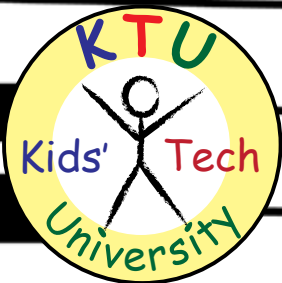


Dr. Victor Raboy
February 23, 2013

“The Genetic Code:
Is it the piano that’s
important, or the
music played
on it?”

Kids’ Tech University
at Virginia Tech



 VirginiaTech
Virginia Bioinformatics Institute



Thank you to all of our supporters!

Your generous support helps to make
Kids' Tech University possible!

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We would also like to extend our gratitude to our
corporate sponsors:

  **Rackspace** &  
Thermo Fisher Scientific

Thank you for helping to make Kids' Tech
University 2013 a success!

Volunteers

Our **volunteers include** many members from the
Virginia Tech and Blacksburg community

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/>

February 23rd 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. Victor Raboy titled "**The Genetic Code: Is it the piano that's important, or the music played on it?**" in McBryde Hall 100

Parents are invited to view the event in a satellite location, over a live video feed, in Torgersen Hall 2150 or 3100

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. After lunch, this card will grant them access into the exhibit area.

Please make sure your child leaves their lanyard with their volunteer.

1:30 - 3:30 PM

The children will be escorted by their parents to the **hands-on portion** of the event, being held in the VCOM Conference Center at the VT Corporate Research Center. 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 the VCOM Conference Center; **only children with their Hokie Passport lunch card will be allowed into the VCOM Conference Center.**



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Educator Workshops 12



Real scientists...

Answering real questions at Virginia Tech...



Office of the Associate Vice President for Engagement
319 Burruss Hall (0265)
Blacksburg, Virginia 24061
(540) 231-9497 Fax: (540) 231-5750
E-mail: sshort@vt.edu www.outreach.vt.edu

January 18, 2013

Kids' Tech University Participants:

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

Kids' Tech University, with interactive sessions and exciting hands-on events, is designed to create the future workforce in science, technology, engineering, and mathematics (STEM) by sparking an interest in these fields for you and your child. We are currently in our fifth year of offering the program through the coordination of the Virginia Bioinformatics Institute (VBI), Virginia 4-H, and the Roanoke-Blacksburg Technology Council (RBTC).

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 Virginia Tech's Associate Vice President for Engagement, I am delighted to welcome you to such a successful project and hope that you and your child are inspired and leave with great excitement and interest in the STEM disciplines. Thank you for your involvement in this unique program and best wishes for continued success.

Sincerely,

Susan E. Short, Ph.D.
Associate Vice President for Engagement

/kr

Invent the Future

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



Dr. Victor Raboy

Feb 23, 2013 | Interactive Session

"The Genetic Code: Is it the piano that's important, or the music played on it?"

HARD-WORKING SCIENTISTS have deciphered the entire computer code of life, the complete set of genes called the "genome", of humans, other animals, plants, fish and bugs. They figured that if they knew the entire genetic code, they would understand pretty much everything about how humans, animals, plants and bugs worked. While deciphering entire genomes has greatly increased what we know about how things biological work, it turns out that just knowing the entire genetic code doesn't explain everything. Sometimes it hardly explains anything! There are thousands of genes in a genome and each one has an "on-off" switch or a "volume control". If the genome is the "piano" and the genes are the piano keys, then it is how all the genes are played together, just like a virtuoso's fingers dancing over the piano keys to make music, that is ultimately important. Scientists are just beginning to understand that it's not only the genes themselves, but how they are "played", via a process called "epigenetics", that can make all the difference. We will have fun learning to understand how epigenetics works, and how we can use this new knowledge to cure disease and make more nutritious vegetables for kids to eat!

DR. RABOY is a Research Geneticist with the United States Department of Agriculture's Agricultural Research Service in Aberdeen, Idaho. He studies the genetics of corn, barley, rice and soybeans. The goal of his research is to develop genetics that can be used to improve the nutritional quality of crops.

Dr. Raboy's travel to KTU is being supported by NSF MCB# 1051646.





Hands-on Exhibits

The Importance of our Watershed

Our organization will be setting up a model of a watershed that will be used to demonstrate the effects of pollution from the local community on the environment. We will use tools to demonstrate where stormwater drains to, and how this can be damaging to surrounding bodies of water due to the pollution that different human activities contribute to the runoff. We will then demonstrate different ways that humans can implement different buffers around the community to help stunt polluting factors from entering important waterways.

American Water Resources Association (AWRA)

Our chapter's mission is to support our local, regional, and national water resources through water education, service, management, and research.

Food Factor

The Student Nutrition and Dietetics Association will host a table for kids to experiment and try new and unfamiliar foods in a fun and interactive way. The game provided will have kids "spin to win" where they will get the chance to try a new and unfamiliar food. Foods in the past used were kumquats, honeydew, prunes, apricot, grapefruit, soymilk, broccoli, and dark chocolate. This provides a chance to expose children to new foods and try out something that may not see everyday in a fun and exciting way. We hope to engage kids attraction to trying new foods to promote a healthy whole foods approach!

Student Nutrition and Dietetics Association

As a student based organization, our mission is to provide those interested in nutrition with opportunities to engage in events and activities that will offer further experience and opportunities in the field of Nutrition. We engage in a variety of activities and community opportunities to do so through nutrition booths (on and off campus), volunteer work for Micah's Backpack, Heritage Hall, athlete nutrition programs, VA cooperative extension programs, and assisting in health promotional workshops. We attend professional conferences and provide members with various networking

opportunities in the nutrition and health field. Other fun activities we participate in as a club include food cooking demonstrations, food cook-offs, potlucks, and field trips.

Exploring DNA with the Biochemistry Club

DNA is the genetic material that gives living organisms their characteristics. The Biochemistry Club of Virginia Tech invites all KTU participants to engage in a hands-on DNA extraction from strawberry. We use strawberries as a source for extracting DNA because they are soft and easy to pulverize, and they produce enzymes which aid in breaking down the plant cell walls. Strawberries have enormous genomes. They are octaploid, which means they have eight of each type of chromosome (which equals abundant DNA). At the end of this experiment participants can take their strawberry DNA home.

Biochemistry Club of Virginia Tech

The Biochemistry Club of Virginia Tech is an undergraduate Biochemistry majors group that sponsors events for career development of students. One important activity is the engagement of elementary school students in science activities.

Wheel of Agriculture!

There will be a wheel to spin, and based on where you land there will be different categories! We will have fun, both easy and hard, questions relating to agriculture! It is a chance for both parents and students to learn about where food comes from, and what goes into production, while winning cool prizes!!

Collegiate 4-H Club

The Virginia Tech 4-H Club welcomes any Virginia Tech student who wants to become more involved in the Hokie community and make a difference here on campus through service and learning.

We are affiliated with the College of Agriculture and Life Sciences, but we do not require that our members have an interest in agriculture. Whether you wish to continue your past 4-H experience or you are trying the club for the first time, we guarantee that you will have fun and make many new friends!



Hands-on Exhibits

Mechanically Stabilized Earth

This exhibit discusses mechanically stabilized earth (MSE). Mechanically stabilized earth is used on a variety of geotechnical applications including walls, bridge abutments, dams, and levees. MSE is constructed by placing steel or plastic reinforcement in layers in the soil structure. This exhibit will show the concepts of how MSE works with a hands-on demonstration using sand and sheets of paper. The paper will represent plastic or steel reinforcing used in full-scale construction. The strength of the sand without paper reinforcing will be compared against the strength of the sand with paper reinforcing.

Geotechnical Student Organization at Virginia Tech

The Geotechnical Student Organization (GSO) at Virginia Tech was founded in 2009 by geotechnical graduate students to enhance the student experience, promote the field of geotechnical engineering to undergraduates and the community at large, and connect with our national professional organization, the Geo-Institute of the American Society of Civil Engineers (ASCE). The GSO receives generous support from the Center of Geotechnical Practice and Research (CGPR).

Water in Our Environment

Come learn about how water moves through an environment with our groundwater hydrology model. See how water moves above and below ground and learn about wells, underground aquifers, the water cycle, and more!

Soil and Water Conservation Society/ Environmental Student Organization

The Soil and Water Conservation Society at Virginia Tech is dedicated to helping educate the public about current issues pertaining to soil, water, and the environment as a whole. The Environmental Student Organization is partnering with SWCS@VT to help with this mission. ESO is involved in education, recycling initiatives, and other activities promoting environmental conservation and appreciation.

The Virginia Tech Chapter of the Wildlife

Society

At our booth we will have specimens that the kids can touch including skins, skulls, and possibly 2 live specimens. We will also have a short game involving kids matching descriptions to pictures of animals. There may be prizes of candy for those who get them all right (or who try the game).

The Virginia Tech Chapter of the Wildlife Society

The Virginia Tech Chapter of The Wildlife Society is a student organization for those interested in wildlife and becoming a professional in the wildlife field. Our mission is to promote professionalism in our membership through experience, networking, conservation awareness and education in an enjoyable atmosphere. Our members develop and promote sound stewardship of wildlife resources and of the environments upon which wildlife and humans depend.

Pump it Up!!

Our aim is to show kids some exercises that are a lot of fun and age appropriate. We are going to have a fun exercise activity for the participants to do along with us. Also we will have a short "zumba" class which is a latin workout that is inspired by dance because what kids don't like to move to the music! Boards will be up with fun nutrition and fitness facts to inform not only the kids but also the parents. Recipes will be available to be copied that are nutritional and simple to make. In addition to the recipes we will have delicious and nutritious snacks to show that healthy eating can be fun and yummy!!!

Fitness and Nutrition Club

Fitness and Nutrition Club is interested in not only physical activity but also the nutritional aspect as well. We are part of the Department of Human Nutrition, Foods, and Exercise. FAN Club participates in activities such as Relay for Life, Big Event, hiking, private fitness classes, and cooking nights. Our goal is to not only promote a healthy lifestyle within the club but to also reach out to the Virginia Tech and New River Valley communities.

Exploring the World of Veterinary Medicine

We will be exploring the wonderfully diverse



Hands-on Exhibits

profession of veterinary medicine through a multitude of demonstrations and hands on activities. We will use radiographs, bones, and perhaps even live animals to help demonstrate a number of different aspects of veterinary medicine. There are more career options for veterinarians than treating Fido and Fluffy, and our goal is to elucidate that only your imagination and the number of species on this planet limit what you can do as a vet!

Veterinary Students as One In Culture and Ethnicity (VOICE)- VMRCVM

The VMRCVM chapter of Veterinary Students as One In Culture and Ethnicity (VOICE), founded in September 2010, is a student-run organization that addresses a need for sociocultural awareness that is not part of the current core veterinary curriculum. We are an organized and unified student voice contributing to enhancing the diversity of the profession and the cultural competence of veterinary students.

BLAST! Let's Make An Elephant

We will provide computers with a program that allows children to change several nucleotides of a human's genetic code and run it through a database, which will output the animal to which the new genetic code belongs. This will show the children that our genetic code is closely related to that of many animals.

We will also discuss the combinatorial aspect of how many ways there are to alter the genetic code.

Association for Women in Mathematics

The AWM seeks to encourage women to achieve successful careers in mathematics. For this reason it is important for us to reach out to children in the community and show them that math is a fun and interesting subject that warrants study.

The Key to Identifying that Tree

Is this tree an oak, a maple, or a hickory? If you want to dazzle your friends with knowing the name of all the trees in your backyard or woods, this session will teach you how to use online and field guide keys to determine the name of many Virginia trees. Learn about the 4-H tree identification project and how you can win prizes for being able to successfully identify trees and shrubs. You will have the opportunity to test your id skills using a dichotomous key to identify several leaf and twig samples. You will also learn about a smart phone app that you can take into the field to identify woody trees and shrubs and how to make your own leaf collection. Virginia 4-H offers 4-H forestry judging competitions. Learn how you could show off your id skills in one of these contests!



Montgomery County 4-H

Montgomery County 4-H offers many programs and activities for area youth, ages 5 to 18. These include community clubs, special interest clubs, after-school programs, day and residential camps, and leadership opportunities. To

receive information about upcoming events, you can subscribe to our 4-H e-mail list at www.montva.com Click on "Join our Mailing Lists". Then submit your e-mail address and select the list to which you would like to subscribe. "4-H Youth Programs" is the first on the list. Be sure to click "Join" at the bottom of the screen. We send announcements about all upcoming events to this list. To find out more about the Montgomery County 4-H program, contact Michelle Dickerson at 382-5790.

The Science of Biomedical Engineering

Biomedical engineers conduct research across traditional educational boundaries to develop solutions for a myriad of medical problems ranging from tissue engineering to imaging. Many disciplines are involved in biomedical engineering including math, biology, physics, chemistry, computers, genetics, biomechanics, electrical engineering.



Hands-on Exhibits

Biomedical engineering solutions include medical imaging systems such as MRI and CAT scanners, prosthetic devices and tissue grafts, drug delivery systems and cancer treatments. Demonstrations at KTU will include DNA extraction and the fabrication of scaffolding materials for tissue engineering; to talk about the importance of DNA and how one may conceptually regenerate tissues.

[VT-WFU Biomedical Engineering Society Student Chapter](#)

The Virginia Tech-Wake Forest University School of Biomedical Engineering & Sciences (VT-WFU SBES) is a joint graduate program that was formed in 2003 to bring together three prestigious academic institutions: the College of Engineering at Virginia Tech, the Wake Forest University School of Medicine, and the Virginia-Maryland Regional College of Veterinary Medicine. The VT-WFU Biomedical Engineering Society (BMES) club is a BMES chapter that was founded to help bridge the gap between Virginia Tech and Wake Forest and foster communication and collaboration among various research groups. Our mission is to encourage the development, dissemination, integration, and utilization of knowledge in biomedical engineering, as well as to enhance interaction within the scientific community.

[The Geographic Society at Virginia Tech presents Our Changing World](#)

The earth changes from natural processes over time. Mostly, these changes take place over hundreds and thousands of years, much longer than humans have existed on earth – for instance, the Colorado River carving out the Grand Canyon. Sometime these changes can take place over the course of hours or even days. In today's age of geospatial technologies, we can track and document these changes. The tools and data are readily available on-line for students, parents, and teacher's daily use. We will be using computers to show these on-line tools, how to use them, and information on how to access these from home.

[Electricity, Magnetism, Mechanics, Optics and Pressure Demos](#)

[About the Physics Outreach program](#)

Our program consists of undergraduate students in physics who have a passion for teaching physics to kids of all ages. They present hands on experiments in mechanics, electricity and magnetism, optics, and pressure.

[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.

[Shocking Science](#)

Do you want to get shocked by a jolt of electricity? Do you want to see other people be shocked? Come by our booth to do hands-on experiments about static electricity and electrical circuits.

In addition to electricity, you will be playing with lots of other fun physics toys!

[Enriched Physics Outreach](#)

Enriched Physics Outreach is a class that undergraduate physics students take to learn how to make interactive physics lessons for students at the K-12 level. We focus on age-appropriate hands-on lessons which promote making predictions and experimenting with both high-tech and low-tech equipment.



Hands-on Exhibits

Finding my garden spot

The Master Gardeners' booth will have information and hands-on projects which teach students to have an appreciation for their place in their local environment. Students will learn about worms, frogs, honeybees, and plants. There will be crafts, such as make your own garden journal and seed balls, as well as a bingo game.

VCE Master Gardeners

The mission of the NRVGMA is to provide service to the community by promoting good horticultural practices in accordance with standards approved by the Virginia Cooperative Extension (VCE) and its Master Gardener program and to foster communication, education, and fellowship among its members. We do this through service projects to the community as well as



fielding queries through the VCE office and booths at local events.

Rock On!

How do we use rocks and minerals in our daily lives? How does a rock fit into the constantly changing geologic cycle of the Earth? Is the rock igneous, metamorphic, or sedimentary? What kinds of minerals are in it? How hard is the rock? Perform geologic tests to find out for yourself.

Science Museum of Western Virginia STEM Inspired! Outreach Program

Crack this case

Young scientists will draw conclusions to determine which egg is boiled and which is raw by using scientific reasoning, logic, and previous knowledge. That's right, we will crack this case without cracking the egg.

Halifax 4-H

Sonya Furgurson is the 4-H Agent in Halifax County, Virginia and a Nation Board Certified Teacher. 4-H offers a variety of positive youth develop programs to youth ages 5-18 in which they learn generosity, mastery, belonging, and independence through studying science, citizenship, and healthy living. 4-H is "Making the Best, Better!"

Virginia Career VIEW, School of Education

Explore VIEW's interactive website, printable activities and resources for students and parents focused on career exploration. Learn about how the study of genetics plays an important role in more than 15 careers!

Virginia Career VIEW

Based in the School of Education at Virginia Tech, Virginia Career VIEW's mission is to inform, encourage, and support the education and career development of the people of Virginia. Our efforts combine independent research and engaging activities, in addition to hands-on statewide training and outreaches with the most current data presented using the latest technology. We share these resources through our website (www.vacareerview.org), toll-free career information line, workshops for professionals, and statewide outreach events.

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 to recognized difference in temperature, vibrations, texture, pressure and pain. 2) The visual system can trick us with optical illusion due bright light and contrasting patterns. It is the mental processing that determines how we see the world. 3) The auditory system detects sound vibration 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 close related.

VTCSOM Basic Sciences Department



Hands-on Exhibits

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

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.

VTCSOM

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

Exploring When to say Happy Birthday to a Fish

All living things including fish, insects, amphibians, and even trees grow old and age just like you. Think about if you did not know when your birthday was. How would you know your age? You might guess you are between 8-12 years of age, but would you know for sure? We face the same problem when aging other living things. How do we know how old animals are if we do not know their birthdays? You might ask why we would care about the age of fish, trees, or even you. Well, it helps us understand animals are growing faster or slower than expected, which helps us determine if enough food is available. Knowing a fish's age helps us know if there is disease, pollution, or too many fish and not enough food occurring in a lake or river. One way we age fish is looking at a bone called the "otolith", which is found in fishes' inner ears. By counting rings on the otolith much like counting rings on a tree, we can determine what year the fish was born, which could help us answer many questions about the health of the fish community.

During this hands-on learning experience, you will learn to identify certain fish species and

to verify their ages by looking at otoliths and other structures.

Bonnie Myers/Department of Fish and Wildlife Conservation

I am a Master's student in the Department of Fish and Wildlife Conservation studying variations in community fish production along a temperature gradient. My project focuses on possible effects of climate change on fish communities. I along with a couple undergraduate students in the Department of Fish and Wildlife Conservation will be conducting this hands-on experience. We are dedicated to the conservation and management of fisheries in the U.S. and beyond. We are also aiming to educate the public and future scientists in the making in understanding the importance of maintaining healthy lakes and streams and tools that help fisheries scientists address these concerns.

Homemade Lava Lamps

Homemade lava lamps can be made from supplies found around the house! All you need is an empty water bottle, food coloring, vegetable oil, and alka seltzer. First, fill up the water bottle a bit more than halfway with vegetable oil. Second, fill the rest of the bottle with water leaving about an inch of space at the top. Third, add TEN drops of food coloring. Fourth, break an Alka Seltzer into 4 pieces and drop it into the bottle one piece at a time. Add the next piece after the first one stops bubbling. Finally, watch the magic happen!

VT American Medical Student Association

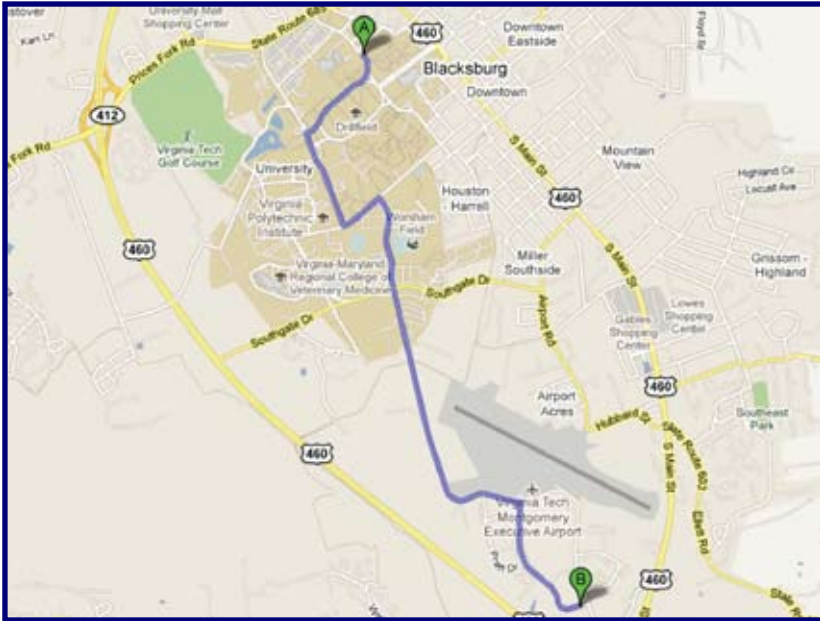
We are Virginia Tech's chapter of the national organization - American Medical Student Association (AMSA). Pre-health students in the club take part in meetings and different professional activities in order to gain knowledge in different health fields and to help prepare them for the transition to professional school.





Driving Directions

Driving directions from McBryde Hall to the VCOM conference center



FROM GOOGLE MAPS

START FROM

McBryde Hall
Blacksburg, VA 24060

1 - Head southeast on Stanger St toward Drillfield Dr
(ABOUT 0.1 MILES)

2 - Slight right at Drillfield Dr
(ABOUT 0.2 MILES)

3 - Slight right toward W Campus Dr (ABOUT 381 FEET)

4 - Turn left at W Campus Dr
(ABOUT 0.4 MILES)

5 - At the traffic circle, take the 2nd exit onto Washington St SW (ABOUT 0.2 MILES)

6 - Turn right onto Spring Rd
(ABOUT 0.4 MILES)

7 - Continue onto Tech Center Dr (ABOUT 1.2 MILES)

8 - Turn right at Kraft Dr
(ABOUT 0.6 MILES)

END AT

2280 Kraft Dr
Blacksburg, VA 24060

LATITUDE & LONGITUDE: 37.1989525,-80.405318



Educator Workshops

We are excited to offer Recertification Points 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-7th 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.

As a result of the workshops, students have the opportunity for exposure to current and relevant research. They will benefit from their teacher's ability to connect research back to classroom content standards through intentional programming.

Educator Workshop Contacts

Dr. Kathleen Jamison
4-H Youth Dev. Curriculum & Learning
(540) 231-9411
jamisonk@vt.edu



Katie LaFon
Virginia 4-H State Events
Coordinator
kapatter@vt.edu

Please visit

<http://kidstechuniversity.vbi.vt.edu/>
for further information.

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 2013 Program Dates

Jan 26 | Technology Day

Feb 23 | Science Day

Mar 23 | Engineering Day

Apr 06 | Math Day

🎵 Contact

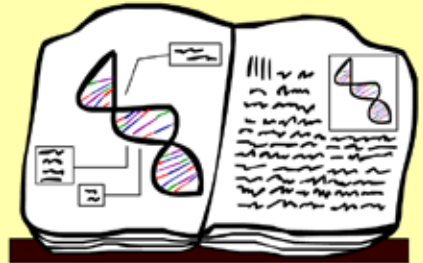
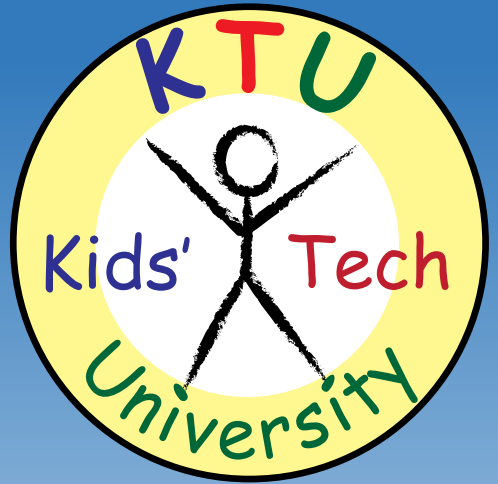
Dr. Reinhard Laubenbacher

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Dr. Kristy Collins

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kdivitto@vbi.vt.edu

We look forward to seeing you in March!



I am 

THE FUTURE OF SCIENCE



VirginiaTech

Virginia Bioinformatics Institute

