

GROW 2009 Summer Workshop Activities

Dr. Daniel Higgins, Mr. Jeff Lange, Mr. Tom Everett & Ms. Brenda Luther

"Acid Raindrops Keep Falling in My Lake"

This activity will involve simulating what happens when acid rain falls in a lake. The students will listen to a brief presentation on acid rain in a classroom. They will then move to a laboratory where they will perform a hands-on experiment. In the lab they will simulate acid rain using dilute vinegar solutions. They will observe how certain solids dissolve to neutralize the acid in the water. Solids to be tested will include chalk, crushed natural limestone, stones, etc. They will observe changes in pH using red cabbage as the indicator.

Dr. Sherry Fleming

"Bacteria: The Good, the Bad and the Ugly"

Bacteria! Where do they live, grow and spread? How does our immune system kill them? We will investigate bacteria (good, bad and ugly) and discover how your white blood cells kill bad bacteria.

Dr. Sue Brown, Dr. Renata Bolognesi, and Dr. Teresa Shippy and (Students from Tribolium Genetics group)

"Beetlemania"

You may have seen flour beetles or their cousins in your cereal box. But did you know that scientists use these small insects as models for studying development and disease. We will show you how they are used in the lab.

Ms. Sally Tucker

"The belowground world of plants in the tallgrass prairie"

Developing an appreciation for the belowground growth and biomass of the tallgrass prairie community

Dr. Valerie Wright & Ms. Annie Baker

"The Botanical Prairie"

Experience the tallgrass prairie at the height of wildflower season to see more than 50 species of native plants blooming. As a botanist, you'll learn how to identify, collect and press wildflower species in the field. Join Konza Prairie naturalists on a short hike through the tallgrass prairie. You will search for and collect some flowering plants. In the laboratory, you will be introduced to a research herbarium and mount a small pressed plant specimen to take home.

Ms. Susan Arnold Christian & Ms. Chelsea Renda

"CHOICES: A game of life decisions"

Come play a game that is all about you and your life! What do you want to do in high school? College? Be prepared to make decisions about your future and get a visit or two from fate!

Dr. Sundeep Rayat & Mr. Olajide Alawode

"Celebrating Chemistry"

See your fingerprints - Release the Grease - Polishing Pennies

Dr. Stefan H. Bossman, Mr. Thilani Samarakoon & Ms. Ayomi Perera

"Chemistry in the Kitchen"

In this activity you will identify acids and bases in the kitchen using basic chemistry principles. We will have series of test tubes with household ingredients and you will identify if these are acids or bases using red cabbage indicator.

Dr. Valerie Wright & Ms. Annie Baker

“Critters in a Prairie Stream”

We will collect invertebrates from the pristine stream on Konza Prairie, identify them and archive the specimens for further use by Konza Prairie ecologists.

Dr. James Edgar & Mr. Ryan LaBarge

“Crystals and Crystal Growth”

The symmetry, order, appearance applications of crystals will be discussed. Students will build simple ball and stick crystal models to see how crystals are formed and why they have specific crystal habits. A variety of crystals will be examined using optical microscopes. Methods of growing crystals from solutions will be demonstrated.

Dr. Chris Culbertson, Ms. Congui Ye & Ms. Eve Metto

“Cyanotypes: A Chemistry and Art Connection!”

Most photography is based on the reaction between silver salts and sunlight. In this session students will explore another chemistry method to produce images using iron salts. In this session, students will prepare blueprint papers, find creative items to place on their paper (i.e: flowers, leaves, sticks, stencils, film negatives, etc.), expose them to the UV light outside, and develop them to create their own cyanotypes to take home!

Ms. Jessica Heier Stamm

“Disaster Relief”

Many kinds of disasters leave people in need of food, water, medical supplies & other necessities. But the unpredictability of these disasters makes it very difficult for relief agencies to respond quickly. In this session, we will each become part of a relief supply chain model. We will explore the challenges of relief supply chains & the ways engineers & scientists can improve them.

Dr. Takashi Ito & Ms. Shaida Ibrahim, Mr. Bipin Pandey

“DNA – Beyond Goo”

All living things have DNA, which makes up the genes that control the properties of living things such as color, shape and size. In this activity, you will extract DNA from onion cells. Then you will use an optical microscope to observe the extracted DNA, and see whether the DNA can be stained using a common food dye and a colored medicine.

Dr. Simon Ou & Mr. John Homer

“Do you know who is on your computer?”

You may have used a computer for browsing the web, receiving emails, or exchanging songs with your friends. But do you know what happens behind the scenes? Do you know what could happen when you click an icon on your computer's Desktop, open an attachment from an email, or simply click through a link on a webpage? We will show you first-hand how an attacker can take over your computer through those simple things that you do on a computer.

Dr. Donghai Wang

“Engineering Your Food”

In this activity you will learn how the work of Biological & Agricultural Engineers is put to work in food production! Come make some applesauce!

Dr. Dyan McBride

“En-LIGHT-enment in Science”

We will explore the many types of light and how light is produced. We'll also see how different light sources interact. Finally, we'll take a closer look at the light given off by different gases to learn about the energies they release. Throughout the workshop we will use hands-on experiments and

computer visualizations. You will work in small groups and discover exciting new ideas and apply these ideas to interesting everyday problems.

Dr. Daniel Boyle

“Exploring the Microscopic World”

In this activity, girls discover what might be found in their mouth or external ear using powerful microscopes capable of seeing proteins, lipids, viruses and cells. They will prepare samples from their own mouths and external ears and look at them at magnifications up to 450,000 times.

Dr. Randy Price

“Farming Sensors”

This activity focuses on the use of the Ntech® Greenseeker to determine different crop and plant species.

Ms. Sarah Nuss-Warren, Mr. Brent Dunkel, Ms. Kellen Ebert, Mr. Eric Figge, Ms. Diana Grauer, Ms. Krystle Thompson & Mr. Mohamed Toema

“Fire it Up!”

This session will investigate fuel combustion. The goal is to determine what happens during combustion, and to explore the factors that affect combustion. The session includes ample opportunity to conduct combustion experiments and determine when a fuel will and will not burn. Experiments will include the use of hydrogen to improve combustion. The attendees will prepare and present a PowerPoint presentation that describes the experiments, results, and conclusions.

Dr. Koushik Adhikari, Dr. Tandalayo Kidd and Ms. Jeehyun Lee

“Five Senses, Food and You”

In this activity you will learn about the science of food! You will discover how we choose foods based on the five senses of sight, sound, touch, smell and taste!

Dr. Carolyn Ferguson

“Flower Power”

In this session participants will explore the world of Botany! Come create botanical collages from pressed flowers and tour the Herbarium.

Dr. Michael O’Shea

“Fun with Magnetism”

Come explore the properties of permanent magnets! We discover simple ways these properties can be used and how electric currents can create magnets. Finally we will look at the Earth’s magnetic field and play with some machines that use magnetic fields. No previous knowledge of magnetism is required!

Dr. Wayne Yuan

“From Algae to the Gas Tank”

We live in a world that relies on fossil fuels. Can you imagine what will happen if one day we run out of oil? Our cars will not move without gas. Our airplanes will not fly without jet fuels. We need to find alternatives to fossil fuels. In this session, we will learn how algae can be grown to make oil, and how oil can be converted into biodiesel. Students will have hands-on experiences of making biodiesel and take home some biodiesel samples they made in the lab.

Dr. Mbaki Onyago

“Grain Analysis”

This test is among the oldest of soil tests, it is widely used in engineering classification of soils. This test is also known as particle size distribution test, can be used as part specification for construction of airfields, roads, earth dams and other soil embankments.

Dr. Ruth Douglas Miller & Ms. Anita Ann Jose

“Harvesting Wind Energy”

Try to build the most efficient wind turbine you can, in collaboration and competition with your friends. How easy is it to capture the wind's energy to make electricity?

Dr. Lisa Freeman

“The Heart of the Matter: Learning How Creatures Go Pitter-Patter”

Your heart beats about once every second. A mouse heart beats 5 times faster than your heart, while a horse's heart beats 3 times slower. We will dissect hearts from different species to compare their size and structure. We will learn how electrical signals are carried from your brain to your heart, and we will measure the surface electrical activity of your hearts (ECG) and compare your ECG to the ECG of the mouse, dog, horse, and elephant.

Ms. Julie Thornton & Ms. Scarlett Sidwell

“How Do Computers Work, Anyway?”

In this session, you will learn the basics of how computers work and communicate. How do computers count? What's in a picture? How do computers make things smaller? All these questions and more will be answered!

Dr. Marianne Korten & Dr. Charles Moore

“How far is it around the earth?”

Using just sticks and some calculations we will be able to figure out the circumference of the earth! The ancient Greeks figured out how to do this over 2000 years ago.

Dr. Dave Auckly

“In a Galaxy Far Far Away....”

Have you ever wondered how astronomers measure the distance to stars? In this session you will learn how to measure some really large distances. We will make some measurements and compute some distances. A related question is how to compare locations of objects described from different places. You will be challenged to describe the positions of various objects from different locations. You will also be given outlines describing how one can predict the path of an asteroid, measures the age of the universe and describe possible shapes of the universe.

Ms. Bridget Kennedy, Ms. Ashley Thomas & Ms. Paxton Rein

“Lego Woman”

Are you a good communicator? Is it sometimes challenging to work on a team and get your ideas communicated? This fun Lego building activity will help you work on this skill!

Dr. Hayder Rasheed

“MathCAD for Young Engineers”

This activity will take you through a trip to the magnificent world of Math assisted by the powerful tool of Math CAD. Your basic and more advanced mathematical operations will all be performed using as-you-read/as-you-write math format. You will enjoy this Math ride and once you learn how to use the software you wouldn't want to quit.

Dr. Abdelmoneam Raef

“Measuring Gravity”

In this activity you will learn how to use a gravimeter to measure earth's gravity and learn about sensitivity of those measurements to elevation changes. This can be used to determine changes of gravity in prospecting for minerals. Let us check out gravity changes with elevation in Kansas State Foundation Building.

Dr. Megan Kennelly & Mr. John Fellers

“Plants get sick, too! An introduction to plant pathology”

Just like people and animals, plants can get sick, too. Plants can become infected with microbial organisms such as viruses, bacteria, fungi, and nematodes. In this class, we'll have hands-on experiences looking at plant diseases in the microscope. Students will have the opportunity to make their own slides to view different types of structures.

Dr. Kyle Riding

“Strong as a Rock “

Students will learn how strong, decorative and versatile concrete can be. It is difficult to imagine our world without any concrete - very few bridges, roads, or even houses would be the same without it. The students will get to see how concrete is tested for strength, and will get to make a concrete sample to take with them.

Dr. Mark Ungerer

“Sunflower Biology”

Sunflowers are fun to look at. Are they good for anything else? Yes, they are! This session will explore the biology of sunflowers. We will talk about their natural history, their use by Native American peoples for food and dye, and their current status as an important crop. By the way, what's a crop? Crops usually are domesticated plants grown together for their produce. Hmmm, what's a domesticated plant? Come find out!

Dr. Rhonda Janke

“Sustainable Agriculture and Soil Quality”

Students will travel to a working organic student farm, learn about sustainable agriculture practices, participate in running soil tests, and then help college students with growing and harvesting crops for market. If you are interested in local food, and where it comes from, this workshop is for you.

Dr. Dave Chandler

“Thirsty Dirt”

Why do we care about how much water the ground can hold? In this session you will learn how this simple concept affects the work of Biological and Agricultural Engineers and Civil Engineers. It affects where buildings are placed, drive ways, side walks, prairies, lawns and much more!

Dr. Alexander Beeser

“UV, Yeast, and You”

We all have heard that ultraviolet light (UV) from the sun can be harmful--it causes sunburns, skin cancers, and cataracts in the eye--here is a chance to learn why. We will learn why yeast is a good model for exploring the effects of UV on living cells and how yeast cells are related to your cells. We will use a special yeast strain to show what UV does to cells.

Dr. Dave R. Steward & Philip Msava

“Water experiments in hydraulic engineering”

Hands-on activities will focus on learning how spillways on dams are designed to minimize stream bank erosion, how tsunami waves are generated, how pumps work, and what happens to chemical spills in groundwater.

Dr. Mahbub Alam

“Water Olympics”

Surface tension is a unique property of water. Participants will learn about Adhesion, Cohesion, and Surface Tension of water and how it applies to the outside world. Students will participate in three demonstrations, which will illustrate these properties.

Dr. Danny Rogers

“Water Quiz”

A computer game on water, environment, and science. Participants will learn about aquifers, water cycle, environment, pollution prevention, science and more!

Mr. Tom Vought, Ms. Katie Franke, Mr. Mitch Stimers, Ms. Keela Andrews & Mr. Ben Munroe

“Wayfinding with Satellites”

Workshop participants will be introduced to global positioning system (GPS) technology and learn how to use GPS by participating in a modern version of orienteering. Upon completion of an outdoor navigation course spanning the Kansas State University campus, participants will then

move to a computer lab and use geographic information system (GIS) software to recreate their experience by calculating their average foot speed and total distance traveled. In case of inclement weather, the outdoor course will be replaced a series of GIS-assisted computer mapping exercises that highlight the physical and cultural geography of Kansas.

Dr. Michael Kanost, Ms. Sandi Yungeberg, Dr. Emily Ragan & Mr. Stewart Gardner

“Wearing a skeleton on the outside: insect exoskeletons”

Girls will learn about insect development and the structure and function of exoskeletons, with some comparison to the functions of bones and internal skeletons. They will work with two insect species, *Tenebrio molitor* (a beetle) and *Manduca sexta* (a moth). We will discuss how chemical polymers make the exoskeleton, and we will make some materials that model the chemical nature of the exoskeleton.

Dr. Kristan Corwin

“Why is the sky blue?”

In this workshop, we will do an experiment to show why the sky is blue. We’ll also learn why polarized sunglasses work best, and even examine how light can be trapped inside a glass fiber. Come learn tricks you can play with light!

Dr. Gurdip Singh, Ms. Shравanthi Kallem & Mr. Dinesh Challa

“Wireless Sensor Networks”

Sensors are finding widespread use in everyday applications such as home security, automated highways, forest fire detection, and patient-health monitoring. In this activity, we will introduce basic concepts of how sensors can be used for various types of monitoring and surveillance activities using wireless communication. Students will be given sensors which they need to wear (on their legs, arms,...) and collect signals from them wirelessly to distinguish between different body movements such as sleeping, sitting, bending, walking and running.

Dr. Michael Herman, Dr. Dave Wheeler, Ms. Suhao Han, Ms. Zoe Wang & Ms. Kelsey Hixson-Bowles

“X-Worms: A lesson in Genetics”

What's all this fuss about mutants? What are they? How can we use mutants (and Genetics) to understand human disease? We will use the soil nematode (roundworm) *C. elegans* to explore concepts in genetics and link them to an understanding of human disease.