-1: Plant PCR
BIO-2: Plant Diversity
BIO-3: Sea Urchin Embryology
BIO-4: Alcohol Tolerance in Fruit Flies
BIO-5: Owl Pellets and PCR
BIO-6: Studying Our Senses
BIO-7: Regulation of Human Rate
BIO-8: Photosynthesis
BIO-9: It's All About You: Genetics
BIO-10: Frog Dissection
BIO-11: Garden Microbes

Molecular Biology:

MOLEC-1: DNA Art
MOLEC-2: Introduction to DNA Structure and Function Through Modeling
MOLEC-3: DNA Supercoiling
MOLEC-4: Candy DNA Color Code
MOLEC-5: DNA Fruit Extraction
MOLEC-6: DNA Detectives
MOLEC-7: Lights, Camera..Action Potential
MOLEC-8: DNA Fingerprinting

Microbiology:

MICRO-1: Simple Staining
MICRO-2: Negative Staining
MICRO-3: Endospore Staining
MICRO-4: Gram Staining
MICRO-5: Acid-Fast Staining
MICRO-6: Microbial Fuel Cell Electricity
MICRO-7: Introduction to Microbiology
MICRO-8: Glow Germ Art
MICRO-9: Bacteria on Our Hands
MICRO-10: Effect of Temperature on Bacterial Growth
MICRO-11: Antibiotics Effects
MICRO-12: Spicy Inhibitors
MICRO-13: Bacterial Transformation

Microscopy:

SCOPE-1: Exploring the Wild World of Microscopy
SCOPE-2: Structure and Function Of Mitochondria
SCOPE-3: Structure of Plants

Chemistry:

CHEM-1: Tie-Dye Chromatography
CHEM-2: Crystal Art Sculptures
CHEM-3: Investigating Oobleck
CHEM-4: Slime Science
CHEM-5: The Science of Candy Making
CHEM-6: The World of Geodes
CHEM-7: Bath Bomb Science
CHEM-8: Candle Chemistry
CHEM-9: Soapy Science
CHEM-10: Cyanotyping
CHEM-11: Dry Ice Rockets
CHEM-12: Thermal Energy (Flame and Specific Heat Tests)
CHEM-13: Making a Mirror
CHEM-14: Solutions and Mixtures; Exothermic, Endothermic, and Chemical Change
CHEM-15: Diffusion and Osmosis
CHEM-16: Matter, Molecules and Movement
CHEM-17: Changing States
CHEM-18: Density: Sinking and Floating Solids
CHEM-19: Energy and Chemical Bonding
CHEM-20: Polarity and Surface Tension
CHEM-21: Dissolving Solids
CHEM-22: Dissolving Liquids, Gases and Temperature
CHEM-23: Chemical Reactions

Biochemistry:

BIOCHEM-1: Introduction to Biochemistry and Vitamin C Concentration

BIOCHEM-2: Physical Properties of Proteins

BIOCHEM-3: Protein Bioassay ELISA Experiments

BIOCHEM-4: Turnip Peroxidase Reactions

BIOCHEM-5: Starch, Protein, and Lipids Investigation

BIOCHEM-6: Enzymes Help Us Digest Food

Contact the CSL for details on how to schedule the following workshops:

: Bacterial Identification

: Oil Slick Lab

Micro Eukaryotes:

EUKARY-1: The Wonderful World of Termites

EUKARY-2: Seeing “Eye to Eye” with Microscopic Organisms

EUKARY-3: Predator and Prey

EUKARY-4: Daphnia and Heart Rate

General Biology

One-Day Experiments:

BIO-1: Plant PCR (1.5 hours)
Students will start by learning the process of PCR and its importance. They will learn how to use the tools needed to complete this process. Then they will be able to obtain DNA from plants that are part of everyday life. This DNA will then be used to complete PCR, which amplifies the amount of DNA collected. This process is used to compare different gene sequences among plants.

Bio-2: Plant Diversity (2 hours)
Plants are all around us and are involved in our daily life, whether that is the grass we walk on or the fruit we eat. Students will get to learn about different types of plants and how they grow and reproduce. This knowledge will be obtained through observation and dissection of the plants. They also will get the opportunity to ask questions while exploring the world right outside their window.

BIO-3: Sea Urchin Embryology (1.5 hours)
Exploring a new world of reproduction, students will get the opportunity to observe the life cycle of a sea urchin. First, students will get to observe how sea urchins live and survive in their aquatic environment. They then will be able to inseminate the urchins and understand their reproductive process.

BIO-4: Alcohol Tolerance in Fruit Flies (1.5 hours)
Fruit flies will be used in this observation experiment to learn about genes, enzymes and phenotypes. The fruit flies that will be used are alcohol intolerant, meaning once they consume alcohol they will die shortly after. This is because the flies cannot digest the ethanol they consume. Students will observe the flies for a 24-hr period, which requires them to take the flies home overnight.

BIO-5: Owl Pellets and PCR (2 hours)
These hairball like objects (owl pellets) can give us a lot of information about different owls we wish to study as well as the surrounding land. In this lab students will dissect an owl pellet to see what type of creature the owl has eaten from the bone structure. They will then take a sample of the fur to run a PCR and amplify the DNA from the prey the owl ate.

BIO-6: Studying Our Senses (1.5-2 hours)
We enjoy the flavors of the food we eat, and we identify the things we see easily, without even thinking about how we do it. But scientists have discovered that these sensory processes are amazingly complex and sophisticated. In this workshop, students will explore two types of sensory processes; how they identify flavors and how their brain interprets images.

BIO-7: Regulation of Human Heart Rate (1.5 hours)
Each time the heart beats blood is pumped into the arteries. As blood surges into the arteries during a heartbeat, each artery stretches and bulges. This is called a pulse. In this workshop, students will learn how the heart operates and then will design a method to test how stimuli affect heart rate. Also, will create their own model of how the heart pumps.

BIO-8: Photosynthesis (1.5-2 hours)
The process of photosynthesis occurs in a series of enzyme-mediated steps the capture light energy to build energy-rich carbohydrates. In this lab, students will use two methods to determine how much oxygen and carbon dioxide are needed in this process. Through experimentation students will be able to understand concepts such as cell structure and function, enzymatic activity and energy storage and use.

BIO-9: It's All About You: Genetics (1.5 hours)
In this lab students will be able to learn and understand how genetics work on a broad scale. We will introduce them to Punnett Squares to determine their very one genes and whom they got them from! Finally, they will observe different traits and determine if they have the dominant or the recessive version of each trait.

BIO-10: Frog Dissection (2 hours)
In this module, students will learn the anatomy and physiology of leopard frogs using a variety of dissection techniques. This lab will give students a detailed look of the body systems of the frogs, which are used as a model for the human systems, as well as how everything is connected and works together.

Two-Day Experiments:

BIO-11: Garden Microbes (2 hours first day, 1 hour second day)
Microbes are all around us, some helpful and some harmful. In this workshop, students will learn the basics of microbes and why they are helpful to us. Plant – microbe interactions help the plant grow and acquire nutrients. Different methods of observing microbes will be discussed and students will conduct these methods on their own. In addition to this students will also pick a leaf sample to run a PCR reaction on to amplify a specific piece of plant DNA. A gel will be used to visually depict the amplified DNA.

Molecular Biology

One-Day Experiments:

MOLEC-1: DNA Art (1 hour)
The structure of DNA is intimately bound up with its function. The famous double helix allows for both easy access to the information it codes for and easy replication. In this module, students will explore the structure of DNA through a simple model— an origami sculpture of a DNA molecule. Then they will then create their own DNA double helix keychain!

MOLEC-2: Introduction to DNA Structure and Function through Modeling (2 hours)
DNA codes messenger RNA, which in turn codes for proteins: this simple process lies at the center of all life on Earth. In this module, students will explore the central dogma of biology through hands-on modeling techniques. In the process, they will be introduced to the processes of replication, transcription and translation, as well as a variety of molecular techniques based on the processes.

MOLEC-3: DNA Supercoiling (2 hours)
The human genome contains a staggering amount of DNA— far more than you'd expect to fit in something as small as a cell. In this module, students will use mathematical and hands-on modeling techniques to explore the process of supercoiling, cumulating with a comparison of the total length of DNA in the human body to various astrological distances.

MOLEC-4: Candy DNA Color Code (1.5 hours)
In this introduction to gel electrophoresis module students will develop the skills necessary to extract “DNA” from candy and run that “DNA” on a gel. Students will learn how to properly use micropipettes and other scientific equipment as well as make an Agarose gel from scratch.

MOLEC-5: DNA Fruit Extraction (1.5 hours)
For all the information it contains, DNA is only a molecule, far too small to see with the naked eye… or is it? In this module, students will extract DNA from various fruits, leaving it in a form that can be seen without the aid of a microscope. In the process, they will learn about the enormous length of the DNA molecule and its physical properties.

MOLEC-6: DNA Detectives (2.5 hours)
In this module, students will have a chance to be CSI technicians by comparing the DNA of four suspects to the sample found at a "crime scene." In the process, they will learn a variety of common molecular biology techniques such as restriction enzyme digestions and gel electrophoresis. *The CSL recommends Candy DNA Color Code as an introduction before this module, especially if your students haven’t had experience with micropipettes and gels*

MOLEC-7: Lights, Camera..Action Potential (1.5 hours)
In this workshop, students will set up a model to simulate how a neuron processes information. The model will include such items as peas, beans and construction paper. Students will also be asked a series of questions to allow them to think deeper into the idea of neurons and how they effect different conditions such as epilepsy..

Two-Day Experiments:

MOLEC-8: DNA Fingerprinting (2 hours first day, 1 hour second day)
It's one thing to say that everyone's DNA is unique, but quite another to prove it for yourself. In this module, students will use techniques to harvest their own DNA from cheek cells and visualize the unique banding patterns through PCR and gel electrophoresis. *The CSL recommends Candy DNA Color Code as an introduction before this module, especially if your students haven't had experience with micropipettes and gels*

Microbiology

One-Day Experiments:

MICRO-1: Simple Staining (1.5 hours)
True to its name, the simple stain is an easy process used to view bacteria's size, shape, and arrangement. Our instructors will give your student personalized attention to introduce them to the basics of bacteria.

MICRO-2: Negative Staining (1.5 hours)
Bacteria are mostly colorless so viewing them under a microscope is next to impossible unless they have been stained. Students will utilize a negative stain to view different species of bacteria. During this module, your student will learn new laboratory techniques, hone their microscope skills, and discover the exciting world of microbiology.

MICRO-3: Endospore Staining (2 hours)
Some bacteria have protective structures called endospores that help them thrive in extreme conditions. However, because of the protective nature of endospores, they can be difficult to stain and view. This module teaches students about these extreme bacteria and the special procedures it takes to stain them and make them visible.

MICRO-4: Gram Staining (2 hours)
Probably the most common and well-known differential stain, Gram staining is used to categorize bacteria based on the characteristics of their cell walls. Students will use basic microscopy techniques to observe the characteristics of a colony before and after performing their own Gram stains, and use these observations to identify the bacteria in question.

MICRO-5: Acid-Fast Staining (2 hours)
One of several common differential stains, acid-fast staining is used to identify bacteria in the Mycobacterium family. In this module, students will use sterile techniques and live bacteria to perform their own acid-fast stains on a variety of non-pathogenic bacteria, and relate the characteristics of acid-fast bacteria to drug resistance.

MICRO-6: Microbial Fuel Cell Electricity (2 hours)
Bacteria are powerful things— and we're not using metaphors here. When harnessed correctly, a tank full of bacteria can literally generate electricity. In this module, students will learn about metabolism and the chemistry of batteries as they build— and keep-- their own bacteria-based fuel cells.

Two-Day Experiments:

MICRO-7: Introduction to Microbiology (2 hours first day, 1 hour second day)
Some estimates claim that there are more bacteria on the planet than there are stars in the universe. Microorganisms live everywhere we can imagine, and a few places we can't. In this module, students will discover this for themselves by taking and culturing samples from their surroundings.

MICRO-8: Glow Germ Art (1 hour each day)
Students get a chance to create their own glowing bacterial art. Students use non-pathogenic E. coli that expresses fluorescent proteins to draw their image. Students can choose between green, yellow, blue, red, and orange fluorescent bacteria or use a combination of all five. The plates are incubated overnight and the following day students get to view their glowing bacteria art under a black light.

MICRO-9: Bacteria on Our Hands (1 hour each day)
They will then investigate how well hand sanitizer really works on bacteria. Students begin by taking a swab of their own hands and placing it on bacterial growth media. Then students clean their hands with sanitizer and repeat the same process. Students return the next day to see how big of a difference the sanitizer actually made.

MICRO-10: Effect of Temperature on Bacterial Growth (1 hour each day)
Students will examine the effects of heat on two different types of bacteria. This will show students how some bacteria can withstand high temperatures while others cannot.

MICRO-11: Antibiotics Effects (1 hour each day)
Antibiotics are one of the biggest lifesavers in human history-- and the presence of antibiotic-resistant bacteria one of the greatest public health threats of our day. In this module, students will explore the effectiveness of antibiotics on certain bacteria.

MICRO-12: Spicy Inhibitors (1 hour each day)
Spices were once tremendously valuable commodities-- not just for their taste, but also for their ability to keep foods from spoiling. In this module, students will test the antibiotic properties of a number of common spices, learning about bacterial culturing and aseptic technique in the process.

MICRO-13: Bacterial Transformation (1 hour first day, 30 minutes second day)
While we usually think of genetic engineering as the stuff of science fiction, or at least cutting-edge research, in simple organisms it's surprisingly easy. In this module, students will create their own glowing bacteria through the true gene transfer of a plasmid coding for a fluorescent protein. In the process, they will learn about bacterial culturing, ascetic technique, and horizontal gene transfer.

Microscopy

One-Day Experiments:

SCOPE-1: Exploring the Wild World of Microscopy (2 hours)
In this module students will be taught all the parts of a microscope as well as how to properly use one. After learning how to properly use a microscope, students will examine prepared slides, which will show them a variety of organisms. Following this, students will be taught how to create their own dry and wet mount slides!

SCOPE-2: Structure and Function of Mitochondria (1.5 hours)
Mitochondria are the powerhouses of the cell; energy-generating organelles that still contain many characteristics of independent organisms. In this module, students will see them in action by staining for hydrogen ions, which are used up during mitochondrial activity. The change in color as the stain is gradually removed will be easily visualized using a simple light microscope.

SCOPE-3: Structure of Plants (2 hours)
In this module, students will explore the structure of plants, from the macro level down to the plant cells themselves. In the process, they will learn how to use a variety of conventional and fluorescent stains.

Chemistry

One-Day Experiments:

CHEM-1: Tie-Dye Chromatography (30 minutes)
Vibrant colors and patterns are an awesome way to get students interested in the science about the world around them. We use the same concepts of chromatography, a common laboratory technique, but re-imagined it to become something fun and beautiful.

CHEM-2: Crystal Art Sculptures (30 minutes)
Some children use pencils to create art. Some children use paint to create art. Our students use crystals. Let your student's creativity flow as they grow crystals and create something truly beautiful and unique. Crystallization is used in chemistry labs to create a pure substance; your student will use it to create pure art.

CHEM-3: Investigating Oobleck (1 hour)
What object is able to act like a solid and liquid at the same time? Oobleck, that's what! Dr. Seuss was the man to name this non-Newtonian fluid with a high potential for fun. This module discusses stages of matter, properties, and hands on experiments that challenge the laws of physics.

CHEM-4: Slime Science (1.5 hours)
Slime is the original fun science experiment, but not many people talk about what's going on molecularly. Students will be taught how to use proper laboratory technique to carry out this entertaining chemical reaction.

CHEM-5: The Science of Candy Making (2 hours)
No one ever said that chemistry had to be boring. What happens in your oven is just as much a chemical reaction as what happens in a test tube. In this module, students will learn about melting points, crystallization, and making delicious treats.

CHEM-6: The World of Geodes (1.5 hours)
Geodes seem like normal rocks on the outside, but on the inside is a treasure trove of crystals waiting to be discovered. How did those crystals get inside that rock anyways? And how can we make them ourselves? We'll share the answers to those questions and teach you the ins and outs of crystals in the process. *Optional: edible rock candy fondant geode for an additional $5 per student*

CHEM-7: Bath Bomb Science (2 hours)
A simple pleasure in life is dipping into a nice, warm bath and plopping a fizzy bath bomb in to soften the waters. It turns out the science behind this simple pleasure is not so simple! These relaxing crafts have quite a bit of chemistry behind them. Students will learn about acids and bases, chemical reactions, and will get to make their own custom bath bombs!

CHEM-8: Candle Chemistry (1 hour)
Did you know that when you blow out a candle, you aren't really seeing "smoke?" And how are candles able to burn for so long? It's a more difficult question than it seems. This module explores melting and vaporization points, what fire is and what it needs to stay lit, and more!

CHEM-9: Soapy Science (1.5 hours)
Did you know soap is scientifically considered a salt? That's because it's the product of the combination of an acid and base. There is quite a bit of chemistry behind this common household item. Students will learn about each component of soap, the science behind the chemical reactions, and how to make handmade soap from scratch.

CHEM-10: Cyanotyping (2 hours)
A cyanotype is a simple form of photograph, created by the interaction of ultraviolet light and certain chemicals. In this module, students will learn about the chemistry of photography while making their own cyanotypes.

CHEM-11: Dry Ice Rockets (2.5 hours)
Students will be exploring the world of rockets. They will be designing their own rockets out of cardboard, construction paper, and other commonly found items. Then the students will try and use different fuel sources to see which will launch their rocket the furthest. These fuels include: dry ice and water, Alka-Seltzer and water, and baking soda and vinegar. These fuel sources will help teach the students about gas expansion and pressure.

CHEM-12: Thermal Energy (Flame and Specific Heat Tests) (1.5 hours)
It's a rule as old as time: Energy can neither be created nor destroyed. So where does that energy go? This lab will demonstrate to students that energy has to go somewhere – not be lost forever. In the Specific Heat Test lab, students will observe that the heat energy of their specific metal is absorbed by the water in their calorimeter. They will then calculate the specific heat of their metal. The Flame Test will demonstrate the ground state of electron configuration as well as the electromagnetic energy that is given off when an object falls back to the ground state. Different metals will be tested to observe the different colors given off when falling back to the ground state.

CHEM-13: Making a Mirror (1 hour)
Mirror, mirror on the wall, who's the fairest scientist of all? In this lab students will get the chance to turn a test tube into a mirror. Students will make the Tollens Reagent and see how the mixture of different reagents causes a chemical reaction and visible change.

CHEM-14: Solutions and Mixtures; Exothermic, Endothermic, and Chemical Change (2 hours)
In the first part of this lab students will do various experiments to distinguish between a solution, a suspension, or a colloid. Characteristics of different mixture types will be explained so students are able to look at their three mixtures to classify each. Some of the characteristics will be obvious and immediate while others will take more thought. The second part of this lab students will explore exothermic, endothermic, and chemical changes of mixtures. Students will be able to learn and distinguish whether or not a chemical reaction is endo or exothermic. Additionally, they will observe changes in temperature and classify whether the reaction taking place is chemical or physical.

CHEM-15: Diffusion and Osmosis (1.5-2 hours)
The movement of solutes and water across cellular membranes is an overarching concept. Cells must maintain their internal environments and control solute movement. These concepts can be illustrated using model systems and living cells. Students will understand the concept of osmosis and water potential when they investigate transpiration in plants.

CHEM-16: Matter, Molecules and Movement (1.5 hours)
This lab begins at a very elementary level understanding of what matter and molecules are. Students will investigate water as being made up of molecules and understand what that means. Finally, students will experiment with temperatures effect on molecules and make their very own basic thermometer.

CHEM-17: Changing States (1.5 hours)
In this lab students will begin to understand how molecules change from solid to liquid to gas and then back again. There will be many different methods to learn this idea of gas change, each reflecting a specific function: evaporation, condensation, freezing, and melting.

CHEM-18: Density: Sinking and Floating Solids (1.5 hours)
This lab investigates the idea of density and how it compares to sinking and floating in water. Students will discover it is not the weight of an object, but its density compared to the density of water, that determines whether an object will sink or float. This concept is then applied to liquids and how their density can predict if it will sink or float in water.

CHEM-19: Energy and Chemical Bonding (1.5 hours)
This lab introduces students to different subatomic particles that allow chemical bonds to occur. They will be able to draw a model of the covalent bonds between basic atoms such as oxygen, hydrogen, and water. They also will learn the idea of ionic bonding and how this process occurs.

CHEM-20: Polarity and Surface Tension (1.5 hours)
Throughout this lab, students will be able to explain, on the molecular level, what makes a water molecule polar or non-polar. The polarity of water actually allows it to have interesting and unique characteristics, which are also explored in this lab. Surface tension will be investigated to help students understand polarity further.

CHEM-21: Dissolving Solids1.5 hours)
Students will further investigate how water, being polar has the ability to dissolve different solids. They will understand why water can dissolve things like salt and sugar. Finally, they will use the process of dissolution to identify unknown solids.

CHEM-22: Dissolving: Liquids, Gases and Temperature (1.5 hours)
A continuation of Dissolving Solids, this lab investigates if temperature has an effect of rate of dissolution. Also, students will experiment with solubility of liquids and gases. Lastly, students will be able to identify if a dissolution reaction is endothermic or exothermic through experimentation.

CHEM-23: Chemical Reactions (1.5 hours)
Students will gain an understanding of chemical reactions through experimentation with household items. They will be introduced to atoms and the idea that matter is never destroyed or created, but simply changed. Finally, students will be able to explain that the bonds between atoms in the reactants are broken, the atoms are rearranged, and new bonds between the atoms are formed to make the products.

Biochemistry

One-Day Experiments:

BIOCHEM-1: Introduction to Biochemistry and Vitamin C Concentration (1.5 hours)
Even before you get to the level of cells and DNA, life depends on specialized organic molecules— proteins, carbohydrates, fats, and more. In this module, a wide variety of chemical assays will be utilized to learn about these molecules; students will analyze foods for starch, sugar, lipids, protein, and amino acids; observe the enzyme mechanisms of digestion; and perform chromatography separation. Vitamin C is vital for human health—without it, we develop scurvy. In this module, students will also test a variety of foods for their presence and concentration of vitamin C.

BIOCHEM-2: Physical Properties of Proteins (2 hours)
Proteins are a critically important part of organic life, so it's no surprise that there are a variety of techniques for working with them. In this module, students will learn a number of methods for working with proteins, including precipitation, fractionation, and denaturation.

BIOCHEM-3: Protein Bioassay ELISA Experiments (1.5 hours)
Immunoassays are one of the most powerful analytical tools in molecular biology. In this module, students will learn how to conduct an ELISA assay, using antibodies to probe for the presence of environmental hazards.

BIOCHEM-4: Turnip Peroxidase Reactions (1.5 hours)
What exactly is a redox reaction? Students will learn that Reduction – Oxidation Reaction describe all chemical reaction where the atoms have changed their oxidation number (simply the exchange of electrons). Enzymes are also very important for these reactions to take place and this lab will demonstrate this as well. The interaction of enzymes will be discussed and how they specifically relate to this lab as well as the bigger picture. Students will then learn how to use a spectrophotometer to read the levels of specific proteins and enzymes from their turnip.

BIOCHEM-5: Starch, Protein, and Lipids Investigation (1.5-2 hours)
Students will complete a series of tests and comparisons of starch and proteins in this workshop. They will begin by being introduced to what starch and proteins are and how they are represented molecularly. Then students will test different samples to see if starch or proteins are present in them.

BIOCHEM-6: Enzymes Help Us Digest Food (1.5 hours)
The food you eat contains many different types of molecules, including sugars. In order for our bodies to digest these large molecules we need enzymes to help break them down. In this workshop, students will further understand how enzymes and sugars interact through activities and experimentation.

Micro-eukaryotes

One-Day Experiments:

EUKARY-1: The Wonderful World of Termites (1.5 hours)
In this entertaining module students will be looking at termites in two very distinct ways. Students will start out by using the scientific method to describe the behavior of termites when they come into contact with ink pens (pheromones). During the second half of the module students will learn about the symbiotic relationship that occurs between termites and the protozoans that live in their guts. Students will be given the opportunity to extract the protozoans from the termite gut and view them under a microscope.

EUKARY-2: Seeing "Eye to Eye" with Microscopic Organisms (1 hour)
Protozoa occupy a somewhat strange place in taxonomy: once a catch-all category for anything that didn't fit neatly into kingdoms, the term now refers to a large group of unrelated, mostly single-celled or colony-based organism that are nevertheless more complicated than bacteria. In this module, students will learn basic microscopy skills and use them to observe a variety of protozoa, including amoeba, euglena, and paramecium.

EUKARY-3: Predator and Prey (1.5 hours)
Some aspects of the world are impossible to experiment with-- it would be too expensive or too unethical to try. In cases like these, scientists rely on passive observation and mathematical models. In this module, students will use both methods to explore the relationship between predator and prey. Students will observe the microscopic Hydra use its tentacles to devour Daphnia, a tiny water crustacean.

EUKARY-4: Daphnia and Heart Rate (2 hours)
The process of drug discovery-- the journey from chemical to medicine—is a long one. One of the first steps is testing the effects of the chosen chemical in a simple model organism. Students will experience this first hand by treating daphnia-- water fleas-- with a variety of common drugs and making qualitative and quantitative observations of the effects. In the process, they'll learn important concepts such as dose response and critical level.

Contact the CSL for details on how to schedule the following workshops:

Bacterial Identification- Microbiology (2 weeks; week one: learning micro tests, week two: Mystery Microbe)
How can we tell two species of bacteria apart? It's a simple matter for plants and animals, where differences are usually visually apparent. But in bacteria, visuals aren't helpful— we need to analyze what they do, what they can and can't eat, what they do and don't secrete. In this module, students will learn how to perform a variety of metabolic tests for things such as catalase production and motility. They will then be given an unknown culture and using their new skills determine which bacterial sample they have.

Oil Slick Lab- Microbiology (5 days; 1 day of experimentation and 4 days of observation)
Large oil spills are ecological disasters, capable of devastating enormous swathes of the environment. In recent years, scientists have explored the idea of using oil-eating bacteria to clean up spills quickly and easily. In this module, students will test the ability of bacteria to digest a variety of oils, and compare the biological results with commercial chemical methods.

Contact Information

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