

March 24, 2012

Kids' Tech University



"How Much Work Could
a Network Net if a
Network Could
Net Work?"

Dr. Stephen
Eubank



VIRGINIA
BIOINFORMATICS
INSTITUTE
AT VIRGINIA TECH



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at Virginia Tech

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Kids' Tech University possible!



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Many
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the Virginia
Tech and
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Additional Support is always welcomed. If you would like to help us provide this exciting opportunity for children, please contact:

Dr. Kristy Collins

540-231-1389

kdivitto@vbi.vt.edu

<http://kidstechuniversity.vbi.vt.edu/>



About the Program

The **primary goal** of Kids'Tech University (KTU) is to help grow the future workforce in **science, technology, engineering, and mathematics** (STEM) by sparking kids' interest in these disciplines.

KTU's curriculum features three parts:

Interactive Sessions

- where children meet scientists and learn about their research

Hands-On Activities

- that give children the opportunity to learn about research projects across the VT campus and beyond

Online Virtual Labs

- which allow continued exploration of science topics at home.
- <http://ktu.vbi.vt.edu/>



March 24th Agenda

9:45 AM

Parents drop off their children for the **interactive session** in McBryde Hall 100

10:30 - 11:45 AM

Kids enjoy an interactive session led by Dr. Stephen Eubank titled "**How Much Work Could a Network Net if a Network Could Net Work?**" in McBryde Hall 100

Parents are invited to view the event in a satellite location, over a live video feed, in Torgersen Hall 2150

11:45 AM

Parents pickup their children and kids receive a Hokie Passport lunch card containing \$6.00 for **lunch** at one of the specified dining halls on campus.

1:20 - 3:30 PM

The children will be escorted by their parents to the **hands-on portion** of the event, being held in Cassell Coliseum on the VT campus. There the students will enjoy the experience of interacting with various exhibits from the Virginia Tech community. Parents/guardians are responsible for being with their registered KTU child(ren) during the hands-on activities at Cassell Coliseum. No non-registered children will be allowed in the event arena.



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Real scientists...

Answering real questions at Virginia Tech...

January 2012

Parents and Participants of Kids' Tech University:

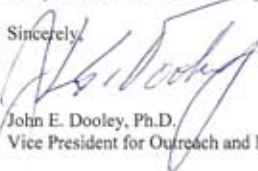
Welcome to the Virginia Tech campus and to Kids' Tech University!

Kids' Tech University, with informative lectures and exciting hands on events, is designed to ignite an interest in Science, Technology, Engineering and Mathematics (STEM) disciplines for you and your child. We are currently in our fourth year of offering the Kids' Tech University program through the coordination of Virginia Bioinformatics Institute (VBI) and Virginia 4-H and the leadership of Dr. Kristy Collins, Dr. Reinhard Laubenbacher and Dr. Kathleen Jamison.

Virginia Tech has a strong commitment to connecting national prominence in research and discovery to advance quality STEM programs across the Commonwealth. Kids' Tech University is just one example of this commitment.

As Vice President for Outreach and International Affairs, I am pleased to welcome you to such a successful program hope you and your child leave with great excitement and interest in the disciplines of Science, Technology, Engineering and Mathematics.

Sincerely,



John E. Dooley, Ph.D.
Vice President for Outreach and International Affairs

/s/

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
An equal opportunity, affirmative action institution



Dr. Stephen Eubank

March 24, 2012 | Interactive Session

"How Much Work Could a Network Net if a Network Could Net Work?"

Every day, we have to deal with dozens of networks, from natural ones like spider webs to man-made ones like road networks, telephone networks, and the world-wide web. What is it about networks that makes them a solution for so many different problems? How can we design networks so they'll do the things we want them to do – like let us make a phone call to the other side of the world – and not do things we don't want them to do – like spread a virus? We'll start by describing networks as mathematical objects so that we can think about them in precise ways. Then we'll look for patterns in the kinds of things that can happen on networks and how they're related to the way the network is put together. Along the way, we'll take detours and short cuts through the networks of science, mathematics, and computing.



Dr. Stephen Eubank is the Deputy Director of the Network Dynamics and Simulation Science Laboratory at Virginia Bioinformatics Institute and a Virginia Tech Adjunct Professor of Physics. Dr. Eubank's research and training program centers on detailed mathematical modeling and computer simulation of biological systems. Two principle areas of interest are population-level infectious disease epidemiology and cellular-level immunology. For both of these, he and his collaborators are integrating knowledge from diverse areas of biology and sociology into high-performance-computing enabled simulations with tens of millions of interacting agents.



Hands-on Exhibits



Special Senses

How does your body recognize what happens in the environment? In our exhibit medical students from Virginia Tech Carilion School of Medicine will interact with you to demonstrate the Special Senses. You will learn that 1) Touch is part of the sensory system and it is more than using our hands to feel things. Our skin helps us recognize differences in temperature, vibrations, texture, pressure and pain. 2) The visual system can trick us with optical illusions due to bright lights and contrasting patterns. It is the mental processing that determines how we see the world. 3) The auditory system detects sound vibrations and we can identify where the sounds come from because we have two ears on each side of our head. 4) Taste and Smell are the chemical senses and they are very closely related.

Medical Students from VTC SOM

Volunteers, students, and a faculty member from Basic Sciences at the Virginia Tech Carilion School of Medicine (Roanoke, VA).



VTC's Food Laboratory: Guess that Portion Size

Healthy eating means knowing what and how much you eat. Although the terms serving and portion sizes are used interchangeably, they are actually two different things. A "serving" is the amount of food recommended by consumer education material such as MyPyramid. A "portion" is the amount of food you choose to eat at any one time. If your portion is bigger than one food group serving, it counts as more than one serving. To overcome portion distortion, kids will have the chance to be part of a game show where they estimate recommended serving sizes using common household items.

PIG: Pediatric Interest Group from VTC SOM

Medical students from Virginia Tech Carilion School of Medicine

Wheelchair Challenge

We don't often think about how amazing it is to be able to walk and move around. About 50 million Americans have a disability according to the US Census Bureau (about 1 in 5 of us). Roughly 40 Million of those with disabilities need NO ASSISTANCE to carry out their daily activities. Do you have what it takes to live independently with a disability? Come to our exhibit and take the challenge! Students from the medical school at VTC SOM will help you go through a wheelchair obstacle course and learn more about the challenges which 3 million people in the United States face every day.

Medical Students from VTC SOM

Family Medicine and Pediatric Interest Group students from the Virginia Tech Carilion School of Medicine



Hands-on Exhibits

Food Factor

Are you a fearless eater? Come find out at the Food Factor table run by the Student Dietetic Association of Virginia Tech! You may find a food you never knew existed, may like a food you have never liked before and even learn some fun facts about the foods!

Student Dietetic Association

The Student Dietetic Association is a student run organization comprised of undergraduate and graduate students with an interest in nutrition. Many of our members plan to become registered dietitians. The mission of the Student Dietetic Association is to provide students interested in nutrition opportunities to engage in events and activities around campus and the community that will offer further experience and opportunities in the field of nutrition.

Hydropower

Hydropower is a form of generating electricity that has changed the world. We will be taking a look at where this started and how it has changed through human ingenuity. Also how has Hydropower taken on such a big role in the world? We plan to go over the inner workings of the plants including its turbines, power transformation process and the dams that are used to do this. Although Hydropower may be clean and renewable it does have its drawbacks like all power plants. The world is looking to improve this clean energy source by making it more efficient and friendly to local ecosystems.

Theta Tau

Theta Tau is a Professional Engineering Fraternity that regularly engages in outreach programs designed to increase awareness and interest in

science, technology, engineering and mathematics. Our target audiences range from young children in pre-school to the entire community. One of our main goals is to debunk common misconceptions, and educate people about certain technologies and practices that have an unwarranted reputation in public opinion. Our mission with this booth is to both highlight the advantages of hydropower and also point out its limitations and environmental impact.

The importance of exercising and nutrition

Healthy nutrition and exercise is extremely important for growing children and adults. We will be explaining the importance of healthy foods and how it is beneficial to their health. In addition to this we will provide information about how exercise can prove to be beneficial to mental and physical health. At the booth, along with the information being provided, we will have the children learn how to find their heart rate, and then have them do a set number of jumping jacks. Afterwards they will find their heart rate again and will be informed about why that occurs and where their heart rate should be as a healthy child.

The W. B. Alwood Entomological Society

started in 1966, is a student-run organization bound by our shared interest of insects and the desire to relate our interests in the world at large. Come to our exhibit where we will show the importance of insects on Earth and how they directly, and indirectly, affect you. We will have microscopes to see insects in high definition, and we will have live insects from our very own insect zoo!

The VT-WFU Biomedical Engineering Student Chapter is a joint organization



Hands-on Exhibits

whose mission is to encourage the development dissemination, integration and utilization of knowledge in biomedical engineering. Students in our chapter are conducting exciting biomedical research in the areas of musculoskeletal biomechanics, imaging, cell and tissue engineering, and nanotechnology for medical applications.

At our exhibit, kids will learn about molecular analysis through extraction of DNA from baby food, examine changes in body temperature using a thermal camera, and measure your brainwave activity playing the brain game!

Play hard, eat right! or Fit for Nutrition
Club members will demonstrate different exercise activities and there will be a miniature relay race for the children (two groups of 2-3 children) in which they will complete an exercise and then tag the next child to complete the next exercise. We will also have a nutrition activity, highlighting MyPlate and how it can be incorporated into their lives. There will be a poster board with exercise information on it and also a handout for parents to take that will encourage them to get their children active and eating right.

Fitness and Nutrition (FAN) Club

We are a student organization at Virginia Tech, open to all majors, for those interested in fitness and nutrition. We have club meetings every other week to discuss volunteering opportunities, upcoming activities, and share recent news in the field of nutrition or exercise. We do Happy Feet, Micahs Backpack, Relay for Life, the Big Event, and many other events in the area. Kids'Tech is a great opportunity for FAN Club to give back to our community and educate the youth about fitness and nutrition and how to integrate them into their lives.

How well do YOU wash YOUR hands?

Glo Germ Activity:

Using a safe and nontoxic lotion or powder based product that fluoresces under black light, we will be able to demonstrate to participants the importance of properly washing your hands. The lotion or powder is rubbed onto hands and cannot be seen under regular light. The participants will then go wash their hands as they usually do. This can be done if there is a bathroom nearby, we could walk groups back and forth. Then the participants hands are placed in a box containing a black light to show





Hands-on Exhibits

where the lotion still remains on their hands. Usually there is still some around the fingertips or between fingers. This activity demonstrates the importance of thoroughly washing ones hands because wherever lotion is there may also be the potential for germs to still be present.

The Food Science Club of Virginia Tech

The Food Science Club of Virginia Tech is a student organization whose missions include education, career development, community outreach and fellowship.

The CanSat at VT organization and the RASC-AL senior design team

are hosting a joint exhibit for KTU on March 24th. CanSat is a competition for students to build a miniature satellite roughly the size of two soda cans that gets launched into the lower atmosphere and collects and transmits atmospheric and telemetry data on its way down to the ground. The RASC-AL group works on a paper study for NASA for a potential manned mission to Mars.

We will be hosting 3 distinct activities at our booth. For the first activity kids will build paper rockets using paper, a straw and a index card. They'll learn very basic things about control and fins. For the second activity the kids will design a duck call straw. And lastly, the kids will see some "cool" electronics gadgets.

Tracking the geographical spread of disease: how and why diseases seem more prevalent in today's globalized world

Analyzing disease transmission and diffusion assists in understanding the etiology of a specific disease. This analysis also provides health care providers and public health officials with the tools necessary to track diseases and determine

where and when to apply preventative measures. We will examine the types of disease diffusion and why different disease spread in different ways. We will review how globalization has contributed to the spread of diseases and discuss if new diseases are emerging. We will also examine ways to prevent disease and other illnesses at the local level, including innovative ways to grow healthy, more nutritious foods.

This hands-on activity is being led by three masters students in our Medical Geography Program, with assistance from a Ph.D. student and three undergraduate students from the Department of Geography. The Geography Department (founded in 1975), located in Major Williams Hall, is part of the College of Natural Resources and Environment. We offer both Bachelors and Masters Degrees and we participate in the College of Natural Resources doctoral program in Geospatial and Environmental Analysis. We have recently added a new degree program in Meteorology. The department's students are active in its Geographic Society's many outreach events and fellowship activities, such as exploring caves in southwest Virginia. More information about our program, our students, staff, and faculty can be found on our website at: <http://geography.vt.edu/>

Rainbow Eggs

Before an egg is laid, it begins as a yolk in the hen. The white portion of the egg is added later, followed by the hard outer shell. The yolk is formed in a series of layers that are put down each day as the yolk develops. If a hen is fed pills filled with non-toxic dye, that dye will appear in the fatty parts of the hen's body after



Hands-on Exhibits

a few days. This includes the developing egg yolks. We fed red and blue dye capsules to white leghorn hens on alternating days for one week. Then, we collected and hard-boiled the hens' eggs. As you will see, the yolks have a series of colored layers. These red and blue layers correspond to the days that the hens were fed either red or blue dye, demonstrating how the yolk is formed.

Poultry Club at Virginia Tech

The Poultry Club is a group intended for students of all majors who are interested in learning more about or becoming involved in either poultry science or the commercial poultry industry.

Hot Stuff! Volcanoes and Geysers

Volcanoes and geysers are some of the most fascinating and powerful of the Earth's processes. The Virginia Tech Geoscience Outreach Team will present an exhibit on the geology of these features. Using models we will explain the conditions necessary for these kind of explosions, and we will have volcanic rock samples to show how different rocks result from different eruptions. We will also demonstrate how geysers can result from similar processes.

The Geoscience Outreach Team promotes Earth Science literacy. We work with the Virginia Tech Museum of Geosciences to provide hands-on activities and programming for K-12 youth.

What do you want to be when you grow up?!

Come explore Virginia Career VIEW's online and print resources about careers in the fields of science and mathematics. Explore unusual careers, play computer games, and learn more about which careers might be a good match for you!

Virginia Career VIEW

Virginia Career VIEW offers free career exploration resources for K-8 students in Virginia. Based in the School of Education at Virginia Tech, VIEW offers various hands-on resources for students to explore skills and interests as they relate to career development. In addition to providing resources for students and parents, VIEW also holds annual workshops and webinars for educators.



VT Rocketry and SPACE (Student Participating in Advancing spaCe Education)

Come build a paper rocket with VT Rocketry! Using a sheet of paper, an index card, a pencil and an air launcher, build a pencil sized paper rocket and see how far you can fly! Learn about how VT Rocketry is participating in the annual NASA USLI competition and come take a look at our prototype rocket! It's four feet tall and flies to over 1000 feet!

You will also learn about buoyancy and the ideal gas law using Cartesian Divers! Using a straw, some paper clips, a rubber band and a 2-Liter bottle, watch as the "diver" that you make "magically" sinks as you squeeze the bottle filled with water but then rises when you release it! It's not actually magic but it sure does look like it!



Hands-on Exhibits

Microbiology

Our exhibit will focus on the role microbes play in our daily lives both good and bad. We will have microscopes set up so that individual bacterial cells may be seen and we will have bacterial cultures from different environments available for observation. The small size of bacteria will be emphasized as well as the importance of hand washing before eating.

The Microbiology Club of Virginia Tech is a student chapter of the American Society for Microbiology. Its memberships consists primarily of undergraduate students from across campus with an interest in microbiology.

"ANIMALS, INSIDE & OUT," THROUGH THE EYES OF VETERINARIANS

Sponsored by Veterinarian students as One In Culture and Ethnicity (VOICE) at

VA-MD Regional College of Veterinary Medicine -
www.vetmed.vt.edu/students/voice

VOICE is a student run organization that helps educate veterinary students about cultural differences and unique perspectives among people in the community that we serve.

Come visit our hands-on exhibit to:

- look at x-rays of cool animal cases
- learn an animal's nutrition status
- touch & feel animal skeletal models
- learn fun facts about rabies & public health
- learn about everything else veterinarians do!





Educator Workshops

We are excited to offer CEU (Continuing Education Unit) credits for educators in conjunction with the KTU program.

Educators will learn it, teach it, and take it back to the classroom.

Interact with:

- Scientists
- Technology Experts
- Engineers
- Mathematicians

You will engage in an exciting, hands-on teaching experience, and then apply what you learned in a unique, first-hand teaching environment with 3rd-6th graders. You will also be able to participate in ongoing community blogs and network with other teachers and education specialists.

This program is ideal for elementary and middle school teachers, out of school time educators, or others interested in STEM teaching.

Educator Workshop

- interact with Scientists, Technology Experts, Engineers, and Mathematicians
- participate in a four (4) hour interactive hands-on training
- interact with KTU students at learning stations to deploy what you learned
- be an audience member in a topic session with kids, led by a world renowned research scientist
- learn how to incorporate fundamentals and concepts from the interactive session and training into your classrooms

Any educator who has a child enrolled in Kids' Tech University and who is attending the teacher workshop will need to arrange for a chaperone to accompany their child during the program. Children are not permitted to attend the educator workshop (regardless of age).

Cost

Virginia 4-H is paying the registration fee for the first 10 participants for each workshop. Register early to hold your spot for April! The cost per workshop is \$30. However, if there is a hardship please let us know by emailing, Dr. Kristy Collins at kdivitto@vbi.vt.edu.



March Educator Workshop

The workshops will be held on the Virginia Tech campus in Blacksburg, Virginia.

"Interactive Session: How much work could a network net if a network could net work?"

WORKSHOP INSTRUCTOR: DR. KATHLEEN JAMISON, VIRGINIA 4-H;

GUEST RESEARCHER: DR. STEPHEN EUBANK

March 24, 2012, 8 am-5 pm

CEU credits offered

Networks are everywhere; but what are some examples and how do we define them? In this educator workshop we will discuss what networks are, how they are defined and how to spot examples of them in the world around us. Principles of computers, biology, physics and mathematics will all be touched on. Educators will also learn various exercises to do with their classes including a virus spreading simulation.

Registration

The registration deadline is one (1) week before the scheduled educator workshop. The class/workshops can be taken as a series or individually.

Please visit

<http://kidstechuniversity.vbi.vt.edu/> for further information, and to register for the next KTU Educator Workshop.



KTU is a program at
Virginia Tech with
one primary goal: creating the future
workforce in

Science,
Technology,
Engineering,
and **Mathematics**

by sparking kids' interest in these fields.



KTU 2012 Program Dates

Jan 28 | Math Day

Feb 25 | Technology Day

Mar 24 | Engineering & Health Centric Day

Apr 07 | Science Day



Contact

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Dr. Kristy Collins

VBI at Virginia Tech
kdivitto@vbi.vt.edu



THE FUTURE OF SCIENCE



We
look
forward
to seeing
you in
April!