GELFAND OUTREACH

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

Fall 2019 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.

John Choi

ARTIFICIALLY INTELLIGENT CHATBOTS GRADES 5-7

October 12th or November 2nd

Want to learn how systems like Amazon Alexa and Google Assistant work? This hands-on workshop will give students a taste of the artificial intelligence side of robotics with simple speech recognition and basic natural language understanding. This workshop will feature a brand new, experimental full-size humanoid robot called the ASPIR (Autonomous Support an Positive Interaction Robot), developed at your local friendly neighborhood robotics company, Choitek LLC. Students are expected to know how to use PowerPoint, the Internet, and other basic computer tasks.

John Choi is a robot programmed with a mission to teach and inspire the generation of tomorrow. With a Bachelor of Computer Science and Arts Degree from CMU, John has over 10 years experience building software, hardware, robots, video games and everything in between. As a CMU Innovation Scholar, he founded a tech company called Choitek in 2016, Pittsburgh's friendly neighborhood humanoid robotics company. John also does a bit of research at CMU LTI's Articulab, an artificial intelligence research lab for social good. He has volunteered at the Carnegie Science Center, AssemblePGH, Carnegie Mellon's Leonard Gelfand Center, Project Ignite, Robotics Club, and was awarded the Gelfand Student Service Award in 2017. John is truly an artist, engineer, and entrepreneur all in one.

Pamela Piskurich

BUG BOTS GRADES K-2

September 28th

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.

Pamela J. Piskurich is the program director of the Gelfand Center for Service Learning and Outreach. She develops and teaches classes for the GO Saturday Series Program and conducts the GO Summer Series Classes. Pam has a master's degree in education and is a certified secondary mathematics teacher and taught for ten years in public school. She has been working at Carnegie Mellon University coordinating and developing curriculum for outreach programs for K-12 students for the past 22 years.

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http://www.cmu.edu/gelfand - GelfandCenter@andrew.cmu.edu

Courtney Daylong

THE DYNAMICS OF SUGAR GRADES 2-4

September 14th

Have you ever wondered what sugar really is, what happens to our bodies if we eat too much and just how much is too much? You will discover how sugar is made, processed by the body and just how much gets consumed every day. Students will create their own shopping basket of common items to take home while learning and understanding the math of sugar grams in our daily diet using simple sugar cubes. This workshop deepens our understanding of an improved nutritional foundation while creating a fun, lasting impression!!

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 Masters 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 Minnesota and California. She also completed doctoral studies from the University of Southern California in Public Policy and earned a Bachelor of Arts in Education. After having three boys, she is now the co-Founder of Totally Fit Mama, LLC, a national nutrition business focused on women's health, giving back, and partnering with the Magee Women's Research Institute.

Dr. Michael Ford

Jiahe Liao

ENERGY HARVESTING GRADES 6-8

September 28th

How can the human body be used to power conventional electronics like wearable computers? In this short course we will discuss ways the body uses - and wastes - energy while focusing on the future of wearable computers. Specifically, we will talk about how to capture that wasted energy and turn it into something useful. Students will learn different ways that body heat and motion can be converted to electricity. Instructor-led demonstrations and a hands-on activity involving circuit-building will let students visualize and understand how the energy the human body uses can be captured by electronic devices.

Dr. Michael Ford is a researcher in the Soft Machine Labs at CMU. He earned his PhD from the University of California, Santa Barbara in 2018 before moving to Pittsburgh to work with Professor Carmel Majidi on developing new materials for soft robotics. His main research interests fall under the broad category of polymer science and engineering.

Jiahe Liao is a Ph.D. student in the Robotics Institute at CMU. He received his B.S. in Computer Science from National Taipei University, Taiwan (2015), and M.S. in Robotics from CMU (2018). He is working in the CMU Soft Machines Lab advised by Prof. Carmel Majidi. His research interests are in soft-matter artificial muscles for robots.

Ericha Geppert

GENES YOU'RE ALWAYS WEARING GRADES K-2

September 14th

Have you ever wondered what makes you...you? Explore DNA, genes, biology and heritability. Discover the reason behind your connected earlobes and widow's peak. Choose the genes to create your own creature and take your knowledge home to share with your family and friends!

Ericha Geppert has been working with K-12 children on university campuses in Pittsburgh for over 10 years. She began her career at CMU as Graduate Intern within the Leonard Gelfand Center, serving as a Teaching Assistant for several different Gelfand Outreach courses, and now works in CMU's Office of Human Resources as the Child Protection Specialist. Ericha has a Bachelor's Degree in Psychology and a Master's of Education degree from the University of Pittsburgh.

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

Dr. Yisong Guo

HOW ENZYMES WORK GRADES 7-9

October 12th- ***9:15am - 12:15pm at Mellon Institute***

This class aims to introduce basic scientific concepts related to enzymes, powerful biocatalysts designed by nature. It will consist of two components: a lecture and a hands-on session. The lecture will be used to introduce amino acids, the building blocks of enzymes. It will also introduce the basic factors that affect enzyme functions, and basic experimental techniques that researchers use to study enzyme functions. The hands-on session will give students opportunities to use the knowledge obtained from the lecture to monitor and explain enzyme behaviors. All the chemicals and biochemical reagents are commercially available, standard lab safety procedures will be followed, and the lecturer and the lab assistant will monitor student's progress at all times during the lab session. This class will be offered in an actual chemistry lab: students must wear closed-toed shoes and follow the safety rules in the lab. Lab coats and goggles will be provided.

Dr. Yisong Guo is an Assistant Professor in the Chemistry Department at Carnegie Mellon University (CMU). Dr. Guo received his B.S. in Material Science and Engineering from Fudan University in China, and Ph.D. in Applied Sciences from University of California-Davis. His research group at CMU is working on an interdisciplinary field where efforts from biochemists, synthetic chemists, physicists, and spectroscopists are joined together to understand the mechanisms of chemical transformations catalyzed by enzymes. The chemical principles discovered through his research will help improve the technologies needed to make the transition to a sustainable energy future and enrich scientific knowledge in fighting disease.

Alexandra Schott

LIQUID SCIENCE GRADES K-2

October 12th

Normal liquids can do crazy things when you look at them in the right way. Did you ever think you could watch them crawl on top of or below other liquids? Float objects and sink them upon command! Come and perform experiments with acids and bases and discover a magic pitcher that changes between a pink and clear solution in a matter of seconds. As you try out these tricks, learn about cohesion and adhesion in liquids. You've never seen liquids this crazy!

Alexandra Schott is a Senior with a major in Chemistry and Minor in Computer Science. She currently is doing research on the synthesis of DNA as it relates to different components in cell delivery. Aside from chemistry, Alex also enjoys rock climbing in her free time as well as piano. Alex is a member of DNA Zone, which attracts students to science by exposing them to modern and exciting, state-of-the art aspects of nucleic acids science. This program, fosters students' interest in STEM

Dr. Gizelle Sherwood

MARVELOUS MACROMOLECULES GRADES 3-5

October 12th

The existence of life is dependent upon nature's ability to manufacture very large, complicated molecules such as DNA and proteins. The ability of chemists to prepare really big molecules called polymers in the laboratory has revolutionized the manner in which we live. In this workshop, students will explore a variety of polymers, their usefulness, and how to make them in a manner which demonstrates care for the environment. This hands-on workshop will have students working in the lab and participating in lecture demonstrations to explore the amazing world of polymer chemistry.

Dr. Gizelle Sherwood is currently an Assistant teaching Professor at Carnegie Mellon University.
She earned her Ph.D. in 2008 where her research focused on the effects of aggregation on the photo-physics of oligomers related to MEH-PPV and CN-PPV. She primarily lectures Quantitative chemical Analysis laboratories to the sophomore chemical engineering, biology, and pre-med students. She is also involved in several outreach programs working with both the Boy Scouts of America and the Leonard Gelfand Center.

Dr. Rebecca Taylor

NANOENGINEERING WITH DNA GRADES 4-6

November 2nd

Did you know that DNA can be used to make tiny nanostructures and nanomachines? Engineers can design structures that are 1/1000th the width of a single hair and these structures will build themselves under the proper conditions. Professor Taylor will introduce students to structural DNA nanotechnology. Students will physically interact with both the chemical structure and mechanics of DNA, acting like nanomanufacturing engineers who treat DNA as an engineering material. They will build DNA double helix models from pasta and then as the focus of the class they will build scale DNA origami models of double helical rafts and nanotubes using pipe cladding and lasercut wooden connectors (using a kit designed by the Taylor lab students).

Dr. Rebecca Taylor is an Assistant Professor in Mechanical Engineering at Carnegie Mellon University (CMU). She also holds courtesy appointments in the Biomedical Engineering department and in Electrical and Computer Engineering (ECE) at CMU. Prof. Taylor received her B.S.E. in Mechanical Engineering from Princeton University and her M.S. and Ph.D. in Mechanical Engineering from Stanford University. During her doctoral research she worked with Professor Beth Pruitt developing microscale force sensors for studying the mechanics of stem-cell derived heart muscle cells. She was subsequently a postdoctoral fellow in Biochemistry at the Stanford University School of Medicine, working under the supervision of Professor James Spudich. She is the director of the Microsystems and Mechanobiology Lab and her research team uses micro- and nanoscale structures as sensors and actuators for investigating the mechanics of cellular and molecular biosystems.

Stephanie Blackwood

OWLS: WHAT A HOOT! GRADES K-2

September 28th

What do owls look like? Where do they live? What do they eat? If you want to know the answers to those questions sign up for this workshop. You will discover the answers and much more as we explore the life, habitat and diet of an owl. You will be able to examine owl pellets, the regurgitated remains of an owl's prey, build a skeleton, make observations and determine what the owl ate. What a hoot, who will go out on a limb to join us?

Stephanie Blackwood is a junior undergraduate student at CMU and has been a part of the Leonard Gelfand Center's Saturday Outreach programs since her freshmen fall semester. She is studying biology and psychology with a minor in biomedical engineering while involved in on-campus biology research. In addition to her research, Stephanie has a passion for teaching. Prior to her time at CMU, she was a math and Spanish tutor, and over the summer, she is a teacher for Destination Science summer camp, where she leads science lessons about robots, programming, chemistry, and physics to students K-6.

Dr. Oliver Kroemer

PERCEIVING THE WORLD THROUGH ROBOT SENSORS GRADES 4-6

October 12th

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 Masters 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. Carla Bevins

STOCK MARKET GRADES 5-6

September 14th

What are stocks? How do people make decisions about buying stocks? See what it's like to be a stock trader by participating in a stock market simulation. Buy stocks, pay commissions, and trade stocks with your friends. We have a challenge for you: can you invest some "money" and turn it into a whole lot more? Play our game and find out!

Dr. Carla Bevins is an Assistant Teaching Professor of Business Communications in the Tepper School of Business at Carnegie Mellon University (CMU). Dr. Bevins taught in the School of Information Sciences at the University of Kentucky (UK) and as a Visiting Educational Scholar at Qingdao Technological University. She earned her B.A. in English and Creative Writing with a concentration in Public Relations from Butler University and her Ph.D. in Communications from UK. She holds Graduate Certificates from the UK in Health Communications, Medical Behavioral Sciences, Statistics, and Distance Education. At CMU, Dr. Bevins mentors undergraduate and MBA students and teaches Business Communications, Business Presentations, and Interpersonal Managerial Communication.

Marieke Van Der Maelen

STORYTELLING THROUGH AUGMENTED REALITY
GRADES 7-9

September 14th or November 2nd

Do you love comic books and manga? Come learn how augmented reality is reshaping the comic book industry in this introductory workshop. Here you will be able to create basic overlay and targets using Unity 3D software as well as design your own interactive comic strip. This workshop is recommended for students who love to draw and write stories. The workshop integrates high and low technological materials, combining empathetic storytelling, augmented reality, and visual design in order to create interactive comics.

Marieke Van Der Maelen is a 3D modeler and product of the Carnegie Mellon Pre-College Art program. Through CMU, she was exposed to local art conservators, and later pursued a career as an art conservator in Chicago, where she preserved period clothing for the Harley Davidson Museum in Milwaukee, conserved ethnographic textiles from Japan and West Africa, and restored a rare Finn Juhl "floating couch." Her desire to share her knowledge with the next generation as well as connect traditional conservation practices with modern technology led her to bring her work to the classroom where she taught the science behind art conservation to students at the University of Chicago's Charter School System. Her background in art, science and education continue to inform her current research: combining augmented reality with blockchain to redefine how people experience and interact with visual art, culture, and entertainment.

Jasio Santillan

SUPER HERO SCIENCE GRADES 3-4

November 2nd

Have you ever wondered how Spider-Man is able to swing through the Big Apple and stick to walls? Ever wonder why Wolverine's claws can cut through anything? Or even how Ant-Man is able pack a punch while he's so tiny? If you're curious how superheroes do what they do (and maybe even secretly want to become one yourself), then this is the class for you! Spend the day learning how we can use materials science to explain superhero powers and learn how to make some super-materials for yourself.

Jasio Santillan is currently completing his M.S. degree in Materials Science and Engineering here at CMU. He spent the previous four years getting his B.S. in Materials Science and Engineering with an additional major in Biomedical Engineering at CMU. His experiences include developing snake robots, testing artificial lung devices, synthesizing nanoparticles for drug delivery, and even fabricating synthetic marimba keys from fiber composites. He is currently studying self-healing materials and composites with tunable properties.

Dr. Gloria Silva

TINY HARD WORKING GUYS GRADES K-2

November 2nd

This workshop will show the students how microscopic organisms can do a fantastic and effective job transforming certain chemical compounds into gases among other things. We will use the Baker's yeast to produce CO2 and O2. The first is produced by making the yeast eat sugar and the second by attacking the yeasts with hydrogen peroxide. Gases are invisible but we will find ways to demonstrate how they are formed. Our hands-on experiments will involve feeding sugar to the yeasts, preparing fluffy dough, and making a foamy mess with soap water. It will be a lot of fun!

Dr. Gloria Silva is an Assistant Teaching Professor in the Chemistry Department at CMU. Gloria received her B.S. in Organic Chemistry and Pharmacist degrees from the National University of Cordoba (UNC), Argentina. At UNC she was an Assistant Professor with tenure and a Researcher of the Argentinean Research Council. She performed research in Bioactive Natural Products from plants. Gloria and her family moved to Pittsburgh in 2002 and she has been at CMU since. She was involved in research in the field of Bioorganic Chemistry and has been teaching undergraduate and graduate courses since 2008. Her courses have a main focus on Organic Chemistry and courses that teach concepts at the interface between Biology and Chemistry including a course on Food Science.

Left: A Gelfand Outreach student discovers chemical reactions in the Tiny Hard Working Guys class. Right: Students making trades in the Stock Market class.

WEDO ROBOTICS GRADES 3-4

September 14th or September 28th

Explore the world of robotics using the LEGO® WeDo 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.

Jasio Santillan is the instructor for this class. Please see his biography on the previous page.

YOUNG ENTREPRENEURS - AN ECONOMICS MARKETPLACE GRADES 3-5

September 28th or November 2nd

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, a store "front", and 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.

YOUR BRAIN'S SENSORY WORLD GRADES K-2

October 12th

What you feel is based on the sensory input we receive from the world around us, which we experience through our eyes, ears, skin, nose, and tongue. In this course, students will explore these sensory organs and how they transform light, sound, and chemicals into your favorite food or song. We will model the specialized cells in your eyes, make simulation snot, map our tongues, compare the sensitivity of our fingertips to our toes, and why smells reach us from across the room. We will deepen their understanding of, and their appreciation for, the most complex organ in the body—the brain.

Ericha Geppert is the instructor for this class. Please see her biography on page 2.

- - PARENT SESSION - -

Dr. Conrad Zapanta

HOW TO SURVIVE A SCIENCE FAIR PROJECT

PARENTS ONLY

September 28th - Cost $15

9:30am - 11:30am

Dr. Laura Zapanta

Participating in a science fair is a great way for young people to experience the thrills and challenge of "doing" science. Student participants learn first-hand about the scientific method and they get involved in an in-depth investigation that will challenge their creativity and persistence. It may be difficult for an elementary or middle school teacher to dedicate enough time to help individual students prepare their projects, so it is important for parents to be informed about science fairs. Discuss topics such as: How do you pick a good project? What science fairs are available to students in the Pittsburgh area? How do you sign up for them, and what are the expectations for students? Our presenters are Dr. Conrad Zapanta, Associate Department Head of Biomedical Engineering, Carnegie Mellon, and Dr. Laura Zapanta, Lecturer in Biological Sciences, University of Pittsburgh. Both presenters have experienced science fairs from the perspective of a judge, an organizer and a parent.

Gelfand Outreach Fall 2019 Saturday Series Classes

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

September 14th
Gr. K-2: Genes You're Always Wearing
Gr. 2-4: The Dynamics of Sugar
Gr. 3-4: WeDo Robotics
Gr. 5-6: Stock Market
Gr. 7-9: Storytelling Through Augmented Reality

September 28th
Gr. K-2: Bug-bots
Gr. K-2: Owls: What a Hoot!
Gr. 3-4: WeDo Robotics
Gr. 3-5: Young Entrpreneurs - An Economics Marketplace
Gr. 6-8: Energy Harvesting
Parent Session: How to Survive a Science Fair Project - $15*

October 12th
Gr. K-2: Your Brain's Sensory World
Gr. K-2: Liquid Science
Gr. 3-5: Marvelous Macromolecules
Gr. 4-6: Perceiving the World through Robot Sensors
Gr. 5-7: Artificially Intelligent Chatbots
Gr. 7-9: How Enzymes Work (*9:15am - 12:15pm at Mellon Insitute)*

November 2nd
Gr. K-2: Tiny Hard Working Guys
Gr. 3-4: Super Hero Science
Gr. 3-5: Young Entrpreneurs - An Economics Marketplace
Gr. 4-6: Nanoengineering with DNA
Gr. 5-7: Artificially Intelligent Chatbots
Gr. 7-9: Storytelling Through Augmented Reality

To apply for scholarship funds, please submit a copy of the first page of your IRS 1040 tax form from 2018

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