

GELFAND OUTREACH

Rigorous - Educational - STEM Focused - Hands-on - Fun

Fall 2021 Saturday Series Classes - Carnegie Mellon University

All Gelfand Outreach Fall Saturday Series Classes are \$55 per class from 9AM to noon.
Scholarship funds are available through gifts from several Carnegie Mellon alumni. Please see last page to learn more.

NOTE: Strict COVID-19 mitigation requirements will be in place; all students and instructors will be required to wear masks. There is NO eating or drinking allowed in classrooms during Gelfand Outreach programs.



Miriam Wertheimer

BIOSPHERES GRADES 3-4

October 9th

What is a biosphere? Learn the answer and much more! We will identify the components of a biosphere and discuss how each part contributes to the wellbeing of the ecosystem. Design your own ecosystem and explain the parts that are essential for it to thrive. You will then create your very own biosphere terrarium to take home!

Miriam "Mimi" Wertheimer joined the Leonard Gelfand Center for Service Learning and Outreach in the fall of 2019 as Program Administrator and LGC Tutor Coordinator. She has a Master of Arts in Teaching from Chatham University (K-6) and has worked in public, private, and charter schools, teaching everything from Early Childhood Education to Middle School English Language Arts. As the Program Administrator, Miriam facilitates enrollment for the Gelfand Outreach Saturday and Summer Series programs. Additionally, Miriam coordinates tutoring programs in collaboration with Pittsburgh area schools and after-school programs that provide CMU students with opportunities to work as tutors, teaching assistants, and mentors.



Leela Jay

BUG BOTS GRADES K-2

October 9th

Bounce your way into the exciting world of robots by exploring motion, power, and electricity. Discover the way motors and batteries operate. Discuss robots and bugs and then create a robot, explain how it moves, and take the robot home to share with your family and friends! Parents are invited into the class at 11:45 for a Bug-Bot parade of all the class creations.

Leela Jay is a third-year Decision Science major, minoring in business. At CMU, she is on the executive board of the Activities Board (CMU's student-run organization that plans campus events for students), the Head of Entertainment for the Spring Carnival Committee, a Senator for CMU Student Senate, and a Consultant for CMU 180 Degrees Consulting. She works for the Leonard Gelfand Center as a Teaching Assistant and STEM Ambassador, working with children from K-12 and teaching them about STEM through workshops and fun activities. Outside of that, she is an Orientation Leader for First-Year Orientation, a Teaching Assistant for introductory psychology courses, and a research assistant at the Data Driven Diversity Lab at CMU. In her free time, she enjoys hanging out with friends, listening to music, and watching tv shows.

COLORFUL CHEMISTRY CREATIONS GRADES 4-6

November 6th

Have you ever wondered how your clothes, accessories, and foods get their color? Many are dyed using natural materials and processes dating back hundreds of years. Join us as we explore the history, economics, and chemistry of natural dyes including cochineal scales and a variety of vegetables and plants. The class features several exciting demonstrations to illustrate chemistry in action. Students will get to experiment, mixing substances and testing a variety of types of paper to determine their impact on color. Students will bring home many colorful creations of their own!



Dr. Judith Hallinen

Dr. Judith Hallinen is the Assistant Vice Provost for Educational Outreach at Carnegie Mellon University. Dr. Hallinen works with faculty and students at Carnegie Mellon to design and implement activities and events that share information about university research with external populations, including K-12 educators and students. She has worked with learners of all ages, including, but not limited to, teaching kindergarten at the CMU Children's School, science education methods to graduate students at Chatham University, and computer applications to senior citizens. Judith coordinates the Gelfand Center's STEM Ambassador program and advises university students who are interested in pursuing a career in education. She holds an EdD from the University of Pennsylvania, MAT from the University of Pittsburgh and BS from Carnegie Mellon.



Max Sprigg-Dudley

Max Sprigg-Dudley is a senior in the chemistry department at Carnegie Mellon. His career interests include the pursuit of sustainable practices in energy, water, and transportation. Max is currently doing research on water purification catalysis in the Collins Lab, and plans to pursue a master's degree in Engineering and Public Policy. Outside of class, Max sings bass in the D Flat Singers Choir, plays club ultimate Frisbee at CMU, and enjoys cycling around Pittsburgh. He is excited to share his passion for chemistry with the next generation of scientists!

HEAR ME RAWR! GRADES K-2

November 6th

Have you ever wanted to understand more about dinosaurs? This workshop is for K-2 students to deepen their knowledge of dinosaurs, their existence, prehistoric life, their extinction, and the roles of paleontologists and archaeologists. Students will complete STEM based, hands-on activities such as simulated dinosaur bone excavation and fossil replication. They will also use their creativity and written work to better understand and respect the dinosaur world of the past, how it has shaped our current existence, and what implications that has on the future.



Courtney Daylong

Courtney Daylong is a Carnegie Mellon University, Heinz College alum. She served as a Teaching Assistant for the Communications/Public Speaking course and holds a Master's in Public Management with a focus in Strategic Planning. She spent a decade in executive leadership as a District Manager and Regional Vice President in higher education and American Honda Motor Co. throughout the Midwest and California. She also completed some doctoral work from the University of Southern California in Public Policy and earned a Bachelor of Arts in Education. She is a certified Nutritionist/Health Coach from the Institute of Integrative Nutrition and an Instagram Influencer in health and wellness @mostlyplantmama with a monthly column in Inspiring Lives Magazine. She is on the Board of Directors for the Global Sisterhood and is a proud boy, homeschooling mama to three little ones.



Dr. Ioannis Gkioulekas

INTRODUCTION TO DIGITAL PHOTOGRAPHY GRADES 7-9

October 9th

This class provides an introduction to photography, optics, and imaging. We will begin by investigating properties of optical elements such as lenses, prisms, and filters, and see how we can use them to manipulate light. Then, we will go over how digital image sensors work and look at the internals of a digital camera. We will use this background to understand the various settings (focus, zoom, exposure) and stages (optical, analog, digital) of the modern photography pipeline. In parallel, we will get hands-on experience with all these concepts using high-end digital cameras, including a photography competition at the end.

Dr Ioannis Gkioulekas is an assistant professor at the Robotics Institute of Carnegie Mellon University, where he has been since 2017. Before that, he was a PhD student at Harvard University, and even before that an undergrad student at the National Technical University of Athens, Greece. He works on computational imaging, which can be broadly described as coming up with systems that combine imaging (optics, sensors, illumination) and computation (physics-based modeling and rendering, inverse algorithms, learning) in innovative, unexpected, and meaningful ways. Particular problems he is interested in, include imaging around walls or through skin, material acquisition, differentiable rendering, and the integration of physics-based simulation, learning, and optics. He is also more broadly interested in computer vision and computer graphics. For his work he has received the Best Paper Award at CVPR 2019, a Sloan Research Fellowship, and an NSF CAREER Award.



Biohybrid and Organic Robotics Group

IT'S ALIVE! SCIENCE BEHIND LIVING ROBOTS GRADES 7-9

November 6th

How do you make robots more like animals? How do muscles work? How do you keep cells alive outside the body? The answer to all of these questions and more will be discovered in this workshop! Learn about bioinspired robots, cyborg robots, muscles, and the effects of liquid nitrogen on living tissue. Explore hands-on activities to discover how electricity can control your muscles, build a syringe-powered robot and investigate the effect of super cold temperatures on the body. Instructors: Biohybrid and Organic Robotics Group (BORG) Lab.

B.O.R.G. Lab Animals have long served as an inspiration for robotics. However, many of the mechanical properties, physical capabilities, and the behavioral flexibility seen in animals have yet to be achieved in robotic platforms. Towards addressing this gap, research in the CMU Biohybrid and Organic Robotics Group (B.O.R.G) focuses on the use of organic materials as structures, actuators, sensors, and controllers towards the development of biohybrid and organic robots. The research group's long-term goal is to develop completely organic, autonomous robots with programmable neural circuits. These robots will have future applications in medicine, search and rescue, and environmental monitoring.



Students participating in hands-on STEM activities in Gelfand Outreach workshops.



Jiahe Liao

LIQUID ROBOTS GRADES 6-8

November 6th

Let's build a robot from liquids! This hands-on lesson will introduce you to the physics of liquids and their applications to soft robotic actuators. You will learn the concept of surface tension of liquids and why it is important in nature and biologically inspired robots. You will also learn how to turn a drop of liquid metal into an artificial muscle. Design your own self-moving robot without an engine or a motor — but with a small drop of liquid!

Jiahe Liao is a Ph.D. candidate in Robotics at Carnegie Mellon University. He studies biologically inspired robotics and artificial muscles with Prof. Carmel Majidi in the Soft Machines Lab. He has been participating in the Gelfand Outreach classes since 2017. He received his B.S. in Computer Science from National Taipei University in 2015 and his M.S. in Robotics from CMU Robotics Institute in 2018.



Dr. Oliver Kroemer

PERCEIVING THE WORLD THROUGH ROBOT SENSORS

GRADES 5-7

November 6th

Which household chore would you like a robot to do for you? What does the robot need to know about its surroundings to perform that chore? We will explore different sensors and discover the various types of information that they provide. Learn about how robot sensors mimic human sensing capabilities and sometimes exceed them! Build a sensor-actuator loop that reacts to its environment. Learn how machine learning is making it easier for robots to perceive the world around them.

Dr. Oliver Kroemer is an assistant professor at the CMU Robotics Institute. His research interests are in machine learning and robotics, with a focus on learning for grasping and manipulation. Before joining CMU, Oliver was a postdoctoral researcher at the University of Southern California. He received his Master's and Bachelor's degrees in engineering from the University of Cambridge in 2008, and he defended his Ph.D. thesis at the Technische Universitaet Darmstadt in 2014.



Dr. Coty Jen

SMOG, CLOUDS AND CLIMATE GRADES 6-8

October 9th

The air we breathe in is filled with millions of tiny dust particles and gas molecules emitted from trees, wildfires, cars, and thousands of other sources. These particles and gases affect visibility and our health. This hands-on workshop will explore the different ways dust particles form in the atmosphere to create smog and clouds. We will also investigate how particles in the air impact Earth's climate. Instructors: Dr. Coty Jen and the Jen Lab .

Dr. Coty Jen is an assistant professor of Chemical Engineering at CMU. She joined the department in fall 2018 and is a member of the Center for Atmospheric Particle Studies. Her research focuses on how nanoparticles form and grow in the atmosphere and ultimately impact the environment. Her group designs and builds instruments capable of measuring the composition of 1 nm particles formed from manmade pollution and biogenic emissions. In addition, her group is examining how wildfire and prescribed burning smoke impacts human health and investigating ways to manage wildlands to prevent wildfires and reduce air pollution. Dr. Jen completed her B.S. in Chemical Engineering at Columbia University, M.S. in Chemical Engineering at University of Minnesota- Twin Cities, Ph.D. in Mechanical Engineering at University of Minnesota-Twin Cities, and postdoc in Environmental Science, Policy, and Management at University of California, Berkeley.



Shannon Werntz

WEDO ROBOTICS GRADES 3-4

November 6th

New and improved! Explore the world of robotics using the new LEGO WeDo 2.0 kit designed specifically for younger students. Build LEGO models that feature working motors and sensors, then program them to move and react to the world using an intuitive “drag-and-drop” interface. This class will include completely new build projects and programming challenges from previous semesters!

Shannon Werntz is a senior at CMU studying Decision Sciences and Business Administration. She is involved in research with CMU’s Center for Behavioral and Decision Research, and is a teaching assistant with the Psychology Department. She has worked with the Leonard Gelfand Center’s outreach program since her first semester at CMU, as a Saturday Session TA and an afterschool tutor at Assemble. She is also heavily involved in STEM outreach through FIRST Robotics; as a high school senior, Shannon initiated a \$2,500 FIRST program at her elementary school including 10 robotics teams, and she currently coaches the Girls of Steel high school FIRST team which meets on the CMU campus.

YOUNG ENTREPRENEURS: AN ECONOMICS MARKETPLACE GRADES 3-5

October 9th

Have you ever wanted to run your own business? This workshop encourages creativity and deepens the understanding of being both an entrepreneur/producer while also being a consumer. Each student will create a good to “sell” in class, and a store “front”, to understand the dynamics between supply and demand. This workshop allows students to experience what it’s like to own and operate a business through virtual simulations and in-class explorations. It will also include simple and complex business vocabulary and accounting.

Courtney Daylong is the instructor for this class. Please see her biography on page 2.

Gelfand Outreach Fall 2021 Saturday Series Classes

Classes are \$55.00 each and are conducted from 9:00AM to noon unless otherwise noted, at Carnegie Mellon University.*

NOTE: Strict COVID-19 mitigation requirements will be in place; all students and instructors will be required to wear masks. There is NO eating or drinking allowed in classrooms during Gelfand Outreach programs.

Please contact the GelfandCenter@andrew.cmu.edu for Gelfand Outreach registration questions.

October 9th

Gr. K-2: Bug-Bots
Gr. 3-4: Biospheres
Gr. 3-5: Young Entrepreneurs
Gr. 6-8: Smog, Clouds, and Climate
Gr. 7-9: Introduction to Digital Photography

November 6th

Gr. K-2: Hear Me Rawr!
Gr. 3-4: WeDo Robotics
Gr. 4-6: Colorful Chemistry Creations
Gr. 5-7: Perceiving the World through Robot Sensors
Gr. 6-8: Liquid Robots
Gr. 7-9: It’s Alive! The Science Behind Living Robots

To apply for scholarship funds, please submit a copy of the first page of your IRS 1040 tax form from 2020.