

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

*All Gelfand Outreach Summer Series Classes are \$325 per class.*

*Scholarship funds are available through gifts from several Carnegie Mellon alumni. Please contact us to learn more.*

## KITCHEN CHEMISTRY, GRADES 2-3

9am - noon, June 19th-23rd



Join your fellow scientists as we use everyday ingredients to conduct experiments and learn the science explaining them. Learn about solids and liquids by making your own glop! Learn how to blow up a balloon without using your own breath! Discover how to make a rainbow in milk. Discuss molecules and make your very own molecule model.

*Jennifer Lang has taught several Gelfand Outreach courses over the past few years at CMU and has taught Science and Special Education at Kiski Area School District for the last two years. Prior to that Jennifer taught Chemistry at Vincentian Academy and Mount Alvernia High School for 10 years. She attended Saint Vincent College and has a BS in Chemistry and a MS in Environmental Education. Jennifer also has a MS in Special Education from Slippery Rock University.*

## COOL CHEMISTRY, GRADES 4-5

9am - noon, June 19th-23rd

Students will participate in hands-on activities and demonstrations. Emphasis will be placed on fundamental chemistry concepts such as the three states of matter, chemical bonding, covalent bonding, dehydration reactions, hydrolysis, polymers, density, buoyancy, molecules, acids and bases. Make polymer pop, dance colors, life jacket floats and much more! Participate in activities and get ready to get messy!

*Yaniv Tivon is a graduate student at the University of Pittsburgh in the Department of Chemistry pursuing a Ph.D. in chemical biology. He received his bachelors from Rutgers University where he studied chemistry with a focus on organic synthesis. His current research involves the synthesis and utilization of modified DNA to study and inhibit cancer pathways. Yaniv's goals include teaching how to provide logical explanations to chemical phenomena and manipulate them based on that knowledge.*



## ENVIRONMENTAL ENGINEERING, GRADES 5-7

9am - noon, June 19th-23rd

How does a bike become a bike? Or a computer become a computer? What happens when we're done with them? We will explore where "stuff" comes from, and where "stuff" goes. Along the way, we'll see how green engineers involved in designing these products reduce the impact they have on the environment. Favorite activities in this class include taking apart objects such as radios and phones and building structures using newspapers.

*Dr. Deanna Matthews is an Associate Department Head for Undergraduate Affairs and Assistant Teaching Professor in Engineering and Public Policy (EPP), and Education Director and researcher in the Green Design Institute (GDI) at Carnegie Mellon University. In her role in EPP, Dr. Matthews oversees the undergraduate programs. In the GDI, an interdisciplinary research center that focuses on the intersection of environmental and economic issues, her research centers on the development and deployment of the Economic Input-Output Life Cycle Assessment tool, examining energy life cycles of new products, corporate environmental management, and educating general populations about energy-environment issues. As Education Director, she oversees education and outreach initiatives for the GDI. She is the coordinator and instructor of outreach programs to K-12 students and teachers in school settings and informal educational events. She received her B.S.E. in Civil Engineering from Duke University (1994) and her M.S. (1995) and Ph.D. (2001) in Civil and Environmental Engineering from CMU.*



## JUNK BOTS, GRADES 1-2

9am - noon, June 26th-30th



What are robots and what makes robots work? Can robots really take over the world? In this class, we'll build different types of robots and learn about batteries, LED, circuits, electricity, and more. We'll explore how engineers build machines and make modifications to our robots to really make them buzz, rattle, and move! Draw and design your own junk bot, bringing it to life with household items! Have fun with science and technology while learning to think like a robotics engineer. The sky's the limit!

*Christa Romanosky is the director of Child Protection Operations at Carnegie Mellon University, and is a writer and educator in the community. She has a master's degree from the University of Virginia and bachelor's degrees from Carnegie Mellon University. She has taught courses at the high school, college, and elementary school levels, and has been working with K-12 students in for over a decade.*

## SCIENCE AND ENGINEERING SAMPLER, GRADES 3-5

9am - noon, June 26th-30th

Students will visit a variety of labs and spaces at Carnegie Mellon to learn about cutting edge research. Faculty, graduate students and staff in science, engineering and computer science will share information, demonstrations and hands-on activities to help Sampler participants to develop a broader understanding of what it means to work as a scientist or engineer. Dr. Hallinen will help the students to summarize the information that they have learned and to make connections between the research activities and the content that they are learning in school.

*In her role as Assistant Vice Provost for Educational Outreach Dr. Judith Hallinen works with faculty and students at Carnegie Mellon to design and implement programs that share information about university research with external populations, including K-12 educators and students. She has taught in a variety of settings 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 advises Carnegie Mellon students who are interested in pursuing a career in education and teaches a course on education policy. She holds an EdD from the University of Pennsylvania, MAT from the University of Pittsburgh and BS from Carnegie Mellon.*



## FINCH PROGRAMMING, GRADES 4-5

9am - noon, July 10th-14th



Learn Scratch programming language and write code to move the Finch robot with the keyboard. Daily challenges will include choreographing the robot to move with lights and music, navigate through a maze, play a game, and more! Students will use sensors and accelerometers to control the Finch while learning Scratch programming.

*Alexander Volkov is a first year master's student at the CMU Robotics Institute. His research focuses on enabling legged robots to naturally interact with their environment. Before coming to Carnegie Mellon, he graduated from Cornell University with a degree in Electrical & Computer Engineering. Above all, he is fascinated by robotic technology and its potential for positive impact on society, and hopes to share his passion with the next generation of STEM students.*

## PICSELS: PICTURES TO SHOW EXTREMELY LITTLE STUFF, GRADES 6-8

9am - noon, July 10th-14th

Do you wonder how we can see "small" things like cells, microbes, the tiny hairs on bugs and even atoms themselves? We will learn how to "see" the microworld using pixels. During the week we will learn about how we "sense" our macroworld, and how we make machines similar to our smartphones to "sense" microscopic things. This will involve lab exercises where we learn how machines like barcode scanners can "read." We will learn about the similarities between sound and color because of "waves." We will learn how smartphones can "see" your face and add fun features to them, like rainbows and dog ears. Finally, we will use what we've learned to operate an electron microscope to see small things ourselves, things like cells and microprocessors.

*Dr. Yoosuf Picard is an associate research professor of materials science and engineering in the department of materials science and engineering at Carnegie Mellon University. He has a B.S. degree in Mechanical Engineering from Louisiana Tech University, and a Ph.D. in Materials Science and Engineering from the University of Michigan, Ann Arbor. Prof. Picard researches nanoscale materials using advanced electron microscopy methods. He teaches undergraduate and graduate courses on materials characterization methods, as well as a course on energy resources and energy conversion technologies. He also serves as a judge for regional and national science fairs.*



## **ALL STEAM AHEAD,** GRADES K-2

9am - noon, July 17th-21st

All aboard! Create, discover, and learn with Science, Technology, Engineering, Arts, and Math. In this course, students will be sampling the different parts of STEAM, making connections between the things around us and how they work. Explore the different states of matter, gravity, sound waves, and more! Use science, technology, engineering, arts, and math to make predictions, design and run experiments, and make conclusions that help us to understand our world.

*Christa Romanosky is the instructor for this class. Please see her biography on the previous page.*

## **ANATOMY & ROBOTICS,** GRADES 5-7

9am - noon, July 17th-21st OR July 24th-28th

Here's a class for the aspiring physician, scientist or roboticist! Learn the anatomical concepts of the bones and muscles that make up the human arm. Dissect a chicken wing to see the components and how it functions. Discuss extension and flexion of the arm and how the elbow and wrist move. Diagram the muscles and bones and make life-sized models.



Program a circuit board and make your arm model come to life. Use servos, LEDs, and sensors as you apply robotic technology to make your anatomical model move in a very realistic way. When science meets technology you will be amazed -- we're not twisting your arm!

*Since 2010 Dr. Terry Richards has been a mentor for the Girls of Steel robotics team (FRC(r) 3504) and since 2012 she has been the FIRST® Robotics Program Coordinator at Carnegie Mellon University (CMU). Leading the team's FIRST(r) LEGO(r) League (FLL) program, she offers summer camp and team experiences for the high school girls to mentor middle school boys and girls in all aspects of FLL skills – research, robot, and core values. In 2015 Terry received a National Center for Women & Information Technology (NCWIT) Educator Award. Terry has a B.S. in Chemistry (Simmons College) and a Ph.D. in Biological Sciences/Biochemistry (CMU).*

## **ROBOTICS: PROGRAM AND DESIGN,** GRADES 6-8

9am - noon, July 17th-21st OR July 24th-28th

This course is an introduction to robot-building and robot-programming. Using LEGO® pieces and the MIT Handy Board, design and build desktop mobile robots, then program them using IC programming language to do dances, follow lines, and “sense” different objects in the environment. Will you be able to program your robot to bowl? Will your robot successfully be able to navigate through a maze without getting stuck? This is a team-based, hands-on course. No experience in robotics is required.

*Joe Lang taught the Robotics Programming Design Gelfand Outreach course for the past several years at CMU. Joe has worked as a middle school math teacher for the New Kensington Arnold School District for 11 years. He attended Waynesburg University for his BS and his MS in Instructional Technology.*



## **ALICE FOR BEGINNING PROGRAMMERS,** GRADES 3-4

9am - noon, July 24th-28th

Learn computer programming skills using Alice, a software program designed at Carnegie Mellon that you can download at home. Learn the steps needed to create a computer program as well as programming concepts such as loops and conditional statements. Create your own animated movies and video games! Prerequisites: some familiarity with using a mouse and Windows.



*John M. Ellis is a classroom instructor and professional development/ trainer with 45 years of teaching experience. His educational background includes a B.S. Degree in Education with a major in Chemistry, B.S. Degree in Industrial Management/Computer Science and a M.S. Degree in Management and Supervision. He is currently employed as an instructor/trainer by the Intermediate Unit 1 located in Coal Center, Pa. His professional responsibilities include teaching Alice, Scratch and Autodesk 123d Design 3d software. In addition, he is an instructor/trainer for the Intermediate Unit 1 FAB LAB which incorporates the use of 3d printers, lasers, vinyl cutters, heat press, mold casting and CNC Shopbot.*

## **FITT CAMP**

noon - 4pm, June 19th - July 28th

FITT Camp, offered by the Carnegie Mellon University Athletic Department, is an extended day option for students attending a morning Gelfand Outreach class. For FITT Camp details, contact Pattye Stragar, at [pls@andrew.cmu.edu](mailto:pls@andrew.cmu.edu) or (412) 268-1235.