



Gelfand Outreach Classes April 25th

Classes developed by Carnegie Mellon University Faculty and Staff

Classes are designed to be

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

Registration begins on February 16, 2015

see cmu.edu/gelfand

Science of Everyday Things Grades K-2

Did you ever wonder how soap gets your hands clean? How does a light bulb work, and how do new light bulb technologies save so much energy? Cars get us from place to place, but how does liquid gasoline make a car move? These scientific and engineering questions are around us all of the time, and in "Science of everyday things" we will take the time to answer them. Kids from K-2 will have the chance to learn at their skill level the chemistry, physics, thermodynamics and other engineering properties of phenomena all around them through lectures, experiments and design. This course will excite kids about science and technology while teaching them how to investigate the world around them using the scientific method to develop new ideas and hypotheses. Help us produce the next generation of great scientists and engineers! Instructor: Dr. Kris Dahl.

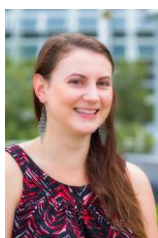
Class times 9am-noon and 1pm-4pm



Dr. Kris Noel Dahl is an Associate Professor in the Departments of Biomedical Engineering, Chemical Engineering and Materials Science and Engineering at Carnegie Mellon University. Her group is interested in structure and mechanics of materials inside cells including the nucleus and cytoskeleton. By studying these structures, it is possible to provide insight into cell function and adaptation including stem cell differentiation, cancer metastasis and interactions of cells with nanomaterials. Dr. Dahl received her BS degree from Carnegie Mellon in 1998, and Ph. D. degree in Chemical Engineering under the supervision of Professor Dennis Discher at University of Pennsylvania in 2004. She performed her postdoctoral fellowship in Cell Biology at Johns Hopkins University before joining Carnegie Mellon in 2007. She is a recipient of a Whitaker Fellowship and NIH Postdoctoral Fellowship for her training. She received an NSF CAREER award as well as a Young Investigator Award from the World Congress of Biomechanics.

Building Up! Grades 3-5

From concept sketch to building, skyscrapers must be designed with geometry and physics in mind. Students will learn the math, science, and design behind skyscrapers. Work as a team and work individually to add to Pittsburgh's skyline. How can a new skyscraper be inspired by geometry found in native Pittsburgh plants? Instructor: Samantha Carter. **Class times 9am-noon and 1pm-4pm**



Samantha Carter graduated from Carnegie Mellon University's School of Architecture in 2011, with a Bachelor of Architecture and a focus on sustainable design, participatory design, and K-12 education. During her education, Samantha completed a thesis designing adaptable learning corridors in schools and taught summer camps at the Carnegie Museum of Art. As current director of CMU's Architecture Explorations outreach program, Samantha has expanded program offerings and tied lesson plans directly to current architecture trends and the expertise of local Pittsburgh architects. Samantha's goal is to provide an architectural foundation for children and youth; fostering appreciation of the built environment, encouraging creative expression and critical thought, and inspiring civic responsibility. In Building Up!, Samantha will guide students through the architecture design process as they research native Pittsburgh plants and use organic geometry to create towering structures.

It's a Material World Grades 5-7

What is materials science? Materials science is the study of "stuff". Materials are everywhere - from your clothing to your computer to the appliances in your home. Explore the world of materials by learning about how scientists use the properties of materials to engineer products we use every day. Students will explore the different categories of materials, learn about the basic building blocks and experiment with new materials with hands on demonstrations. Instructor: Dr. Neetha Khan. **Class time 1pm-4pm**



Dr. Neetha Khan has a PhD in Materials Science from the University of Delaware and a B.A. in Chemistry from Franklin and Marshall College. She has been working at Carnegie Mellon University, developing materials science curriculum with k-12 teachers for the past 6 years. Dr. Khan is the director of the MS program in Materials Science and Engineering. She teaches a course focusing on developing professional skills for graduate students.

Additive Manufacturing Grades 6-8

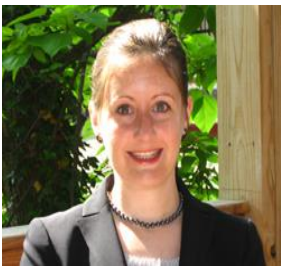
Engineers create many of the products that you see and hear about every day, often using computers to draw, analyze, re-design, and manufacture these products. This introduction to additive manufacturing (AM) includes a brief history of AM processing, a discussion of and technical fundamentals of current AM processes and a tour of the Carnegie Mellon Mechanical Engineering Lab. Instructor: Dr. Jack Beuth. **Class time 9am-noon**



Dr. Beuth's research interests are in the area of solid mechanics and manufacturing. Much of his research relates to his expertise in the areas of thermomechanical modeling of manufacturing processes, fracture mechanics, and the mechanics of coatings and layered materials. His current research includes work in three areas. One area currently being investigated relates to Mechanics of Electron and Laser Beam-Based Additive Manufacturing Processes, which are automated processes for directly building three-dimensional parts or features, layer-by-layer, via electron beam- or laser-based deposition. These processes are also referred to as direct digital manufacturing or solid freeform fabrication and offer an alternative means for fabricating metal parts for the aerospace and medical implant industries.

Extreme Weather Trends, Climate Science, and Public Opinion Grades 7-9

The scientific consensus is that climate change is occurring and is anthropogenically caused. Since 2007, no scientific body of national or international standing rejects the findings of human-induced effects on climate change. A second scientific consensus is that the frequency and severity of extreme weather events are increasing. In the last two years, the United States has experienced twice the average frequency of record extremes in temperature, precipitation, drought, and tropical cyclones. In 2011 alone, a historic combination of 14 "billion dollar events" including fires, droughts, floods, and severe precipitation events occurred. The first ten months of 2012 were the warmest on record in the contiguous U.S., and July 2012 was the hottest month on record. Scientists have rigorously tested possible links between climate change and certain extreme weather events; the consensus is that climate change has historically increased and is predicted to continue increasing the probability of certain extreme events such as heat waves, heavy precipitation events, and local flooding. This three hour workshop will explore climate change, extreme weather, and possible links between the two. Instructor: Dr. Kelly Klima. **Class time 9am-noon**



Dr. Kelly Klima is a Research Scientist at the Department of Engineering and Public Policy of Carnegie Mellon University with over ten years of research experience on adaptation, hazard mitigation, climate, extreme weather, and risk communication. Her research work supports community resilience throughout the world, and has been applied in the City of Pittsburgh and counties in New Jersey. Previously, Dr. Klima worked at the Center for Clean Air Policy (CCAP), where she helped New York and Washington DC advance their adaptation planning. Dr. Klima completed her doctoral research in the Department of Engineering and Public Policy (EPP) at Carnegie Mellon University where she used physics, economics, and social sciences to conduct a decision analytic assessment of different methods to reduce hurricane damages. She has published several journal articles, won multiple speaking awards including the AGU Outstanding Student Paper Award, is an active member of 9 professional societies, and serves on the Natural Hazard Mitigation Association (NHMA) Board of Directors and the American Geophysical Union (AGU) Executive Council.

Puzzles, Games and Problem Solving Grades 7-9

Explore critical thinking and problem solving via Puzzle-based Learning. While solving puzzles is innately fun, companies such as Google and Yahoo also use puzzles to assess the creative problem solving skills of potential employees. The ultimate goal of Puzzle-based Learning is to lay this foundation to become effective problem solvers in the real world. In this interactive and fun workshop we will brainstorm and discuss a range of puzzles, brainteasers, and games. Come and experience moments of puzzlement morph into moments of, Aha insight! Instructor: Dr. Raja Sooriamurthi. **Class time 1pm-4pm**



*Dr. Raja Sooriamurthi is an Associate Teaching Professor of Information Systems in the Dietrich College of Humanities and Social Sciences at Carnegie Mellon University. According to Dr. Sooriamurthi, solving puzzles is more than just fun. It's a great way to boost out-of-the-box thinking and creative problem solving. In addition to his work in the US, he has offered a range of popular courses and workshops on PBL in Australia, Qatar, UAE, Kazakhstan, and India. Along with colleagues, he recently published the book *Guide to Teaching Puzzle-based Learning* (Springer, 2014) to help other educators utilize this approach. Dr. Sooriamurthi's is a passionate teacher whose pedagogical efforts have been recognized with several awards for distinguished teaching.*



Visit our web site for JULY academic classes (Mornings)

**<http://www.cmu.edu/gelfand/>
Details will be available in mid-February
pjp@andrew.cmu.edu or (412) 268-1863**

**For FITT camp information (Afternoons in July)
contact Pattye Stragar,
Operations Manager of Fitness/Aquatics in the CMU Athletic Department
pls@andrew.cmu.edu or (412) 268-1235**