

Digital Catalyst Camp 2020

The West Linn-Wilsonville School District hosts a program called the CREST-Jane Goodall Science Symposium, which is an affiliate of the Regeneron International Science and Engineering Fair (ISEF). Students from each of the three high schools work in teams of up to 3 people or as individuals to do science or engineering projects with the support of two full-time Program Coordinators who serve as technical mentors. This camp is for incoming freshmen to introduce them to the program and help them get a running start on their ISEF project. This year, the camp will be offered digitally to maximize the safety of participants.

The main goals of the camp are:

- To explain what ISEF is and the structures of the program,
- To share information about resource available to support projects,
- To inspire creative ideas to plant a seed for an International Science and Engineering Fair (ISEF) project,
- To have fun doing hands-on activities.

Digital Catalyst Camp will involve two main parts. The entire group will meet on-line for an hour or two each day (depending on the day) and then participate in activities campers can do on their own or with friends and family. The times we will meet together on-line will be called *synchronous* and the activities that will be done separately will be called *asynchronous* activities. Your mentors will have on-call hours to support you on the asynchronous activities. The purpose of the asynchronous activities is to inspire possible project ideas and to introduce you to new ideas, to resources, and technologies. Throughout the camp, you'll choose from a selection of fun, hands-on activities according to your own areas of interest. You won't necessarily choose to do an ISEF project that has anything to do with the topics addressed in these activities, however, you will learn information that may inspire you and about resources available to help you push the boundaries of science or engineering with your own project.

Overview of planned activities for Catalyst Camp

Synchronous: Web conferencing sessions held throughout the week

Introductions: Overview of the camp design and the ISEF program.

Ice breaker: Mystery boxes activity.

Web conferencing labs tour: A virtual tour of the ISEF labs to show you the facilities we have at each school.

Description of the choices of asynchronous activities:

Sign up for your choice of activities on Monday. Several activities involve kits to use on your own; kits will be dropped off at your home on Monday afternoon.

Virtual Roundtable:

- Experienced ISEF students will share their own fair presentations, talk about how they came up with their project ideas, and share tidbits about what the ISEF process has been like for them.
- Virtual roundtable Q & A: Campers will submit questions to ISEF alum about the program or to run their project ideas by experienced ISEF students to get a bit of help choosing or refining a focus.

CREST/ISEF resources: We'll discuss the supplies and materials we have for you and talk about ways to access resources.

Introduction to free research resources and how to access them for ISEF and for other school projects.

Conversation with an expert panel: Hear from experts from a variety of fields about how they develop their own research or engineering design projects. Get ideas for project topics and learn about community resources available to help you.

Social science research methods: Learn about approaches to studying people from a variety of perspectives. Practice using tools of social science while at the same time collecting data to explore topics related to cognitive and behavioral science.

Pitch your project idea: One at a time, each camper or project team will provide a brief (5-minute) project pitch to ISEF alumni who will provide feedback on your ideas on the last day of the camp.

Asynchronous activities we'll all do:

View the CREST ISEF video (introduction to the high school level program).

Check out the ISEF projects database - Learn about this collection of amazing projects readily available to help you to find topics that interest and inspire you.

Design your project pitch: While you may not actually do the project you come up with during this camp, it's great practice to design a project pitch and actually present your ideas in a safe, low-stakes situation. Working from that premise, working as an individual or in a team of up to 3 people, you'll outline your project and pitch your ideas to a panel of ISEF alumni to get feedback and help thinking about resources.

Choice activities:

Campers will choose one or more of these activities each day of the camp.

CREST Tour: Access this tour via a link posted to the Google Classroom to learn about resources available to you at CREST through the lens of *permaculture*, a set of design principles centered on whole systems thinking that involves simulating, or directly utilizing, patterns and features observed in natural ecosystems. Have fun hunting within this tour for hidden gems in the built and natural environment there to inspire your curiosity and wonder!

Geocaching: This computer science and engineering design related activity involves playing an app-based game in a local park to find and learn about civil, mechanical, and bioengineering design examples you pass by with every walk in the park that represent thousands of years of creative ingenuity.

Backyard entomology: Each flower provides habitat for a diverse community of insects that live on the flower and on each other. Borrow *Insect Collection and Observation Kits* to do your own investigation of what's living on flowers. Use a hand-held paper Foldscope (microscope) in the field that magnifies up to 140 times to investigate hidden communities living right under your nose. Then, pass along your samples to your mentors who will them back to the lab and put them into a scanning electron microscope you will remotely access from and control from your own computer to view your samples at 10,000 to 15,000 times magnification. Authentically contribute to a citizen science project by taking photos with the scanning electron microscope to post to the citizen science *Bug Guide* (<https://bugguide.net/node/view/15740>) where you can get help figuring out what those insects are from the photographic keys or through the on-line forum hosted on the website.

What's in a Bird Song?: Songs versus calls - For most people, birdsongs go in one ear and right out the other; people rarely stop and think “what is that bird saying?” unless you're an *Ornithologist*! People who study birds know that most bird sounds fit into two big groups: calls or songs. Here, you will explore the difference between the two and increase your sensitivity to the sounds that surround you.

Water quality exploration: If you did Outdoor School, this activity will seem familiar but oh boy, do we have an amazing step up in analytic power to offer you here! Borrow a kit to collect water samples from two very different bodies of water near your home (anything from a drainage ditch to a pond, stream, river or lake). Use simple but powerful tools to compare indicators of water quality by examining the water temperature, pH, and turbidity (how cloudy the water is). Then, your mentors will collect your water samples to take to the lab where we'll step it up by giving you remote access to use a scanning electron microscope to examine single-cell algae called diatoms found in each water sample you collect. You will control the microscope and built in camera from the comfort of your own computer to examine these amazingly beautiful, teeny tiny organisms that are super sensitive to pollution, which makes them fantastic biological indicators of water quality. Comparing the abundance and diversity of the diatoms you find in each of your water samples will tell you a great deal about the quality of the habitat they live in. Next, use satellite views via Google Earth to look what may be contributing to differences of water quality found in each habitat. You may be surprised by what you find!

Givers and Takers in the plant world: Borrow a kit and take home a spinach plant and a pea plant to explore how organisms that live amongst the roots affect soil health. You may have heard that planting legumes *feeds* the soil because legume roots host bacterial “givers” that take in and convert nitrogen from the air, but what does this look like in action? Check out what lives on the roots of pea plants (legumes) with a hand held microscope then test the soil pH and nutrient levels of soil where the peas are growing in comparison to soil where a “taker” plant (spinach) is growing. Finally, compare the soils where the plants are growing with a sample of the same soil where nothing was planted (control soil). Check out the differences!