CORNELL UNIVERSITY

April 6, 2024

EYH

expanding your horizons network

powered by techbridge girls

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Expanding Your Horizons

The Expanding Your Horizons Conference provides a hands-on opportunity for students in grades 7-10 and their parents to learn about careers involving mathematics, science, and engineering. Meet physicists, astronomers, chemists, biologists, computer scientists, and more. See for yourself how exploring mathematics and science can lead to fun and rewarding careers!

At the EYH conference, you will attend two or three hands-on workshops, each one offering a different perspective in science, mathematics, or engineering. You will also hear from our keynote speaker, receive a folder full of fascinating information, and get a free EYH t-shirt!

The conference has a particular interest in providing opportunities for girls and gender minorities, as they have traditionally not had the same opportunities to be exposed to STEM as boys. However, participation is not based on sex and is open to all.

For more information, please contact us

E-mail: eyh@cornell.edu
Phone: (607) 255-1486
Website: www.eyh.cornell.edu

For registration questions, please contact:

E-mail: CornellEYHreg@gmail.com
Phone: (607) 252-6728

CONFERENCE SCHEDULE

Junior Scientist Program

All 7th & 8th grade students

7:30 - 8:45 Breakfast (Barton Hall)
7:30 - 8:45 Registration (Barton Hall)
9:00 - 9:45 Welcome & Keynote Address (Barton Hall)

9:45 - 10:10 Participants Escorted to Workshop 1
10:20 - 11:30 Workshop 1 (Parents meet students)
11:45 - 12:30 Lunch (Purple Group, Barton Hall)
Demo (Green Group, Barton Hall)
12:30 - 1:15 Lunch (Green Group, Barton Hall)
Junior Scientist Activity (Purple Group, Barton Hall)
1:35 - 2:45 Workshop 2
3:10 - 4:20 Workshop 3
4:20 - 4:30 Reconvene for Closing Remarks (Barton Hall)
4:30 - 5:00 Raffle Drawing (Barton Hall)

Senior Scientist Program

This track is designed specifically for **9th and 10th grade students** who are beginning to take high school-level science courses. They offer the students an opportunity to gain more in-depth and hands-on experience in different STEM fields. Please see workshop descriptions on page 11 for more information.

7:30 - 8:45 Breakfast (Barton Hall)
7:30 - 8:45 Registration (Barton Hall)
9:00 - 9:45 Welcome & Keynote Address (Barton Hall)
9:55 - 10:05 Participants Escorted to Demos

10:05 - 10:35 9th and 10th Grade Demos
10:45 - 12:25 Workshop 1
12:35 - 1:15 Lunch (Barton Hall)
1:30 - 2:15 9th Grade Activity
2:40 - 4:20 Workshop 2
4:20 - 4:30 Reconvene for Closing Remarks (Barton Hall)
4:30 - 5:00 Raffle Drawing (Barton Hall)

REGISTRATION INFO

Questions? Email: cornellEYHreg@gmail.com or Call: (607) 252-6728

2023 Registration Timeline

Registration Event	Date
EYH lottery open on website	Feb 19 (9 AM) - Feb 23 (5 PM)
Lottery results announced via email	Feb 25
Full online registration for lottery winners	Feb 26 (9 AM) - March 8 (5 PM)
Consent forms and payment due	March 23
EYH Conference	April 6

Enrollment in the lottery will be available on our website (www.eyh.cornell.edu). If selected for EYH, you will be sent instructions for completing your registration to secure your spot. ***Failure to complete these instructions within the prescribed time will forfeit your spot to a member of the waitlist***

Conference Fees

There is *no fee to enter the registration lottery*. If you are selected to attend EYH, the registration fee is **$25** per student and is non-refundable. With this payment, the student will receive:

- Participation in 2 - 3 hands-on workshops, the keynote address, science displays and demos, and a raffle of science-related prizes
- One EYH T-shirt
- Breakfast and lunch for herself and for one accompanying adult

We encourage each attendee to bring an accompanying adult to the conference. There is no additional fee for the participation of an accompanying adult. Any student who does not have an accompanying adult will be assigned a Cornell Buddy for the day. However, we want to open EYH to as many students as possible, and the availability of Cornell Buddies is a limiting factor on the size of the conference.

Additional adults beyond the accompanying adult can register for $10. Additional T-shirts can be purchased for $10

Scholarships: EYH offers scholarships to those who require assistance with the registration fee! You will be able to request a scholarship when you register.

Group Leader Responsibilites

If your group is selected for participation in EYH, you will be our contact person for all registration logistics. You will pass on information about the conference to your group members. You will ensure that each student completes their online registration on time. You will submit a single payment to EYH to cover the registration fees for all group members. On the morning of the conference, you will sign your group in at the EYH registration table, and will coordinate the distribution of nametags and folders to your group members. **For safety purposes, if you are unable to serve as group leader on the day of the conference please let us know ASAP who the replacement group leader will be**. You can be the group leader for only one group.

KEYNOTE

Flying to Fiji for Feces: Chasing your passion

Dr. Brito will share her random walk through science that ultimately led her to her passion — developing cutting edge tools that reveal how the microbiome affects human health.

Dr. Ilana Brito, PhD
Associate Professor, Mong Family Sesquicentennial Faculty Fellow in Biomedical Engineering

ABOUT DR. ILANA BRITO

Prof. Ilana Brito earned her BA at Harvard University double majoring in Biology and Government. She took a year off in the middle of college, spending part of that year performing supportive work for ongoing malaria vaccine trials in Mali. This was a transformative experience for her, solidifying her interest in infectious disease. She went on to pursue a PhD in Biology from the Massachusetts Institute of Technology, where she detoured into the study of cell division—mitosis and meiosis. After that, she received a postdoctoral fellowship to work on infectious disease at Columbia University's Earth Institute, where she single-handedly launched a major effort to study the transmission of microbes that make up the human microbiome. Whereas some of the microbiota in and on our organisms may have pathogenic qualities, many offer beneficial functions to the human body. This was the first large-scale study of non-Western microbiomes, the size of the NIH-funded Human Microbiome Project. She continued processing and analyzing these samples, picking up computational biology skills at MIT and the Broad Institute. She joined Cornell's Meinig School of Biomedical Engineering in 2016, studying the mechanisms by which these organisms in our bodies contribute to health outcomes, namely antibiotic resistance and the promotion and prevention of cancer and autoimmune disease. Her lab aims to harness attributes of the human gut microbiota to develop strategies for treating, diagnosing and preventing disease. Prof. Brito has received numerous accolades for her work, including the Packard Fellowship, the Pew Biomedical Scholarship, the Sloan Foundation Fellowship, and the NIH New Innovator Award.

JUNIOR SCIENTIST

2024 EYH WORKSHOPS

1. Beyond Bacon: Why Fats are so Important

Fats are a major component of some of our favorite foods, from bacon, to ice cream, French fries, and potato chips, but that is not all that fats are or do. This workshop delves into the amazing world of unique roles that they play in our bodies. Fats help keep animals warm in the winter, hold your body's cells together, keep you from turning into a mummy, and so much more. Join us to learn how they do it!

2. Black Widow vs. Wonder Woman

Ever wonder what you have in common with Black Widow and Wonder Woman? Your body does amazing things and you just don't know it! Like the super spy Black Widow, it can decode secret messages. It can also make sure your cells only tell the truth when talking to other cells, just like Wonder Woman's Lasso of Truth! These superpowers help make us who we are and allow us to do incredible things. Come discover how "super" you are and better understand some of your favorite heroes!

3. Bouncing into Polymer Chemistry

Making useful items like sticky glue, rechargeable batteries, and plant-based plastic is all part of polymer chemists' daily work. In our workshop, we'll explore how chemists string together long chains of atoms to create polymers, and how they build different materials from these polymer chains. Come make your own custom stretchy slime and bouncy balls from polymers, which you can take home with you!

4. Build your own electric vehicle

The Tesla roadster is cool? What does make EVs so powerful compared with gasoline vehicles? It is the magic of electromagnetism! In this workshop we will figure out how electrical power drives the motion of electric motors and electric vehicles. Particularly, you will have the opportunity to build your own toy EVs using simple tools, including a funny magnetic train that runs on a coil rail and a simple electric motor spinning fast.

5. Build your own Foldscope, and explore what your eyes don't see!

Have you ever wondered how things look beyond what your eyes let you see? How fun would it be if you had your own microscope, simple yet powerful enough for exploring the microscopic world with you on the go? Attend this workshop where you can build an origami-inspired mini microscope using paper and lenses! We will use the microscopes we build to look at biological samples and see what types of cells are in an orange, a flower, and your body! You will also be able to take your microscope back home with you to continue exploring the microscopic world.

6. Cell City Relay

Have you ever wondered how the tiny cells that make up our bodies ultimately govern everything that we do? Or how your cells communicate with each other to fight off pathogens? Join us as we shrink down to become the organelles inside of a cell and conduct our own cell signaling relay race. You'll also get to stain a slide with your own cells and see different cell types under the microscope!

7. Colorful Chemistry Detectives

You've probably used different brands of black markers before, but did you know that although they all look black on paper, each company uses different mixtures of dyes? Explore the chemistry of colorful dyes by making your own dye from crushed bugs, study the effect of chemical interactions on your dye, and make some cool art along the way! As a synthetic chemistry detective, see if you can use chromatography to figure out the brand of your mystery marker and then mystery solved!

8. cool_beat.exe

Music? From code?! Our workshop will answer both of these questions with a *resounding* yes! In it, we are going to learn how to program synths and beats using a language called SonicPi. Come and make a .wav file full of cool vibes and good memories! 🎵😎

9. DIY-o-sphere

Plants draw down carbon dioxide (CO_2) from the atmosphere through photosynthesis. This process is an important part of the global carbon cycle, and results in carbon being sequestered in forests. For this reason, and because excess CO_2 in the atmosphere from burning fossil fuels is currently heating up the planet, forest conservation and reforestation are important parts of the suite of climate change solutions that people around the world are implementing. Here, we will create the world's smallest climate model: a miniature, living model of plant photosynthesis on a tabletop to demonstrate how plants draw down CO_2 and change the atmosphere around them.

10. Engimatic Magnetics

What do computer memory, hydroelectric power and electric cars have in common? Magnetism! Magnetism is used every day to encode information on computers, harvest clean energy to power our cities and power electric cars. Explore how the technology of tomorrow will use magnets!

11. Exploring Math: Patterns and Puzzles

Do you know how to win games every time? Or how to calculate and maximize your chances of winning a game? Or what happens when you can teleport across the board while playing tic-tac-toe? We will explore these ideas using twists on common games, trying to introduce notions of strategy and mathematical analysis.

12. Fueling Your Gut Reactions!

Did you know that there are TRILLIONS of tiny microbes living inside your gut? Scientists refer to this community of microbes as the gut microbiome. In this workshop, you will learn about the chemical reactions these microbes carry out, both inside your intestines and during the production of some of your favorite foods. Join us to build a gut model (out of cake!) and get hands-on with some of these chemical reactions!

13. Googling with Paper Airplanes

Have you ever wondered how computers talk to each other? How a video from California gets onto your phone in New York? Would you like to throw paper airplanes? In this workshop, you will learn how the internet works by throwing paper airplanes!

14. Meals Made with Microbes!

What comes to mind when you think about microbes? Bugs that make you sick? Mold on your bread? Microbes do so much more than that! Learn about food and drinks made using microbes and get hands-on experience making your own. Students will take home their own starter cultures to make sourdough bread and kombucha.

15. Plant Domestication and Adaptation: A Seed Dispersal Game

Become an ancient plant and adapt your “seeds” for dispersing in the wild, then, become a modern plant and domesticate your “seeds” to help early farmers make plants more suitable for agriculture in a 10,000 year long process called plant domestication.

16. Program Your Own Animation!

Do you love Encanto or Frozen? Interested in how animators make cartoons fly? Do you like to play puzzle games? If you’ve ever wondered about what it takes to make something creative with the computer, this workshop is for you! We will teach you the basics of Scratch, a popular free program, to make characters fly. We’ll teach you computer science techniques to make your animations super cool with interactions and fun effects! Come make animations and discover how the inner details of programming can help you create!

17. Radioactive World

From energy to medicine to everyday life, radioactivity is all around us. As scientists, we solve problems and learn about different systems by using radioactivity in techniques including carbon dating and cancer therapy. We also take a look at important figures in radiochemical history. Join us as we learn how to identify, detect, and understand fundamental nuclear chemistry!

18. Red Light, Green Light

Get ready for an enthralling adventure in the field of electronic with a miniature traffic light project! You will explore the basic concepts in creating a functional electronic circuit that is easy to build and test in a short amount of time. Experiment with a myriad of analog components such as the capacitors, resistors, light emitting diodes (LEDs) and transistors. Learn how to time and blink different color LEDs in a fun, innovative approach. No coding required and a simple 9V DC battery is sufficient to provide power for the circuit. A simple equation is what it takes to calculate the value of resistor and capacitor to time each LED.

19. Reverse Your Taste Buds

How do we differentiate the tastes of so many different foods? How does our tongue work to allow us to taste sweet, salty, or sour? Wouldn't it be nice if vegetables tasted sugary sweet? Well, maybe they can! The miracle berry fruit contains a compound that will turn your taste buds upside down! With this workshop, discover the science behind taste and the molecular signaling events that make it all possible.

20. Somebody Call the Plant Doctor

Somebody call the doctor… the plant doctor! Have you ever wondered what's spoiling your favorite fruits and veggies? Plants can get sick, just like you. Take a trip with us to the lab and solve the mystery of what is killing your tomato plants, ruining your strawberries, and making your potatoes a rotten mess!

21. Squeaky Clean Brains

Almost ten years ago, the Ice Bucket challenge went viral, generating millions of dollars to help fund research for ALS. In this workshop, we dive into the science behind neurodegenerative disorders such as ALS, Alzheimer's, and Parkinson's. Perhaps you've wondered how these diseases affect the brain and what causes them to arise. Wonder no more! Cells, just like people living in a city, produce garbage. Cells can't function if the garbage is not cleaned off the streets. Therefore, cells in our body use specialized "garbage trucks" to remove this cellular garbage to maintain our health. In this workshop, you will be responsible for removing litter from the brain until it's squeaky clean before it's too late! Come learn what brain cells do to stay clean, and how cellular garbage can otherwise cause diseases like ALS and Alzheimer's.

22. World Builders

What if we did a science experiment on COUNTRIES to figure out what they should do to make their people better off? That could be useful, but also impossible (and probably unethical!) So how about instead we run experiments on models of countries? Join us for a role-playing game where you can be a country deciding what to trade. See how a simple game can teach us why the US buys so many goods from other countries. We'll also play a game (with prizes!) to learn why things like national defense, public parks, weather prediction, and broadcast television cannot be provided by private companies in the same way as, for example, telephone service or cable television can be.

SENIOR SCIENTIST

2024 EYH WORKSHOPS

23. Catch a Wave, a Wavelength of Light that is....

The light we can see is made of electromagnetic energy that travels in waves. Do you know sensors can also capture waves of energy beyond the visible? With hands-on activities we will explore imagery of different spectra to learn about the environment on earth. You will be introduced to remote sensing applications, as well as academic and industry career opportunities in the field of geospatial science and technology.

24. Crystals from Salty to Sweet

Come take a look up-close at some of life's most important crystals forming in real time under a microscope and learn about all the sizes and shapes they can come in. We will explore the world of crystallization and how you can change their environment to customize their appearance and texture. We'll then use what we know about crystallization to make ice cream like you've never seen before!

25. De-Spelling the Magic of Coding

At first glance, coding seems a lot like magic. It requires knowledge of different commands and components that are put together to cast incredible spells! While coding won't let you shoot fireballs or make yourself invisible, it can allow you to do amazing things with your computer! In this workshop, learn how to navigate the mystical world of your computer and put together "potions" using the Python coding language. This workshop does not require a background in coding and is designed to help beginners learn some of the basics of coding through fun and magical activities!

26. Electrifying Chemistry

How do submarines replenish their oxygen? What about the International Space Station? How are scientists trying to fuel cars with water? Join us to learn about how we can use electricity to power chemical reactions. In this workshop you will construct an electrochemical cell and use it to split apart water molecules and deposit metals!

27. Holey Cow

How do cows turn hay into milk? Come meet our fistulated cows, Lily and Snowflake, and explore a cow's stomach and experience aspects of life as a dairy cow. You will get to put your hand in a cow's stomach (called a rumen) and look at its contents under a microscope to tell if she's healthy! Learn why what Sunny eats is so important to her health and yours! NOTE: Dairy products, hay, fur, latex involved. Students should wear clothes they do not mind getting dirty.

28. Observing Moiré Patterns in the Classroom

What is a Moiré pattern and how are they created? Students will discover how sounds can create patterns and then look at how 2D layers can also create patterns. They will then test different variables to see how they affect the Moiré pattern.

29. Peering into the mysterious world of molecules

Why do apples turn brown when you cut them open? Why do your lips turn blue in the cold? Color is everywhere within our world but it also shares secrets about the atomic world with us. As chemists we try and decode what our colorful world is telling us. Join us in this workshop, where we will use spectroscopy, the study of light, to learn just how much color can teach us about the world around us. In this workshop, you will learn about how molecules manifest color in our food and drink and how we can use it to learn about changes that are happening on the atomic level.

30. The Hidden Rainbows of Plants

Rainbows aren't just in the sky, they exist everywhere…even in plants! Join us in the lab to discover what colors are inside your favorite plants, fruits, and vegetables- and learn how plants use their hidden rainbows to survive! Note: Plant/pollen allergens. Food allergens (fruits & vegetables present but not consumed).

31. Turning On The Lights

Have you ever passed by a wind farm and wondered what all those "windmills" were for? Wind farms convert the energy from the wind into electricity that can be used to power your computer or phone. Join us in this exciting workshop, where you will get to build your very own wind electricity generator and use it to turn on real lights!

2024 SPONSORS

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QUESTIONS?

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Phone: (607) 255-1486