



Biological Systems Engineering

Newsletter

Fall 2014

BSE Fall Picnic & Expo

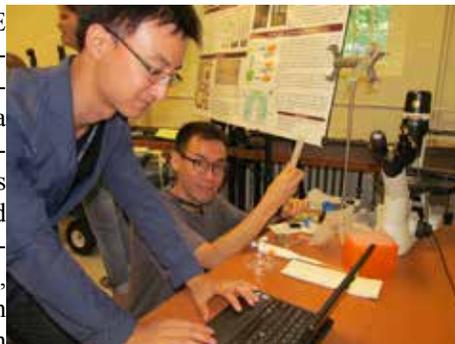
In August, the department held its annual picnic and expo. There were displays on activities and opportunities for students in the department, e.g., study abroad, ASABE, GSO, BSE Ambassadors, minors, and undergraduate research. The main event this year was an assortment of research/extension booths developed by BSE faculty and their groups to highlight their programs, including hands-on activities. Three of the booths are described in the following paragraphs.



Many watershed best management practices (BMPs) are designed to reduce stormflow and nutrient export to streams and rivers. One example is floodplain reconnection which can lead to the removal of sediment and contaminants. However, few studies have examined the influence of many BMPs on greenhouse gas emissions. During this year's fall picnic, a realtime greenhouse gas (GHG) analyzer made by Picarro was demonstrated by the research group of **Durelle Scott**, BSE associate

professor. The instrument simultaneously measures CO₂, N₂O, and CH₄, and can be used in the field and laboratory. Currently, Scott's group is exploring how GHG emissions vary seasonally and in response to rainfall across a river-floodplain-upland gradient.

The research group of **Warren Ruder**, BSE assistant professor, focuses on applying synthetic biology and biological micro-electro-mechanical systems (bioMEMS) to a range of problems in medicine and the environment. In this picture, group members and graduate students **Sung-Ho Paek** and **Ruihua Zhang** demonstrate the use of microfluidic chips to manipulate two converging, non-mixing aqueous streams. These chips can be used to precisely manipulate chemicals in a cell's environment with applications including biosensing and bioprocessing of low volume reactions. Ruder's group also has an outreach focus on aquaponics, the co-culture of fish and vegetables. "Build-Your-Own" recirculating aquaponics kits were available, along with a demonstration of this hybrid agricultural technology.



BSE professor **Cully Hession**'s booth at the BSE Fall Picnic featured an "Adopt-a-Duck" event, where participants selected a rubber duck for the Stroubles Creek Duck Race. Ducks were dropped into Stroubles Creek at the footbridge on West Campus Drive and raced to the finish line about 50 m downstream. This race was used to demonstrate research

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Summer Internships

Summertime is known as a time to rest and relax between hectic academic semesters – or, in the case of many BSE undergraduates, a time to build their knowledge and real-world skills through on site internships. Read more on pages 8 - 9.



Nancy Stevenson, BSE senior, points to leadership development on the Total Productive Management (TPM) display outside Nestlé in Fremont, Michigan, where she spent her summer as an operations management intern.



Department News

Dear BSE Alumni and Friends,

Update: We ran into production difficulties with a new newsletter software so my letter below represents the end of the semester and beginning of a new year. We are now immersed in spring semester with our classes and research and extension activities and all continues to be well in BSE.

It is a great time of year: endings and beginnings! As I write, students are busily studying for and taking final exams (every coffee shop is packed) and faculty are grading, grading, grading. We are looking forward to December commencement, followed by a restful break.

Also time for new beginnings: a new year, a new semester. We are looking forward to new graduate students joining our program. We will have a new Academic Programs Coordinator, **Liza Spradlin**, joining us in the new year. **Susan Rosebrough**, our former Academic Programs Coordinator, moved to the Department of Animal and Poultry Sciences in November to become their Graduate Program Coordinator. We miss Susan and wish her all the best.

Over the past six months, the BSE family has been busy. During the summer, we again hosted students from across the country to participate in the 9-week Research Experience for Undergraduates (REU) programs directed by BSE faculty members, one by **Justin Barone** and the other by **Cully Hession** and **Leigh-Anne Krometis**. In August, we welcomed a new faculty member, **Xueyang Feng**; a building manager for HABB1, **Roman (Rusty) Rustia**; and 70 new sophomores - yes, 70 in the Introduction to BSE course. We also have our largest number of seniors ever (50) in senior design.

Our graduate program is doing well. We have been working to increase the number of graduate students by adding highly qualified students to join our already outstanding

Valued Contributors to BSE (6/1/14 - 12/31/14)

The BSE faculty, staff, and students would like to thank our alumni, friends, and organizations who have generously supported the department through their gifts and donations. Please contact the department (barbt@vt.edu, mlwolfe@vt.edu) if your name has been omitted; we want to make sure we have recognized all our donors. Your contributions are used to provide student scholarships, purchase teaching laboratory equipment, aid in recruitment of outstanding graduate students, enable students to participate in special projects both domestically and internationally, and allow students to attend professional conferences. Activities we would like to add or expand through the generous contributions of our alumni and friends include senior design project fabrication and a Distinguished Lecture Series.

Collins, Eldridge
Eaton Charitable Fund
Elliot, John Wesley
Fidelity Charitable Gift Fund
Flagg, J. Michael
Hale, Edward
Hatcher, Charles
Holmes, Brian
Isaacs, Steven
Leach, Charles
Massie, Fred
Mills, Betty Anne
Montalbano, Gene & Marcia
Parsons, Frances

Patterson, Jr., William Frank
Perumpral, John
Powers, David
Prince, George Robert
Rowland, Neville
Smith, Easley
Smith, John
Stroup, Elizabeth
Thetford, Kim
Trykowski, Tom
Wells, Donald
Wills, Larry
Yagow, Eugene

group of students. We are developing formal mentoring programs for graduate students that will provide them with significant experience in teaching and extension. These programs build on the Graduate School's Preparing the Future Professoriate Program.

The faculty and graduate students continue to conduct outstanding research focused on addressing significant challenges in water, energy, food, and health. Faculty have been successful in 2014 in obtaining external funding from agencies such as the National Science Foundation (**Easton, Sample**), U.S. Environmental Protection Agency (**Benham**), National Institutes of Health (**M. Zhang**), U.S. Agency for International Development (**Mallikarjunan**), National Fish and Wildlife Foundation (**Heatwole**), and USDA Natural Resources Conservation Service (**Easton**).

For the past several (many) newsletters, I have written about HABB1 (Human and Agricultural Biosciences Building 1), the new research building that approximately half of our faculty and graduate students moved into about a year ago. It is a wonderful facility! The move to HABB1 opened up some lab space in Seitz Hall, so now I am happy to be able to update you on a couple changes in Seitz Hall. We now have a Sediment Lab (in 115B, previously the Protein Separations Lab). Over the winter break, we will be finishing renovation of the Food Engineering Lab (115A Seitz) into a Senior Design Workshop/Lab, including equipment and instruments for fabrication and testing of a range of senior design projects.

Best wishes for a happy 2015!

Mary Leigh Wolfe

Vist us at:
<http://www.bse.vt.edu/>

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in Hession's group about streamflow, sediment transport, and nutrient transport at the StREAM Lab (<http://www.bse.vt.edu/site/streamlab/>). The booth also featured a challenge to make a water column filter to reduce sediment in water. Participants chose from different filter media to place in their columns, and sediment-laden water was poured through their filter. The goal was to decrease the turbidity of the water as much as possible.



Stroubles Creek Duck Race

BSE Advisory Board Members 2014-2015

Clifton Bell, P.E. (*Chair*)

Brown and Caldwell
Virginia Beach, Virginia

Matthew Dickson

MedImmune, Inc.
Gaithersburg, Maryland

J. Michael Flagg, P.E.

Hanover County Public Works
Hanover, Virginia

Dale Lehman, P.E.

URS Corporation
Germantown, Maryland

Kumar Mallikarjunan (*Faculty*)

Biological Systems Engineering
Virginia Tech

Kelly Ramsey, P.E. (*NRCS Liaison*)

USDA - Natural Resources
Conservation Service
Richmond, Virginia

Andy Southerly

Cargill Meat Solutions
Wichita, Kansas

Kevin Tweedy, P.E.

Ecosystem Planning and Restoration,
LLC
Cary, North Carolina

Mary Leigh Wolfe (*Department Head*)

Biological Systems Engineering
Virginia Tech

BSE Advisory Board

In each newsletter, we highlight the background of one of the BSE Advisory Board members. Dale Lehman was gracious enough to share some of his accomplishments and current activities for this issue.

Dale Lehman received a B.S. and an M.S. in Agricultural Engineering from Penn State in 1981 and 1983, respectively. He began his career in 1983 with Greenhorne & O'Mara (now Stantec) and later joined URS in 1991. He serves as URS's National Client Director for the Federal Emergency Management Agency and assists in worldwide disaster recovery and mitigation efforts as well as international development. He was a past chair of ASABE's North Atlantic Region (now NABEC), board member of the Association of State Floodplain Managers (ASFPM), and served on Penn State's Industrial and Professional Advisory Council (similar to the BSE Advisory Board).



Lehman's technical area has been predominantly water resources, with a particular focus on disaster response and recovery. He has completed a variety of projects covering water quality best management practices, watershed studies, hazardous waste investigations, green infrastructure design, dam and levee safety and design, waste minimization, and environmental compliance. His emergency management experience has covered the full spectrum of disaster response, recovery, and mitigation, as well as emergency preparedness. He has responded to more than 400 disasters worldwide, covering floods, hurricanes, tsunamis, earthquakes, tornadoes, wild fires, and volcanic eruptions. Examples of his project experience include:

- Development of Coastal Zone Management Act Reauthorization Nonpoint Source Pollution Management Measures
- Remedial Investigation and Feasibility Studies for hazardous waste site cleanup at Aberdeen Proving Ground, MD
- Development of ASFPM's No Adverse Impact approach to Floodplain Management
- Development of a deep water circulation, ice growth, and oil spill trajectory model for the Bering and Chukchi, and Beaufort Seas
- Recovery for the 9/11 World Trade Center Attack, 1993 Mississippi River Floods, Northridge Earthquake, and Hurricanes Katrina, Sandy, and Ivan
- Rural abandoned coal mine restoration in northeastern Pennsylvania
- Development of FEMA's coastal surge model, SURGE, and wave hazard analysis methodology

Lehman is a licensed professional engineer and a certified floodplain manager. He lives in Laurel, MD with his wife and 4 children. He enjoys the outdoors, golf, and camping and serves as a leader of his sons' Boy Scout troop. He also enjoys music and plays in a blues and rock band as well as a local community band.



BSE Expo - research/extension booths

BSE Student News

ASABE Student Branch News



ASABE has been up to a lot this semester. We began the year with a sale of department t-shirts and sweatshirts. This year's Pig Roast was held again at **Dr. Zach Easton's** house, and was a success despite the rain outside. We've also had a few guest speakers, including Claire Childress from Career Services, who gave a presentation on interview skills, and several students who presented on their various study abroad experiences. In order to

give everyone a break from the classroom, ASABE ventured to hike McAfee's Knob and enjoyed a delicious meal at the Homeplace, celebrated Halloween by carving pumpkins to put out in the Julia K. Pryde Memorial garden, and held a Thanksgiving Potluck. We are excited as we are preparing to go to the Southeast Regional Rally at the University of Florida in the Spring!

-Sara Gokturk, BSE Junior and ASABE Chapter President

Nystrom Awarded Virginia American Waterworks Association Scholarship

BSE senior **Vickie Nystrom** was recently awarded \$2000 for first place in the annual Virginia American Waterworks Association Ray A. Jackson Memorial Undergraduate Engineering Student Scholarship essay contest. Her essay reflects on undergraduate research she conducted with BSE assistant professor **Leigh-Anne Krometis** and the Virginia Household Water Quality Program.

"Learning about private drinking systems has improved my understanding of scientific research and enhanced my knowledge of plumbing systems and household water contamination. Average working Americans, no matter where they live or what their educational background is, can be affected by lead contamination in drinking water. Household plumbing systems can be challenging to understand, but there are ways to treat the water before it gets into the pipes.

Throughout this study, I have encountered many types of water treatment systems including sediment filters, acid neutralizers, water softeners and even ultraviolet water purifiers. Being able to combine the science and engineering principles I learn in the classroom with the familiarity of real-life systems used every day has made me understand why we need water treatment and what occurs during the treatment process."



Vickie Nystrom inspecting a household pressure tank in Albermarle County

Spring 2014 Dean's List

Congratulations to the BSE undergraduate students who made the Dean's List in the spring 2014 semester. Undergraduate students must attempt at least 12 credit hours graded on the A-F option and earn a 3.4 grade point average (on a 4.0 scale) during the spring or fall semester to be awarded Virginia Tech Dean's List status.

BSE Freshmen (in spring 2014)

Daniel Morris

BSE Sophomores (in spring 2014)

Christopher Gilson

Brian Harris

Alexander Padilla

Eva Rabil

Kindell Schmitt

Joseph Stevens

BSE Juniors (in spring 2014)

Christopher Balian

Kathryn Brown

Jacob Cantor

Lauren Cashman

Dylan Cooper

Valeria Llanos

Daniel Logsdon

Anish Luthra

Austin Moon

Victoria Nystrom

Maryjoe Rice

Charles Roco

Scott-Eugene Saverot

Michael Scimeca

Xunuo Shen

Sarah Steinke

Nancy Stevenson

William Strickland

Shanel Tsuda

Eda Turgut

Patrick Weldon

Jordan Wetzig

BSE Seniors (in spring 2014)

Jason Arze

Jaclyn Einstein

Kelly Ferguson

Theresa Garwood

Joshua Gozum

Meghan Laporta

Jennifer Lewis

Gary Mitchell

Travis Moore

Sarah Nash

Victoria Nelson

Cassidy Owen

Brian Shenk

Lauren Smith

Michael Swartz

Aishwarya Venkat

Thinking about grad school...

Or know of someone who is?

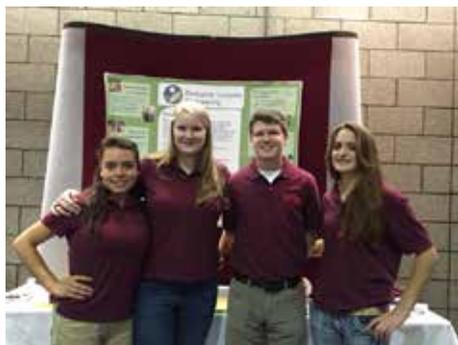
BSE is accepting applications

Application due date for Spring 2016: **October 1, 2015**

For more information, please visit www.bse.vt.edu/apply

BSE Undergraduate Ambassadors

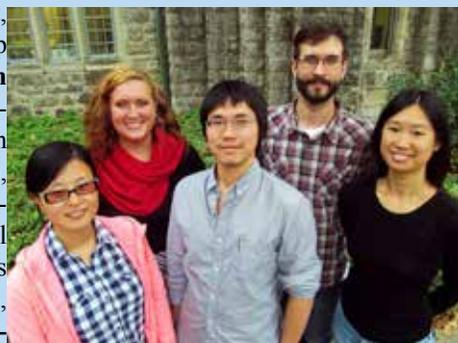
Undergraduate Academic Advisor **Priscilla Baker** has taken over mentoring the BSE Undergraduate Ambassador Program. Open to juniors and seniors with competitive GPAs and current resumes, the Ambassador Program provides its members with numerous opportunities to network with faculty and students throughout the year. BSE Ambassadors help at recruiting events for the department such as the Engineering Education Informational Sessions, COE Open Houses, and Student Engineers Council events. In addition, they serve as mentors to incoming transfer students new to the department to help them get oriented to life in BSE and at Virginia Tech. This year, returning ambassadors **Shanel Tsuda**, **Victoria Nystrom**, **Aidan Suiter**, **Lindsay Carr**, and **Emily Hilburger**, were joined by nine fresh-faced recruits: **Valeria Llanos**, **Sasha Howes**, **Brigid Bird**, **Sara Gokturk**, **Haley Fuller**, **Kindell Schmitt**, **Sarah Steinke**, **David Roth**, and **Chris Balian**.



BSE Ambassadors share their collegiate experiences with prospective new students at the College of Engineering Fall Open House (L-R): Valeria Llanos, Sasha Howes, Chris Balian, and Emily Hilburger

Alpha Epsilon (BSE Honor Society)

With thanks to the former AE president, **Theresah Zu**, for her outstanding leadership over the past year, and to officers **Christan Whysong** and **Hehuan Liao** for giving a stellar presentation at the annual Alpha Epsilon meeting during the 2014 ASABE conference, we are pleased to announce that our Alpha Epsilon chapter has received the 2014 national Outstanding Chapter Award yet again! This year, our AE officers are **Jiun Yen** (president), **Stephanie Houston** (vice president), **Nicholas Cook** (secretary), **Hehuan Liao** (treasurer), and **Chelsea Corkins** (officer at large).



(L-R): (front) Hehuan Liao, Jiun Yen, Stephanie Houston; (back) Chelsea Corkins, Nick Cook

So far, aside from everyone's favorite, Pizza Friday, we have hosted an Academic Advising Panel to help graduate students who are interested in pursuing a career in academia to better understand the process. For this panel, we invited **Dr. Ryan Senger**, **Dr. Zach Easton**, **Dr. Justin Barone**, **Dr. Leigh-Anne Krometis**, and our newest member of the BSE faculty, **Dr. Xueyang Feng**, who each shared their valuable experiences regarding applying for a position, balancing work and personal life, gathering research funds, and building high quality research teams.

AE has also committed to improve the community by aiding in tree planting around Stroubles Creek and continuing the clothes and food drive for the Montgomery County Emergency Assistance Program. We are looking forward to another productive year and thank all our BSE students for their outstanding performances!

Jiun Yen, AE President, 2014 – 2015

GSO (Graduate Student Organization)

Since joining the BSE department here at Virginia Tech, I have been excited to become involved in the Graduate Student Organization – and I believe that excitement has been contagious! This semester, GSO had over 30 graduate volunteers at the BSE Welcome Back Picnic, multiple runners in the Blacksburg Color Me Rad 5K Race, and a phenomenal turnout at the Chili Cook-Off and Halloween Party with 10 various chili dishes for the tasting competition.



Our main focus for the semester has been centered on graduate cohesion – specifically regarding integration of the biomolecular and the watershed science and engineering graduate students. As anticipated, nurturing a close-knit graduate community with a department in two separate buildings has been a challenge, but thanks to a diverse GSO council, it has been a success. So get ready for even bigger GSO events and ideas this coming semester!



With Hokie Pride,
Chelsea Corkins, GSO President

Congratulations to Seven BSE Graduate Students Who Completed Their Degrees

M.S. Degrees Completed Spring 2014

Emily Bock (Advisor: **Z. Easton**), *Greenhouse Gas Production and Nutrient Reductions in Denitrifying Bioreactors*. Emily is continuing her education and pursuing a doctoral degree under the supervision of Dr. Easton.

Kristine Bronnenkant (Advisor: **B. Benham**), *Comparison Watershed Selection When Applying the AllForX Approach for Sediment TMDL Development*. Kristine is a water resources engineer at Parsons Brinckerhoff in Baltimore, MD, where she is currently working on a Small Watershed Action Plan to provide recommendations for watershed restoration in Baltimore County.

David McCann (Advisor: **D. Scott**), *Basin-scale Spatiotemporal Analysis of Hydrologic Floodplain Connectivity*. David works with New Life Christian Fellowship, a campus ministry at Virginia Tech, where his work involves administration, teaching, and men's discipleship.

Emily Williams (Advisor: **W.C. Hession**), *A Comparison of Runoff Quantity and Quality Among Three Cattle Stocking Treatments*. Emily is a stay-at-home mom to 2 yr-old Isaac and wife to Jason. She and her family are excitedly expecting the birth of their next child in the Spring of 2015.

Ph.D. Degrees Completed Spring 2014

Hadi Nazem Bokaee (Advisor: **R. Senger**), *Systems Metabolic Engineering Through Application of Genome-scale Metabolic Flux Modeling*. Hadi is currently working as a postdoctoral researcher in the lab of Dr. Costas Maranas at Penn State University. In his research, he applies computational optimization techniques to explore biological-based processes allowing production of valuable chemicals and biofuels from different sources including methane.

Devin Ridgley (Advisor: **J. Barone**), *Self-Assembly of Large Amyloid Fibers*. Devin is a postdoctoral fellow at the University of Missouri where he is investigating how amyloid- β aggregation influences oxidative stress and inflammation within Alzheimer's disease.

Christan Whysong (Advisor: **K. Mallikarjunan**), *Chemosensory Evaluation of Training and Oxidative Stress in Long Distance Runners*. Christan is working at a small startup company in Blacksburg, Virginia.



Interested in a Co-op?

BSE junior **Sara Gokturk** has recently returned to Blacksburg after an eight-month co-op experience working at ARCADIS in Arlington, VA. Co-oping positions are longer full-time positions (longer than a single academic semester) that provide students with an intense immersive experience in their intended area of employment.

While at ARCADIS, Sara worked on different sewer/storm water hydraulic modeling projects using InfoWorks, ArcGIS, and the rational methods for various clients, including DC Water, Lehigh County Authority, and Chesterfield County. She also did the data collection, analysis, and management for the life cycle analysis of DC Department of Public Works using Natural Capital Asset Management.



Sara poses in the anaerobic digester being constructed at the new DC Water wastewater treatment plant

Sara says her undergraduate research experience in the BSE department prior to co-oping was particularly helpful in understanding the various different water quality standards involved in her projects. Reflecting on her experience, Sara says, "I think that everyone who can should do a co-op. It's great work experience and you get to maintain a longer relationship with your employer than with an internship; not to mention you get to work on cooler more long term projects! Co-ops are typically meant to set students up for full time jobs. I am continuing my work with ARCADIS part-time during the school year and full time during breaks with the end goal of working for them full-time."

Focus on Graduate Students

Of the many graduate students that joined the Biological Systems Engineering department in 2014, **Josh Moehrle**, took a more unconventional route. Josh completed his bachelor's degree in Mechanical Engineering at Virginia Tech in the spring semester. While finishing his undergraduate work, one of his professors mentioned he would be a good candidate for graduate school. Josh decided to pursue graduate work in the BSE department after completing and enjoying several elective classes in environmental engineering/water resources. Josh's intention in continuing his education was to take a lot of classes to increase his knowledge in his new field of study. Because he hopes primarily to use graduate school as a means to expand his knowledge in this area before seeking a position in industry, he decided to pursue a non-thesis master's degree, which requires 24 course credit hours and a final project. The focus of his project is evapotranspiration within herbaceous wetlands. At some point in his professional career, he would like to work in the non-profit sector.



Every year the BSE department welcomes undergraduate and graduate students from around the world. Before coming to Virginia Tech, **Prasanth Valayamkunnath**, a new Ph.D. candidate, studied at the Indian Institute of Technology in Kharagpur, India. Prasanth says he was motivated to leave his home country to attend Virginia Tech given its global renown as a respected research institution, and given the particularly interesting research in water resources occurring in the BSE department. He felt that by becoming a part of that research initiative he could contribute toward addressing some



of the most pressing biological systems engineering problems that face the world. Since moving to the United States this past summer, he has had a smooth transition, noting that everyone he meets is extremely friendly and accommodating. For his Ph.D. research, he will be looking at climate variability and its effect on water resources under the direction of **Venkat Sridhar**, BSE assistant professor. During his years at Virginia Tech, Prasanth hopes to be able to engage himself in American culture and experience all the area has to offer.

New Graduate Students - Fall 2014

Graduate Student (Advisor)

M.S. Students

Hannah Billian (Krometis)

BS Civil Engineering, West Virginia University, 2014

Breanne Ensor (Scott/Hession)

BS Environmental Science, Lehigh University, 2014

BS Environmental Engineering, Lehigh University, 2014

Kinsey Hoffman (Hession)

BS Biological Systems Engineering, Virginia Tech, 2014

Rachael Johnson (Sample)

BS Biological Systems Engineering, Virginia Tech, 2012

Russell Umstead (Easton)

BS Engineering Technology, Civil, University of Delaware, 2013

Ph.D. Students

Pedro Ivo Guimaraes Braga da Silva (Senger)

BS Biotechnology, Universidade Federal do Para, Brazil, 2014

Rui Huang (P. Zhang)

MS Microbiology, Sun Yat-sen University, 2014

BS Biotechnology, Sun Yat-sen University, 2011

James Jones (Thompson)

MS Environmental Engineering, University of Tennessee at Knoxville, 2014

BS Civil Engineering, University of Tennessee at Knoxville, 2012

Hyunwoo Kang (Sridhar)

MS Agricultural Engineering, Kangwon National University, 2011

BS Agricultural Engineering, Kangwon National University, 2009

Tyler Keys (Scott)

BS Civil and Environmental Engineering, University of Tennessee at Knoxville, 2014

Prasanth Valayamkunnath (Sridhar)

M. Tech Land & Water Resources Engineering, Indian Institute of Technology Kharagpur, 2014

B. Tech Agricultural Engineering, Kerala Agricultural University, 2011

Moges Wagena (Easton)

MS Water Science and Engineering, UNESCO-IHE Institute for Water Education, 2011

BS Hydraulic Engineering, Arbaminch University, 2004

BSE Comprehensive Design Project Proposals and Professional Mentors Needed for 2015-2016!

If you have any ideas about potential projects, if you would like to sponsor a particular project, or if you would be willing to serve as a project mentor, please contact Dr. Cully Hession (chession@vt.edu)

Education Abroad in Ireland



The Biological Systems Engineering department offers students many opportunities to expand their borders, both literally and figuratively! Through a partnership with University College Dublin and the ongoing Trans-Atlantic Biosystems Engineering Curriculum and Mobility program (TABE.NET), senior **Lindsay Carr** had the opportunity to study abroad in Ireland last spring semester.

Despite Ireland's many cultural and linguistic similarities to America, she found that there were a number of things that she had to adjust to, including driving on the left side of the road and the different styles of teaching and assessment at the university. Unlike in the U.S. where there are more homework assignments, Ireland's education system has more of a focus on independent study. Some classes have no homework, and the only grade is a final exam. As an American studying in another country, she had to adjust to the idea of being an international student. However, she quickly became friends with many of her Irish classmates and the other international students.

While abroad, Lindsay took advantage of her close proximity to the European mainland and visited a number of other countries during her breaks. For other students that are hoping to study abroad, Lindsay's recommendations are to plan ahead, as it can take time to secure approval for class credit transfers. She also says to not be afraid to travel to places where you don't know the language: "You'd be surprised how much hand motions and Google Translate can help you get by."

Internships

Summertime is known as a time to rest and relax between hectic academic semesters – or, in the case of many BSE undergraduates, a time to build their knowledge and real-world skills through on site internships. Every summer, numerous undergrads use personal networks, professor recommendations, and Virginia Tech Career Services to find paid positions that serve their specific career interests. The variety of positions these students fill reflects the diversity of interests and goals within our department's ever-growing student body: **Casey Schradig**, BSE sophomore, spent his summer working at Sea Salt CSA/B&B Farms in New Jersey, where he not only learned how to grow the perfect tomato, but also the managerial and business side to small-scale agriculture. Meanwhile, **Mj Rice**, BSE senior, learned about the bottling process at PepsiCo in Newport News, VA – and earned her forklift license!



(L-R): Casey Schradig, Mj Rice

Regardless of the particulars of their summer experience, all the students emphasize how useful their BSE coursework has proven in fulfilling their work responsibilities. **Valeria Llanos**, BSE senior, who spent her summer at Avantec Engenharia Ltda. in Vitoria, Brazil, commented: "Most students think or wonder if all the assignments we do will be applied in the future... Trust me they will! It was great to apply and use assignments done in different classes, especially when you start putting all the concepts together." Valeria

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BSE Research Experiences for Undergrads

The BSE department once again served as a site for two REU programs, the Bioprocessing REU and the Dynamics of Water and Societal Systems REU. Together, these programs welcomed 21 students from 18 different colleges and universities for nine-week immersive programs in research at the Virginia Tech central campus.



Bioprocessing REU: Front Row (L-R): Vincent Encinas (University of California at Davis), Jasmine Naik (Rowan University), Jennifer Paul (New Mexico State University), Jessica Symons (University of Wisconsin-Platteville), Simone Gelinis (University of Maryland), Will Heydinger (Ohio State University), Victoria Morales (University of Texas at Arlington). Back Row (L-R): Dr. Justin Barone (VT-BSE), Ben Heithoff (VT-Biology), Shannen Scott (Clemson University), Nathan Harms (Oregon State University), Celeste Blum (University of Missouri), David Roth (VT-BSE).



Stream REU (L-R): Dr. Cully Hession (VT-BSE), Cort Hammond (Washington and Lee University), Caleb Higginbotham (VT-STAT), Nicole Carter (Oklahoma State University), Erica Davis (University of Tennessee), Sarah Medley (University of Virginia at Wise), Andrea Stewart (University of North Carolina at Chapel Hill), Karla Boza (Manhattanville College), Jayme Lee Ewing (VT-APSC), Dr. Leigh-Anne Krometis (VT-BSE), Christine Hart (Smith College).

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spent much of her summer in Brazil using GIS to plan a new highway and determine the effects of the project on local watersheds. **Bushra Alam**, another BSE senior, spent her summer in Fairfax, VA planning stormwater projects for the Northern Virginia Soil and Water Conservation District. Reflecting on her BSE curriculum, Bushra says that because of classes like Thermodynamics and Fluid Mechanics “I developed strong data analysis and math skills which helped me a lot during my internship”



(L-R): Valeria Llanos, Bushra Alam

Summer internships also provide an excellent means for students to gain the sorts of skills they can only truly gain from experience in the workforce. BSE senior **Anish Luthra** spent his summer working for the consulting firm Hazen and Sawyer in New York reviewing data to optimize the efficiency of the Bowery Bay Wastewater Treatment Plant. In addition to learning more about wastewater treatment operations, Anish says he gained a great deal of understanding as to how the management side of an engineering consulting firm operates. Similarly, **Dylan Cooper**, BSE senior, who worked for the consulting firm Kleinschmidt Associates in the New River Valley of Virginia to monitor local reservoirs, said that through his work experience he has been able to improve his ability to communicate effectively with partners from many different fields, including biology and architecture.

Internships can also provide students with an opportunity to live in a new part of the country – or the world! BSE senior **Vickie Nystrom** spent her summer working for the US Forest Service at the Rocky Mountain Research Station in Moscow, Idaho. Her regular monitoring trips to inspect silt fences, install rain gages, and collect watershed data served as a fantastic opportunity to view the mountains of the American northwest. BSE junior **Katie Spruill** spent part of her summer in Ghana working for Saha Global, providing training and education to local women aiming to develop a business to provide treated water, which allowed her to experience a new culture and develop trans-continental relationships.



(L-R): Dylan Cooper, Vickie Nystrom, Katie Spruill

Perhaps most importantly, hard work during the summer can prove to be key in finding employment post-graduation. On-site skills and experience inevitably shine through on resumes and in interviews. And sometimes a temporary summer job proves the direct gateway to a first full-time position. **Nancy Stevenson**, BSE senior, spent her summer as an Operations Management Intern with Nestle in Fremont, Michigan. The job proved such a good fit for Nancy’s interests that she has already accepted a full-time position with Nestle in Eau Claire, Wisconsin to begin after graduation in May 2015.

Interested in hiring more Hokie engineers?

Hokies4Hire
www.career.vt.edu

Post jobs, internships, and co-ops for Virginia Tech students and new graduates.

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BSE in Chile

During the summer of 2014, three BSE students (**Michele Anderson**, **Cassandra Conway**, **McKenna Millington**) went on a faculty-led study abroad program to Santiago, Chile. The program included a food engineering course jointly taught by BSE Professor **Kumar Mallikarjunan** and Dr. Pedro Bouchon of the Department of Chemical and Bioprocess Engineering at Pontificia Universidad Católica de Chile (PUC). The eight student class included four Chilean students and a fellow American student from the University of Notre Dame.



As part of the course, the students visited the Nestle Research Center in Chile to observe the bakery facilities and attended lectures at Universidad Tecnológica Federico Santa María in Valparaíso. The students also had the opportunity to tour in and around the city of Santiago and other nearby places (Maipo River Canyon, Conche y Taro winery, Vino del Mar City).

BSE Faculty and Staff News

BSE Faculty Promotions

Three BSE faculty members were promoted to professor and one was awarded tenure and promoted to associate professor in July 2014. Congratulations to Brian, Kumar, Percival, and Scotty!



Brian Benham was promoted to the rank of professor. Benham's integrated extension and research program focuses on two major areas: watershed management and quality of private water supply systems. Since his last promotion, he has published 19 refereed journal articles and 15 peer-reviewed and 59 non-peer reviewed extension publications. Benham's outstanding work has been recognized by several university awards, including the 2014

Alumni Award for Extension Excellence and the 2012 Extension Award of Merit from the Virginia Chapter of Gamma Sigma Delta. Awards from ASABE include Outstanding Manuscript Reviewer, Soil and Water Division in 2014 and Blue Ribbon Educational Aids Awards in 2008 and 2012.



Yi-heng (Percival) Zhang was promoted to the rank of professor. Zhang's research program focuses on the low-cost production of biofuels, biochemicals, food, electricity, and nutrients from renewable resources, such as sugars and solar energy. Since his last promotion, Zhang has published 68 refereed articles in high quality journals such as Nature Communications and Proceedings of the National Academy of Sciences of the USA.

Zhang's research has been recognized through several awards, including the Virginia Tech College of Engineering Faculty Fellow Award in 2011 and Daniel I.C. Wang Award (Biotechnology and Bioengineering and American Chemical Society BIOT division) in 2010. Zhang is co-founder of two start-up businesses.



Kumar Mallikarjunan was promoted to the rank of professor. His research focuses on food processing and the development of rapid non-destructive sensing methods to evaluate food quality and safety. Since his last promotion, he has published 33 refereed journal articles and 1 book, and filed three patent disclosures. One noteworthy accomplishment is his international program, including significant work in East Africa related to peanut processing.

Mallikarjunan received the 2013 Outstanding Alumni Award for Research Excellence from the Asian Institute of Technology, Thailand. In 2012, he received the Outstanding Volunteer & Service Award from the Institute of Food Technologists and, in 2011, he received a Leadership Citation Award from ASABE.



Durrelle (Scotty) Scott was promoted to the rank of associate professor with tenure. Scott's research program focuses on material fate and transport through inland waters. His research ranges from examining the effects of climate change on glaciers in Alaska to evaluating the effects of freshwater diversion in the Mississippi River Delta. Since joining Virginia Tech, he has published 18 refereed articles in high quality journals, including Nature and Nature Geoscience.

He has been successful in securing funding from the National Science Foundation. He has developed a new undergraduate/graduate course, Field Methods in the Hydrologic Sciences. Scott was elected as secretary for the Biogeosciences Section of the American Geophysical Union (AGU) for 2013-2015.

Yagow Receives DCR Longevity Award

In appreciation of an accomplishment that was long overdue, **Gene Yagow**, BSE senior research scientist, was presented with a Longevity Award by the Virginia Department of Conservation and Recreation (DCR), following a decade of service to Virginia by the Nonpoint Source (NPS) Assessment application he developed. Karl Huber, an avowed user of this application, presented the award to Yagow, commenting: "Very few information technologies have the lifespan and usefulness of Gene's NPS tool". DCR has deployed Yagow's application for the Commonwealth's NPS Assessments of 2002, 2004, 2006, 2008, 2010, 2012, and 2014.

The presentation of this award does not mark the end of Yagow's usefulness to the NPS Assessment program. He is currently planning on modifying and recalibrating his application to serve the needs of DCR as well as the Virginia Department of Environmental Quality to calculate NPS pollution loads for the 2016 Assessment period. Commenting on Yagow's tireless effort in this regard, one ceremony attendee noted that "NPS pollutants must run through his veins".



Karl Huber of VA-DCR presents Gene with a hard drive plaque

Sophomore Class

Our sophomore course, BSE 2004: Introduction to Biological Systems Engineering, set another enrollment record this semester as it welcomed 70 new students to the department. The students in this class represent diverse geographic backgrounds, including thirteen home states (from California to Virginia) within the United States, and four additional home countries (Belize, China, Mexico, and Thailand). Almost half of the students (33 out of 70) are women.

This semester **Leigh-Anne Krometis** is serving as the lead instructor for BSE 2004. During spring 2014, Krometis completed the year-long New Faculty/Early Career Teaching Certificate program offered by the Center for Instructional Development and Educational Research at Virginia Tech, which is designed to introduce faculty with teaching appointments to new teaching strategies and technologies that can be implemented in the classroom. You can read more about Leigh-Anne's experience within the CIDER program and adoption of new teaching techniques to further enhance BSE 2004 at <http://www.vtnews.vt.edu/articles/2014/08/080114-provost-cidercertification.html>.



New Grants

Brian Benham, BSE professor, (pictured on pg. 10) is principal investigator of the six-year, \$2.4 million, project "University Collaboration to Support Expert Review of Best Management Practices for Chesapeake Bay Water Quality Improvements" sponsored by the US Environmental Protection Agency (EPA). The project, which began in April 2014, seeks to manage the process by which the EPA's Chesapeake Bay Program determines how the pollutant-load reduction performance of selected implemented best management practices, treatments, and technologies (i.e., BMPs) are quantified in the Chesapeake Bay Watershed Model. The structured process for developing the BMP performance estimates relies on using Expert Panels to review existing scientific literature and rendering an informed opinion about BMP performance based on their expertise and available evidence. For this project, Virginia Tech is partnering with the other Land Grant universities from states and jurisdictions that fall within the Chesapeake Bay watershed (i.e., University of Delaware, University of Maryland, University of the District of Columbia, West Virginia University, Cornell University, and Penn State University).

Mike Zhang, BSE professor, was recently awarded a \$2.4 million, four-year grant by the National Institute on Drug Abuse (NIDA) to develop novel vaccines against nicotine addiction. Together with his collaborators, Dr. Marion Ehrich, a professor of Biomedical Science at Virginia-Maryland College of Veterinary Medicine, and Dr. Paul Pentel, a professor of Medicine and Pharmacology at the University of Minnesota, he will develop nanoparticle based vaccines that could elicit strong immune responses to nicotine haptens. Haptens are small molecules that elicit an immune response when attached to a larger carrier such as a protein. The nicotine-specific antibodies elicited by the vaccine will prevent the nicotine in the blood (after smoking) from entering the brain and thus provide help to smokers addicted to nicotine to quit smoking.



President Timothy Sands Visits the College of Agriculture and Life Sciences



BSE senior **Jacob Cantor** (right) presents a poster to Virginia Tech President Timothy Sands (left), Provost Mark McNamee (center), and **Erin Ling** (background), coordinator of the Virginia Household Water Quality Program, illustrating the results of his outreach on the Eastern Shore.



President Timothy Sands addresses faculty and staff of the College of Agriculture and Life Sciences in the HABB1 Food Sciences Pilot Lab.

Welcome New BSE Faculty - Xueyang Feng



Xueyang Feng joined the BSE department as an assistant professor in August, 2014. He will lead the Biomolecular Engineering Lab at Virginia Tech and use his expertise in systems biology, synthetic biology, and metabolic engineering to design biological systems to meet the demands of renewable energy and pharmaceutical production. Feng got his Ph.D. in 2012 from the Department of Energy, Environmental & Chemical Engineering at Washington University in St. Louis. Before joining Virginia Tech, he worked for two years as a postdoctoral fellow at the Energy Biosciences Institute - Illinois at the University of Illinois at Urbana-Champaign.

Feng has applied 13C-based pathway analysis to analyze the usage of carbon metabolic routes and identified numerous novel pathways in many environmental microorganisms. He has also developed a web-based platform, MicrobesFlux, to enable the high-throughput and customized reconstruction of genome-scale metabolic models for environmental organisms. During his postdoctoral research at UIUC, Feng genetically modified yeast to use agriculture residues to produce fatty acid-derived biofuels from renewable feedstock through manipulating yeast lipid metabolism.

At Virginia Tech, Feng will focus on the biomolecular engineering of eukaryotic systems such as yeast, plants, and mammalian cells. Through this process he hopes to achieve cell-wide understanding of the eukaryotic metabolism, and design advanced techniques in synthetic biology, including genome editing and synthetic control of cell metabolism, to achieve new functions in eukaryotic cells. Feng will also apply metabolic engineering approaches to modify the eukaryotic metabolism to produce biofuels, drugs, and other value-added compounds.

Outside of work, Feng and his wife, Fei Wang, are both fans of the St. Louis Cardinals and enjoy music, movies, and badminton.

New Addition - Congratulations!

BSE assistant professor **Leigh-Anne Krometis** and husband Justin (VT Advanced Research Computing) were thrilled to welcome their second son, Leo, to the family on July 10th (21" 6 lbs 8 oz). Leo has instilled himself as the smiling center of the family, and has thoroughly charmed big brother Linus. The two are already often mischievously plotting and giggling together, so mom and dad better watch out!



Vist us at:

<http://www.bse.vt.edu/>

Ruder Research Group: Engineered Living Systems

Synthetic biology is an emerging field focused on rewiring genetic and enzymatic pathways to create new biomolecular systems and enhanced cellular capabilities. Substantial progress began fifteen years ago with the creation of two synthetic gene networks that enabled cellular memory and internal oscillations. Using tools such as gene-splicing and protein engineering, the field has continued to design and build increasingly complex synthetic pathways. The research group of **Warren Ruder**, BSE assistant professor, focuses on applying synthetic biology to solve a range of industrial, medical, and environmental problems. Its mission includes both understanding the fundamental biology of natural systems, as well as reengineering these systems with synthetic control pathways for real-world applications.

The group has recently developed several new technologies. For example, bacteria have been engineered with a surface protein that chemically bonds itself to surrounding particles of interest. These bacteria could have applications including bioremediation through particle sequestration, as well as biosensing of pathogen biomarkers. The group has used microfluidic technologies, part of a field known as lab-on-a-chip engineering, to create microchemostats. These chemostats contain only about 50 bacteria and are plumbed with pipes having the same diameter as a human hair. This tool allows researchers to monitor synthetic pathway behavior in real-time using fluorescent video microscopy. Other work in the group includes an effort to reprogram gut bacteria to benefit human health, as well as an effort to control gene expression in mammalian cells using light pulses. The group's expertise spans multiple fields including biological pathway engineering, cell physiology, biomechanics, microfluidics, biomaterials, and ecology.

The members of the Ruder research group include: **Sung-Ho Paek**, BSE PhD student; **Keith Heyde**, BSE/ESM PhD student; **Daniel Wolozny**, BSE PhD student, **Felicia Scott**, BSE MS student; **Ruihua Zhang**, BSE MS student; **Benjamin Heithoff**, Biological Sciences undergraduate student; and **Sean Hardy**, Biological Sciences undergraduate student.



(L-R): Ruihua Zhang, Felicia Scott, Daniel Wolozny, Keith Heyde, Sung-Ho Paek attending the Biomedical Engineering Society annual meeting in San Antonio, TX

Roman “Rusty” Rustia, HABB1 Building Manager

Roman “Rusty” Rustia joined the BSE faculty and staff as the manager of the new HABB1 building. An engineering graduate of California Maritime Academy, he brings over 30 years of experience in building, property, facility, and project management. His broad past experiences include management of the TD Garden Arena housing both the Boston Bruins (hockey) and Boston Celtics (basketball) professional franchises, a performing arts complex, a biomedical research facility for Harvard University, and laboratories at MIT. At Florida Atlantic University he managed construction projects, including the LEED Gold certified College of Nursing Building. He looks forward to building strong relationships with his HABB1 colleagues to support their research, and is excited to join his wife, a professor at Virginia Tech Carilion School of Medicine, in the Hokie community.



Benham Group Welcomes Two New Faculty

The BSE department welcomed two new research faculty to BSE professor **Brian Benham**'s research group: **Jeremy Hanson** and **Charles (C.J.) Mitchem**.



Prior to joining Virginia Tech in August 2014, Jeremy Hanson served as an environmental management fellow with the Chesapeake Research Consortium. He now works with Brian Benham as project coordinator for Expert Panel BMP Assessment and is stationed at the Chesapeake Bay Program in Annapolis, MD. He earned his B.A. at the University of Nebraska-Lincoln, and his M.P.P. from the University of Maryland-College Park. He looks forward to adopting a dog and rekindling his lost love for homebrewing.



Charles (C.J.) Mitchem, Jr. joined BSE's Center for Watershed Studies fulltime in October 2014 as a watershed assessment analyst/project manager. He is a 1994 (B.S.) and 2000 (M.S.) graduate of the department, and has split his professional time between the Center and the Central Shenandoah Planning District Commission for the last two years. Prior to that, C.J. spent 13 years in consulting engineering. He currently lives in Roanoke County, with his fiancée and two boys, and spends most of his free time coaching youth athletics.

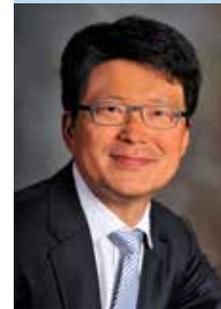
Welcome New Postdoctoral Associate



Mirza Billah joined the BSE department in fall 2014 as a postdoctoral associate under the supervision of assistant professor **Venkat Sridhar**. Billah received his B.S. in Civil Engineering from Bangladesh University of Engineering and Technology, his M.S. in Integrated Urban Engineering from UNESCO-IHE, Netherlands, and his Ph.D. in Civil and Environmental Engineering from University of South Carolina. His research includes hydrologic systems analysis at regional scales, data management in cyber-infrastructure to leverage new hydrologic models, and climate change impacts on water resources due to natural and anthropogenic activities. While at Virginia Tech, his focus will be on analyzing and computing the interactions between surface and groundwater and forecasting impacts on streams related to climate change.

Mirza is accompanied by his wife, Tasrith Jahan, and son Ninad Billah. The family loves watching football and has already started cheering for the Hokies!

Visiting Scholars



Sang Min Kim, a visiting scholar from South Korea, joined the BSE Department in August 2014. He is an associate professor in the Department of Agricultural Engineering in Gyeongsang National University, South Korea. He received his B.S., M.S. and Ph.D. in Agricultural Engineering from Seoul National University. He worked previously in BSE as a post-doctoral research associate under the guidance of BSE professor **Brian Benham** in the area of bacteria TMDL development from February 2005 to August 2007 – and with all his happy memories of Blacksburg, is very glad to be back! Once again he is working with Brian Benham and he wants to learn the latest trends in TMDL and watershed management. He also hopes to develop relationships with many faculty and students in BSE.



Kun Cheng is a masters student from Henan Agricultural University in China, currently working as a visiting scholar at Virginia Tech under BSE professor **Percival Zhang**. His work is focused on the cloning and characterization of an enzyme, thermostable iso-amylase, from a hyperthermophilic microorganism. By using this enzyme, the generation of hydrogen or electricity from corn starch can be increased by 30-40%.

BSE Alumni News

Alumni Updates (Spring 2014)

1980s

Bob Hines (BS '85) was promoted to the position of principal controls engineer at Mallinckrodt Pharmaceuticals in Raleigh, NC. Mallinckrodt Pharmaceuticals is the only producer of acetaminophen, the active pharmaceutical ingredient in many pain relievers, in the western hemisphere. Bob was also recently asked to serve on the Electronics Engineering Technology advisory committee at Wake Tech Community College.

2000's

David Carradine (PhD '02) has been applying his engineering skills all around the world since graduation. Immediately after finishing his degree, David worked as the technical manager for structural testing at the Wood Materials and Engineering Laboratory at Washington State University. In 2008, he moved to Christchurch, New Zealand to take a position as a timber research engineer with the Civil and Natural Resources Engineering Department at

the University of Canterbury. Serving in this position provided David with interesting professional experiences during the massive 2011 earthquake, which levelled much of the city, and required substantial rebuilding projects. In 2012 he moved to Wellington on the country's north island to work as a structural engineer at the Building Research Association of New Zealand.

Steve Collins (BS '03) completed his dissertation work on "Fine-scale modeling of Odonata distributions in the northeast United States" and was awarded a PhD in Biology from Texas Tech University in May 2014. Just months later, in August, Steve and wife Annie welcomed their first son, Theodore Michael. Steve is currently working as a senior engineer at Straughan Environmental Services, Inc. in Columbia, MD.



Michelle Cock (BS '04) is a project engineer with Thompson & Litton in Radford, VA. As a PE with this firm, Michelle has projects that often take her back to Blacksburg, including design of the underground stormwater detention facilities on Lower Chicken Hill at Virginia Tech. Michelle and her husband Phillip Sirrre welcomed their first child, Cecily Jan Sirrre, in March 2014.



Helene Seita (BS '08) has been busy since graduation! Since leaving Blacksburg, Helene has worked as a sales engineer at Siemens, a clinical research assistant at SEAHEC in Wilmington, NC, and earned an M.A. at the Boston University School of Medicine. In 2012, she married fellow Hokie alum, Christopher Sterbling (ISE BS'08). Helene began medical school at Boston University in Fall 2014.



BSE: 70+ years of excellence in environmental monitoring



November 1940: SCS engineer, Richard E. Brown, changes the chart of a water level recorder operated with flume on plots at the Blacksburg Experiment Station (*photo credit: VT-Discovery Commons**)



August 2014: BSE environmental/agricultural research manager, **Laura Lehmann (BS '02, MS '04)** programs a Campbell Scientific datalogger for a wetland project in Fairfax County (*photo credit: T. Thompson*)

**Interested in perusing more departmental historical pictures and articles? Check out "Discovery Commons - Department of Agricultural Engineering Project 10", managed by Digital Imaging and Archiving and W. Cully Hession, at: <https://dcr.emd.vt.edu/vital/access/manager/Index>*

Derek Kichula (BS '08) is a process engineer at Pantheon (formerly Gallus Bio-Pharmaceuticals), where he is responsible for all operations-related capital projects at their Princeton, NJ site. Last May, he married Elena Tous (Kichula). Derek and Elena currently live in Yardley, PA, and, in addition to his engineering job, Derek is pursuing an M.B.A. at Villanova.

Matthew O'Malley (BS '09) recently began his Peace Corps service as an agricultural extension engineer in Malawi in the Mzimba District in the Lunjika area. Matt is serving in the Peace Corps with his wife, Tara Milligan Gardner-Webb (Religious Studies '09), who is working as a Community Health Advisor.



2010's

Erin Norton (BS '10) is working at Novavax, a small, clinical stage vaccine company located in Rockville, MD, that is developing vaccines for RSV, seasonal flu, and pandemic flu.

Matt Stauffer (BS '11) is now a bioprocess engineer at Joule Unlimited Technologies, Inc. in the greater Boston area.

Katie Driscoll (BS' 12) is working as an environmental engineer for Eastern Research Group (ERG) in Northern Virginia.

Her main project at present is within the Indian Head Explosives Ordnance Disposal Technology Division working on a decontamination team ensuring military ordnance is decontaminated in an environmentally safe fashion.

Dan Inman (BS '13) is completing an internship at Blacksburg's Main Street Veterinary Clinic while working on his DVM degree at the Virginia-Maryland School of Veterinary Medicine. Check out this picture of Dan conducting a post-op exam on BSE assistant professor **Leigh-Anne Krometis'** cat, "Captain Kirk"!



Margaret Delany (BS '13) accepted a position as utilities supervisor for Cargill Meat Solutions in Beardstown, IL

Jessica Ewing (BS '13) accepted a position as a project engineer at a civil and environmental engineering consulting firm, MSA, P.C., in Virginia Beach, VA. She is currently working on an extensive land development project in Hampton, VA, involving the design of a 40,000 square foot retention pond, 2,000 feet of connecting storm water pipe, and land grades for the entire 14 acre site.



Damir Grljevic (BS '13) is working as environmental programs manager for the non-profit group Keep Prince William Beautiful, Inc. in Prince William County, VA. Damir works to educate and engage the local community in environmental stewardship programs – including helping a group of local Boy Scouts label over 1200 storm drains with "No polluting! Drains to Chesapeake Bay" this summer.



Aneela Mousam (BS '13) recently completed a training internship at the USDA-National Institute of Food and Agriculture (NIFA) in Washington, DC. Upon completing this program, she began a M.S. program at George Mason University in Civil and Environmental Engineering.



Kimberly Tretick (BS '13) began work as a Stormwater Design Engineer at Con-tech Engineered Solutions. Though based in Baltimore, MD, Kimberly frequently travels to sites in Georgia, Alabama, and Florida to design water quality and quantity systems for client sites.

Amanda (Rew) Gateau (BS '13) married Shawn Gateau (a VT Corps of Cadets graduate) this past June. As her husband is stationed in San Diego, Amanda has recently relocated and is pursuing several new job possibilities.

Travis Moore (BS '14) accepted a position as a regulatory and compliance engineer at the Maryland Department of the Environment in Baltimore, MD.

We enjoy receiving your news & pictures!

Please take a few moments, and fill out our alumni update form:

<http://www.bse.vt.edu/alumni/index.html>

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Research Experiences for Undergrads

Every summer multiple BSE undergraduates are selected to participate in prestigious National Science Foundation Research Experiences for Undergrads (REUs) around the world. Projects range from investigating contaminated sediments to improving drug delivery systems. A few snapshots from their amazing experiences:



BSE junior **Heather Bomberger** shares her final presentation for the University of Georgia's Nanotechnology and Biomedicine REU. Heather wrote a program in Java to control a microscope camera and laser shutter to better image protein transport in the cilia of *Chlamydomonas reinhardtii* cells.



BSE senior **Dan Flannery** enjoys some time away from the lab taking in the sights in Lahti, Finland. Dan participated in an international REU based at Rutgers University focused on bioremediation of halogenated organic compounds. While in Finland he analyzed local stream sediments for natural microorganisms that might be useful in the breakdown of these compounds.

BSE senior **Charles Roco** spent a summer in Cambridge, MA at Harvard University's REU based at the Wyss Institute for Biologically Inspired Engineering. Charles spent his summer optimizing the retention and release of new biomolecular drugs in the body.



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