

Biological Systems Engineering *Newsletter*

FALL 2017

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Welcome Back Picnic

On September 5th over 150 faculty, staff, graduate and undergraduate students came together at the HABB1 building for the annual departmental picnic celebrating the start of the new academic year. In addition to promoting fellowship among the department, this gathering provides an opportunity for students to display posters describing their research and for the different BSE student organizations to advertise their plans for the upcoming academic year. With fears of being rained out, the posters and meal were moved indoors to the atrium. However, the rain held off allowing everyone to start the event outdoors by playing some group games and receiving a warm welcome from Dr. Wolfe. Everyone then regrouped in the atrium for good conversation over a delicious buffet meal. See pictures on back cover.



VIRGINIA TECH™

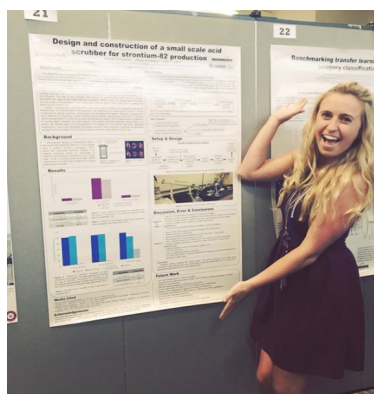
BSE Undergrads Invent the Future this Summer

Summers are always an exciting time for BSE undergraduates, who find amazing ways to gain on-the-ground experience in research and engineering all over the world!

In keeping with past years, many of our undergraduates explored biomedical applications in research settings throughout the United States. Senior **Andrea Kuliasha** spent her summer at the Neuro-Oncology Branch of the National Cancer Institute in Bethesda, Maryland studying methods for delivering chemotherapy across the blood-brain barrier. Senior **Lauren Bochicchio** also spent her summer in Maryland working for Becton Dickinson in Molecular Diagnostics research and development. Much of her work centered on validation of instruments that diagnose various sexually transmitted diseases. Junior **Kasey Chiuchiolo** completed a position as a research intern at Brookhaven National Laboratory on Long Island, New York where she built an acid scrubber for the production of the isotope strontium-82, which is used in heart PET scans. Sophomore **Payton Roberts** spent her summer right here in Blacksburg doing undergraduate research creating nanoparticles for drug delivery in the Materials Science and Engineering department; ideally, these nanoparticles will be used in future studies treating animals that have glioblastoma, a serious form of brain cancer.



Andrea Kuliasha and post-doc mentor take a break at the NCI



Kasey Chiuchiolo celebrates a productive summer at a research symposium



Payton Roberts shows off some nanoparticle experiments in the lab

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Mary Leigh Wolfe
Professor and Department Head

Valued Contributors to BSE (6/1/17 - 10/31/17)

Thank you to all of our alumni, friends, and organizations who generously support the department through gifts and donations! Your contributions help the department enhance the educational experience of our students. You have given us the means to award scholarships to many students. We also use your contributions to help recruit outstanding graduate students and support student travel to conferences and to participate in special projects both domestically and internationally. Your contributions also support departmental activities that enhance the educational and work experience of BSE students, staff, and faculty. Please contact the department (mclark5@vt.edu or mlwolfe@vt.edu) if your name has been omitted from this list.

Eldridge Collins, Jr.
Frances Parsons
David Powers
Robert Pitman
Andrew Southerly
Donald Wells

Dear BSE Alumni and Friends,

As I read through this newsletter, as always, I am impressed by, and proud of, the activities and accomplishments of BSE students, faculty, staff, and alumni. I know that you will enjoy the sampling provided in this newsletter. With respect to achievements, congratulations to faculty members Leigh-Anne Krometis, Karen Kline, and John Ignosh on their promotions in 2017; also to Leigh-Anne for receiving the AW Farrall Young Educator Award from the American Society of Agricultural and Biological Engineers (ASABE); to faculty member Erin Ling for receiving the College of Agriculture and Life Sciences (CALS) Diversity Incentive Award for 2017; and to graduate student Morgan DiCarlo for receiving the Waterlogic World Water Issue Scholarship.

As I am writing this, we are looking forward to Julia Ross, the Paul and Dorothea Torgersen Dean of Engineering, visiting the department on December 8. She will tour HABB1 and Seitz and learn more about the great work that BSE faculty, staff, and students are doing. Dean Ross joined Virginia Tech on July 31, 2017, after serving the previous three years as dean of engineering and information technology at University of Maryland Baltimore County (UMBC).

One of Dean Ross' priorities, "inclusive excellence", is a priority for BSE as well. Faculty, staff, and students are achieving excellence in teaching, research, extension, and service. We have made progress in the diversity of our personnel, and we will continue to increase that diversity to support achievement of even higher levels of excellence. In this newsletter, you see a sampling of the diverse activities of current department members. Our departmental diversity and inclusion committee is helping to nurture an inclusive departmental environment.

We are excited to have the opportunity to hire new faculty members. We are very happy to welcome Jonathan Czuba, who joined us as an assistant professor in August; see more about Jon on page 12. A new faculty member will join us in January to help meet our immediate teaching needs in bioprocess engineering. Later, she will move into a tenure-track, research/teaching assistant professor position. (Paperwork is still in progress, so we will wait until the spring newsletter to formally introduce her.) We are currently conducting a search for a new assistant professor in biomanufacturing. We will be conducting interviews in February/March, with the new faculty member joining us in August 2018. We are also taking advantage of this opportunity to refresh the vision for the department, including building synergies within and outside the department. For example, with colleagues in Food Science and Technology, we are developing ideas for building a food engineering program that involves faculty and students from both departments. We will have an external review in spring 2018 to assess the current state of our programs and to look at the future direction of the department, building on strengths and identifying areas for growth.

Best wishes for a healthy, productive, and enjoyable 2018!

Go BSE! Go Hokies!

A handwritten signature in black ink that reads "Mary Leigh Wolfe". The signature is fluid and cursive, with a long, sweeping underline.

Continued from front page

Other students found research opportunities in the great outdoors! Sophomore **Sara Freix** explored crayfish ecology with the Learning Enhanced Watershed Assessment System (LEWAS) Lab at Virginia Tech. In addition to spending time in-stream around campus, Sara used video tracking analysis to attempt to identify links between crayfish behavior and changes in water quality.



Sara Freix and research subject

Students also found opportunities to learn more about water protection in industry. Senior **Samuel Withers** spent his summer as an Engineering Intern at Wetland Studies and Solutions, Inc. (WSSI) in North Carolina. His primary projects were in stream restoration where he assisted in pre-design field work, design, construction oversight and post implementation monitoring. Fellow senior **Lee Ellen Markley** also learned that environmental work can mean getting dirty during her internship at MSA, P.C. in Virginia Beach, Virginia. She spent her summer in Tidewater taking soil samples, analyzing groundwater, and installing monitoring wells in order to prepare environmental impact reports.



Samuel Withers' wetland selfie

Work with water inevitably involves gaining experience designing infrastructure too. Senior **Jenna O'Brien** spent a third summer interning with



Lee Ellen Markely examines a new monitoring well

GE with their Water and Process Technologies in Woodlands, TX. Much of Jenna's work involved detailed analyses of damaged pipes; she notes that "BSE definitely prepared me to quickly learn how to operate new analytical instruments and how to focus on details that were important to the diverse customer base". Senior **Aram Hudson** found himself using concepts from his BSE Transport Processes course when working as an intern at Flowserve Corporation in Chesapeake, Virginia. Over the summer he spent much of his time writing code in Visual Basic and assessing feasibility in pump applications.

Perhaps some of our most satisfying stories come from current students who spent their summers learning from Hokie alumni. Sophomore **Lars Hoffman** worked under a fellow Hokie at the Anne Arundel County Department of Public Works Bureau of Utilities in Millersville, Maryland



Lars Hoffman sports professional wear in the office

where he learned about project management, pump specifications, and how to prevent nutrient over-loading in the Chesapeake Bay. Senior **Lizzy Merin** spent part of her summer as an Environmental Engineer Intern at Angler Environmental where she used multiple skills from her undergraduate coursework, including Au-



Lizzy Merin (left) on-site sporting appropriate PPE

to-CAD, TR-55, and Excel, to design water quality improvement projects. The most fun part of this position was working with fellow Hokie alumni, including BSE alum **Dylan Cooper** (BS '14, MS '15).

And finally, the best internship is the one that turns into a full-time dream position. Senior **Shelbie Dashiell** enjoyed her summer with consulting firm Hazen and Sawyer in Virginia Beach so much she has already accepted a full-time position to begin following her graduation in the spring. Shelbie clearly impressed her supervisors as she used GIS to conduct site assessment for various stormwater management proposals related to the city's MS4 permits.

In addition to these stories of students gaining on the ground experience here in the United States, several of our undergraduates also spent their summers abroad gaining global experience in the field. Check out their stories on pages 5 and 7.

ASABE Student Branch News

The American Society of Agricultural and Biological Engineers (ASABE) welcomed back students from summer break by hosting a water balloon fight on the Duck Pond lawn after we heard from seven BSE students: **Jake Patish** (McKee Foods), **Michael Johnson** (Fluor Life Sciences), **Elaina Passero** and **Casey Schradling** (Huadong PowerChina), **Austin Gouldin** (VT BSE research with Dr. Senger), **Jessica Slagle** (Virginia Cooperative Extension), and **Nick Bohmann** (VT MSE research with Dr. Foster), about their amazing summer internships and research positions. From these presentations, students learned so much about opportunities that BSE students have available to them and how to get involved in their own study abroad, internships, co-ops, and undergraduate research experiences.

At the end of September, the department welcomed members of the Advisory Board for an open career panel about their experiences and to answer questions from students. They also heard from the senior class about their year-long design projects.

To start off the busy October month, we heard from two speakers: Dr. Patrick Thayer from Cellink in Blacksburg, VA whose company specializes in 3D bioprinting, and Erin Ling from the Virginia Household Water Quality Program in Blacksburg, VA who tests the water quality of homes all across the state and conveys results to those directly affected by the water quality. We also were fortunate to have had the opportunity to take a tour of the Novozymes pilot plant in Salem, VA. Novozymes, “The world leader in biological solutions,” is dedicated to research with enzymes and microbes and many BSE students have gotten a job with them after graduation. The last week in October brought the annual department potluck, where students, faculty, and staff mingle and eat roasted pork by the bonfire, and we hosted a pumpkin carving night on Halloween.

To round out the semester, we will be hosting a resume workshop with a representative from Career Services, and going on a brewery tour of Rising Silo brewery in Blacksburg, VA.

The ASABE Southeastern Regional Rally is at the University of Kentucky in early April. We are looking forward to attending with even more VT students this year and are very busy fundraising in order to be able to cover the cost of the entrance fees, hotel rooms, and large passenger vans for transportation to the school. In a few weeks, we will be hosting our annual “Raking Dead” fundraiser, where we raised about \$1,500 last year raking leaves around town dressed as zombies. We are also hosting a fundraiser selling apparel that sports the new Virginia Tech logo! Please go to <https://www.customink.com/g/tuc0-00b7-108p> to view our collection. You can get short sleeve t-shirts (\$17.89) long sleeve t-shirts (\$20.88) and sweatshirts (\$32.69) in either maroon or orange. Our goal is to raise \$3,000 before the beginning of March. You can place your order on-line by February 26th and Alison Waldman (alisonw1@vt.edu) will be contacting you to arrange payment at the end of February.

If any alum, families, or corporations would like to sponsor our trip, please contact Taylor Lohneis (taylorl2@vt.edu) for sponsor opportunities.

Taylor Lohneis, ASABE President 2017 - 2018



BSE Students Travel Abroad

2016-2017 was an active year for BSE world travelers. Through the generous support of the Julia K. Pryde Fund and the Pratt Scholarships, BSE sent 15 students to four continents and eight countries to support research, service learning, exchange programs, and senior design teams.

Students participated in programs external to Virginia Tech, including the Green Program in Renewable Energy and Sustainability in Iceland (**Abbe Preddy**) and Saha Global in Malawi (**Elizabeth Merin**). Two senior design projects in BSE included trips abroad: one to Honduras (**Jean Javier, Bianca Pinto**) and one to Malawi (**Sydni Koch, Jessica Trieu, Kaitlyn Schneider**). We also sponsored a Service Without Borders team travel to Nepal to build an irrigation system (**Malee Garcia**). Students also participated in university exchange programs: **Weihua Guo** traveled to Qilu University in China to help develop an internship program on fermentation and brewing and **Serena Emmanuel** spent a semester at University College Dublin. Enjoy some pictures from the past year's travels.



Senior Design Team "Peanut Butter" and mascot in Ghana



Abbe Preddy sitting on glacier during Iceland Green Program Study Abroad

Spring 2017 Dean's List

Congratulations to the BSE undergraduate students who made the Dean's List in the spring 2017 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 semester to be awarded Virginia Tech Dean's List status.

BSE Sophomores (in spring 2017)

Nicklas Bohmann
Shuangyi Cai
Carrie Cheung
Kasey Chiuchiolo
Anthony Coniglio
Lindsay Dennis
Alex Domiano
Maria Graber
Daniel Hildebrand
Leila Kamareddine
Rachel Maile
Elijah Rinaldi
Rebecca Schmieley
Laura Wichin

BSE Juniors (in spring 2017)

Emilie Baker
Nikita Balani
Emily Berg
Shiva Rama Challa
Julia Chand
Andrew Clarkson
John Colby
Shelbie Dashiell
Diego De La Torre Campos
Taylor Duncan
Samuel Elizondo Villarreal
Lucy Epshteyn
Emmett George
Austin Gouldin
Alexandra Groen
Aram Hudson
Michael Johnson
Andrea Kuliasha
Nikkole Lenardson
Taylor Lohneis
Lee Ellen Markley
Elizabeth Merin
Kristen Merrifield
Whitley Miller
Joel Neifert
Jenna O'Brien
Joseph Paoletti
Elaina Passero
Jacob Patish
Christopher Perkins
Rebecca Pettit

Matthew Pickering
Dane Pizzo
Teresa Reiber
Naila Sayani
Casey Schradling
Caitlin Steen
Rachel Taitano
Alexandra Thomasson
Gavin Vess
Alison Waldman
Lauren Wills
Urban Withers
Austin Wozniak

BSE Seniors (in spring 2017)

Robert Accolla
Christine Ash
John Brabender
Carolyn Carrithers
Sarah Chaikind
Marisa Cole
Kevin Dennis
Micah Dezort
Ruochoen Dong
Vasilios Dounis
Nicole Fazekas
Katelyn Fernandi
Allison Guzman
Justin Haber
Reece Hoerle
Ellen Hoover
Dina Huynh
Sydni Koch
Samuel Kosich
Haley Kujawa
Sean Mackey
Abigail McCranie
David Meier
Hani Mustafa
Sara Peterson
Dalia Rakha
Keeana Ross
Lea Sarment
Cara Sarver
Jugroop Singh
Suraye Solis
Morgan Steel

NEW GRADUATE STUDENTS - FALL 2017

MS Students

Connor Brogan (Scott) - BS Biological Systems Engineering, Virginia Tech, 2017
Elyce Buell (Easton) - BS Environmental Science & Engineering, Cornell University, 2017
Luke Dillard (TBD) - BS Microbiology, Virginia Tech, 2017
Hunter Flick (Senger) - BS Chemical Engineering, Virginia Tech, 2017
Yihuai Hu (Ogejo) - BS Bioengineering, Nanjing Agricultural Institute, China, 2017
Morgan McCarthy (Shortridge) - BS Environmental Engineering, Oregon State University, 2017
Suraye Solis (Thompson) - BS Biological Systems Engineering, Virginia Tech, 2017

PhD Students

David Scherr (Senger) - BS Biochemistry and Molecular Biology, University of Miami, 2017
Daniel Smith (Thompson) - BS Civil and Environmental Engineering, University of Maryland, College Park, 2017

Graduate Student Organization (GSO)

The 2017-2018 BSE GSO, led by **Laura Hanzly** (President), **Tyler Keys** (Watershed Vice President), **Kyle Saylor** (Bioprocessing Vice President), **Lauren Wind** (Treasurer) and **Cristina Marcillo** (Secretary), set out to provide a wide range of social activities for graduate students in BSE. To begin the fall semester, BSE hosted the Fall Picnic welcoming students, organized with the help of volunteer GSO members. The picnic turned out to be a great success, with wonderful food and icebreakers helping to christen the new members of the BSE community. To promote camaraderie among BSE graduate students, GSO frequently held Happy Hour events throughout the semester at local watering holes such as The Cellar and Mellow Mushroom. This semester, GSO also hosted an international potluck dinner to celebrate the diversity within BSE. Students and faculty enjoyed dishes from Belize, Guatemala, and more as they bonded over a shared meal.



We hope to continue these events in order to create a stronger community within the department. In the future we

plan to hold service activities to give back to the greater Blacksburg community. Events for the Spring semester include attending a local Rail Yard Dawgs ice hockey game, ice skating at the Berglund Center, and continuing the tradition of leaf peepin' on the Appalachian Trail.

The BSE GSO is always looking for suggestions for activities and feedback from BSE graduate students.

BSE Students Part of the Soil Judging Team

During the week of October 9th, the Virginia Tech Soil Judging Team, which includes three BSE students, traveled to far Western Tennessee to compete in the Southeast Regional Soil Judging Contest.



BSE sophomores Morgan Re and Ben Smith, along with BSE senior Samuel Withers, get dirty in a soil pit in Tennessee

During the week, the team explored the soils and geology of the region in many soil pits. They learned about unconsolidated coastal plain sediments, wind blown loess, and a frustrating soil horizon called a fragipan - all of which are not found in Southwest Virginia! On Thursday the 12th, the team competed against 10 other universities from the southeast region and placed Third - high enough to qualify for the national contest in Memphis next spring!



Samuel Withers just hanging out in a dirt pit.

BSE China Partnership Continues!

This past summer's China internship was again sponsored by Dr. Youtong Fu, who received his Ph.D. degree from our department. Dr. Fu arranged with a large company in China, the Huadong Engineering Corporation Limited, to provide internships for eight BSE students: **Refat Ahsan, Rebekah Broyles, Julia Chand, Malee Garcia, Robert Loving, Elaina Passero, Abbegail Preddy, and Casey Schradling**. Airfare, housing, and food were provided plus a small stipend. Interns were trained in a variety of water resources areas, with much of the work in the field, providing hands-on experience. Interns were required to keep a journal and prepare a final report on the internship. Here are some of their thoughts about this unique opportunity:

Refat Ahsan: "I'm working in the Hydraulics department on dam, reservoir designs. Slowly learning the design process, and the language too. All the other interns are having a brilliant time. Every day here is a new learning opportunity, and opportunity to adventure."

Elaina Passero: "I am having an absolute blast. I was placed in the Planning and Development Department and I am working with a bunch of hydrologists. I'm getting to do work that is different from what I have experience in which is what I was hoping to do. I am still struggling to pick up Chinese, but I am getting by."

Malee Garcia: "I am in the water and environment engineering department learning about flood control. The food is great and everyone is so friendly."

Casey Schradling: "I am working in the Ecology and Environment Department and tasked with designing a pump station for a wastewater treatment plant that is going to be built in Jamaica. I am learning many new engineering technical skills related to design, in addition to communication skills that are crucial when working for a new company or traveling to a new country. However, the cultural experience is probably the best part; meeting so many new people and trying so many new things (especially the food)."

Robert Loving: "I am experiencing a lot of new stuff and learning a ton."

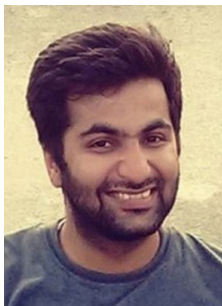
Julia Chand: "It has been a really cool experience! We've been able to go on a couple excursions to see the nearby cities and countryside and it has been beautiful! We went to check out a dam that produces hydropower which was really amazing. I've been placed in the Ecology and Environment department. The people at the company have all been so nice and we're slowly working on our Chinese and adjusting to some of the challenges. I'm very excited for the rest of my time here and I appreciate this amazing opportunity."

Abbe Preddy: "The internship is going well. Everyone is in different departments so no two people are doing the exact same thing. My department has been having me just do research and make presentations so far. We did a lot of exploring of Hangzhou and the west lake last weekend, and yesterday the company took us to visit a hydropower dam, and then we all went to a karaoke place last night. All the interns get along very well and we've been having a lot of fun together."

Becki Broyles: "Everything has been going pretty good here. I have some amazing coworkers that have welcomed me in even though I have only been here a week. My mentor is amazing and wants to show me everything, so I have been to a tidal power plant and am meeting a German CEO on Tuesday. I was surprised by my placement in the company because I'm in the Overseas Business Unit, but I came to see that this unit does a lot of things on both the technical and business fields. Overall, it's been really good so far."

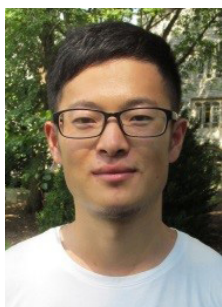
Degrees Earned

Congratulations to two BSE graduate students who completed their degrees in summer 2017



MS Degree

Vinit Sehgal (Advisor: Sridhar), *Near Real-time Seasonal Drought Forecasting and Retrospective Drought Analysis Using Simulated Multi-layer Soil Moisture from Hydrological Models at Sub-watershed Scales*. Vinit has joined the interdisciplinary “Water Degree Program” at Texas A&M University at College Station as a Ph.D. student and is currently housed in the Department of Biological and Agricultural Engineering. He is working on a NASA project for estimating effective soil hydraulic properties using the latest remote sensing platforms and a combination of data assimilation, scaling and inverse modeling. The research is expected to have far reaching consequences in improving the process understanding of the surface and sub-surface hydrology and its incorporation into large-scale continental/global models.

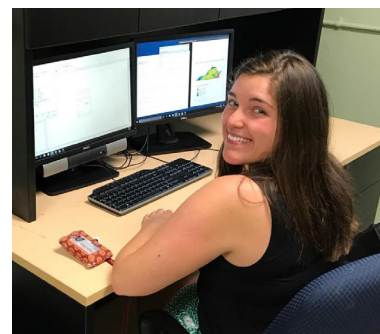


PhD Degree

Zongmin Zhao (Advisor: M. Zhang), *Factors that Affect the Immunogenicity of Lipid-PLGA Nanoparticle-based Nanovaccines against nicotine addiction*. Zongmin began as a post-doc associate at Harvard in October 2017.

DiCarlo Awarded Waterlogic World Water Issue Scholarship

Morgan DiCarlo (MS student) has been awarded the Waterlogic World Water Issue Scholarship! She was awarded this scholarship for her essay on how conservation practices can help address water scarcity now and in the future. Morgan is studying how factors like weather, population, and economic conditions impact water consumption in Virginia. This research will help us better understand the impacts that climate variability and change have on water sustainability in humid regions and inform measures to better manage these impacts. Congratulations Morgan!



Waldman Receives COE McAllister Leadership Scholarship

Alison Waldman (BSE Senior) received the College of Engineering William C. McAllister Leadership Scholarship, which is awarded to students based on superior intellectual promise and academic performance, demonstrated leadership ability, and personal character. Alison is a member of the Honors College and is on the Dean's List with Distinction. She has leadership roles in several organizations, for example ASABE student chapter, Engineers Without Borders, and Relay for Life. Alison is a BSE Ambassador and a member of the COE Dean's Team. She is planning to pursue a Ph.D. in graduate school.



*Dean Ross, Mr. McAllister, Alison
& BSE Head, Dr. Wolfe*

Thinking about grad school...

Or know of someone who is?

BSE is accepting
applications

**Application due date for
Fall 2018:
December 15, 2017
(Early Decision)**

January 5, 2018

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

Engineers Without Borders

Engineers Without Borders connects engineers with developing communities around the world. The organization's mission is to partner with disadvantaged areas to improve their quality of life through the implementation of environmentally, equitably, and economically sustainable engineering projects. Through the experience, the student members become internationally-conscious and build a variety of professional skills that will be valuable in their future careers. Currently, two BSE students are in leadership positions within the VT-EWB chapter: senior **Jenna O'Brien** serves as chapter president, and senior **Alison Waldman** serves as secretary.

One team of students is currently working in the Masaka region of Uganda to provide solar energy to various schools and orphanages. Uganda currently has one of the lowest electricity access rates of African countries. The availability of electricity has made the area safer and has allowed children to study after the sun sets. The project was established ten years ago; since then, five photovoltaic systems have been implemented.

Another project area that the student organization focuses on is wastewater treatment. At a boarding/trade school in Guatemala, the team of students has implemented a water storage tank and a septic tank. The team is currently designing a leach field and a biofilter.

The students are also working to get a new project off the ground in Nicaragua -creating a sustainable food supply for the community of Zapote Oriental. The Virginia Tech students are working with in-country partners to figure out how they can be involved in developing an irrigation system and infrastructure for seed/grain storage.

To learn more about the organization or ways you can support its work, check out our website at ewbvt.org.



Members of VT-EWB at the national EWB conference. Senior and VT-EWB president Jenna O'Brien is at the far left!

BSE Ambassadors

The 2017-2018 BSE Ambassadors have been busy this fall representing the department at various recruiting events. We have had four COE Open House events targeting prospective high school students and the COE Information Session for the General Engineering students here at Virginia Tech as they try to choose which departments they want to apply to when they officially declare their engineering majors. We have also helped students new to BSE get acclimated to the program by volunteering at the BSE Welcome Back Picnic and as student mentors and have given multiple individual tours to high school students and their families. Additionally, the Ambassadors are in the process of visiting classrooms and student clubs at local high schools in Blacksburg, Christiansburg, Salem, and Roanoke.



BSE Ambassadors' 1st Meeting of the Year at PK's



October 7th Open House & COE Showcase

October 8th Open House & COE Showcase

Krometis Promoted to Associate Professor



Dr. Leigh-Anne Krometis was promoted to associate professor with tenure this past summer. Leigh-Anne's research centers on environmental health, i.e. the prevention of human disease via reductions in environmental exposures to infectious microorganisms and toxics. Past projects within the Krometis research group include characterizing the relative impacts of surface mining and inadequate wastewater infrastructure in the Appalachian Coalfields, identification and quantification of sources of waterborne lead in private drinking water systems, characterization of the dissemination of antibiotic resistant organisms from manure-amended fields, application of new molecular source tracking strategies to identify leaking septic systems, and investigation of a cancer cluster in Tazewell County, VA. Her work has been funded by the United States Department of Agriculture, the National Science Foundation, the National Institutes of Health, and the Appalachian Research Initiative for Environmental Science. In addition, Leigh-Anne is an outstanding teacher, who recently received the ASABE AW Farrall Young Educator Award (see page 13). At present, she teaches several departmental courses, including Introduction to Biological Systems Engineering, Nonpoint Source Pollution Assessment and Control, and Water and Sanitation in Developing Countries. In

addition to serving on various BSE departmental committees (assessment, recruitment, newsletter), Leigh-Anne has been active within the Virginia Tech Honors College, serving as a Faculty Fellow in the Honors Residential Commons Initiative for many years and currently serving as Faculty Preceptor for the Hillcrest Honors Community.

Kline Promoted to Senior Research Scientist

Dr. Karen Kline was promoted to Senior Research Scientist in October 2017. Karen joined the BSE faculty in August 2007 as a Research Scientist, with research focused on improving water quality at the watershed level, particularly through the development and implementation of Total Maximum Daily Loads (TMDLs) for impaired waters. Karen has over 15 years of experience in watershed and water quality modeling, and nonpoint source pollution analysis. She has secured funding from multiple sources, with most from the Virginia Department of Environmental Quality. She has led the development of ten TMDL projects and 18 TMDL Implementation Plans. Karen enjoys sharing information on watershed modeling and TMDL development with others and has assisted in the development and leadership of five TMDL-related workshops. One highlight was being part of a team that led a 4-day workshop in Manila, Philippines for 32 environmental scientists from four countries in Southeast Asia. Kline also has the opportunity to interact with students as a supervisor on TMDL-related projects, a graduate committee member, and a guest lecturer in departmental courses. Karen served as President of the Virginia Chapter of Soil and Water Conservation Society (SWCS) in 2014 and has been a faculty co-advisor for the Virginia Tech Student Chapter of SWCS.



Ignosh - Advanced Extension Specialist

John Ignosh was promoted to Advanced Extension Specialist in July 2017. He joined the department as an Area Specialist in 2006 and has developed an impressive extension program focused on the implementation of best management practices (BMPs) related to energy efficiency, renewable energy, and innovative nutrient management technologies. While the audiences and collaborations vary by issue, program clientele share a common interest in applying research-based information to solve problems, to help improve both their livelihoods and lives. Prior to his current position, John performed air quality research with the University of California – Davis related to aerosols associated with agricultural production in the San Joaquin Valley, as well as nationally regarding the contribution of fine aerosols to regional haze and public health in protected environments. He has also worked in international development with a USAID contractor, and served as a resource extension agent with the U.S. Peace Corps in Guatemala. John is a Certified Energy Manager and Distributed Generation Certified Professional by the Association of Energy Engineers, Certified Forester by the Society of American Foresters, a Certified Nutrient Management Planner by the VA Department of Conservation and Recreation, and a certified DACUM (Developing a Curriculum) facilitator by the International Training Center at The Ohio State University. John currently serves as the National Initiative Manager for the National Extension Energy Initiative, and as a co-chair to Virginia Cooperative Extension's Natural Resources and Energy Management Program.

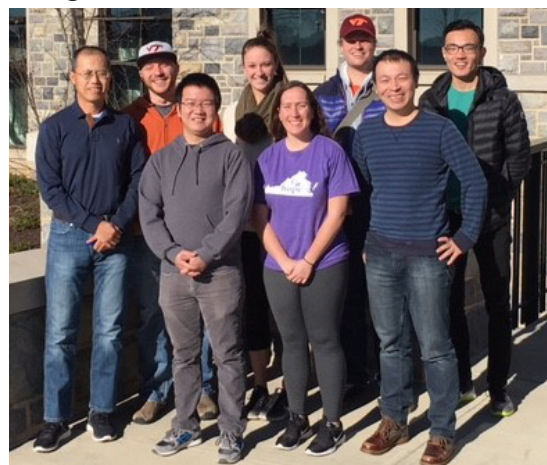


RESEARCH SPOTLIGHT: Dr. Mike Zhang's lab group

BSE professor **Mike Zhang**'s lab is currently working on multiple vaccine research projects. Projects are funded by a wide variety of sponsors, including the National Institutes of Health (NIH), Smithfield Foods, and Murphy-Brown LLC. The research is best divided into two subgroups: the nanoparticle side and the protein expression/purification side. These are two very different processes used to design products for multiple vaccine applications.

The nanoparticle side has been applying fluid dynamics in conjunction with the chemical properties of poly lactic-co-glycolic acid (PLGA) to design vaccines to help smokers break their cigarette habit. Unlike some of the other nanoparticle options, such as gold, the body can easily process the PLGA nanoparticles down into naturally occurring products. Nicotine is attached to the surface of the nanoparticles along with other compounds designed to activate the immune system. The vaccines are able to induce an immune response in mice, the result of which is a concentration of antibodies capable of binding to free nicotine. The goal of this research is to have a vaccine capable of blocking the rush felt when a former smoker relapses, making it easier for the smoker to continue quitting.

The protein expression and purification side are also using nanoparticles, though these are naturally occurring and so are protein-based. Structural proteins from some viruses can be expressed, purified, and assembled into higher ordered structures (nanoparticles). The result of assembly is a protein "shell" called a virus-like particle (VLP), which mimics the original virus in construction only. Further manipulation of these VLPs allows their use in vaccine design for veterinary applications. In the case of this lab, they are being used in a veterinary vaccination strategy for two swine viruses. Both of these viruses are detrimental to the swine industry, and present unique challenges. The overall goal of the lab is to design, test, and redesign vaccines for varying applications using multiple approaches.





CZUBA JOINS BSE

Jonathan Czuba joined BSE as an assistant professor in August 2017. He performs fundamental quantitative research on physical processes in rivers, their linkages to water quality, nutrients, vegetation, and biota, and the interactions between these processes and humans. His work spans spatial scales from entire watersheds to specific river reaches to local features (e.g., bend, bar, bedform) utilizing theory, modeling, and field measurements, ultimately to better inform river-basin management. Dr. Czuba has a Ph.D. in Civil Engineering from the University of Minnesota, M.S. and B.S. in Civil Engineering from the University of Illinois at Urbana-Champaign, and over five years of experience working for the U.S. Geological Survey in Illinois and Washington State.

At Virginia Tech, Dr. Czuba's core research will focus on understanding water and sediment transport in river networks and floodplains. Specific research topics include: (1) watershed-scale dynamics of sediment, nutrients, and biota, (2) river-floodplain-vegetation morphodynamics, and (3) advancing our fundamental understanding of the coupling between river hydraulics and sediment transport through direct, high-resolution measurements of these processes in the field.

In his spare time, Jon enjoys spending time with his wife and two daughters (4 years old and 10 months old). Together, they enjoy hiking around the Jefferson National Forest. In the sliver of remaining time, Jon enjoys painting and brewing beer.

Welcome New BSE Research Faculty

Julia Reis recently joined BSE as a postdoctoral associate in **Dr. Julie Shortridge's** research group. She is interested in water resources methods and environmental systems that support agricultural production, energy generation, and healthy people and environments. For her doctoral work at the University of Virginia, Julie studied water reservoir systems in Ethiopia and Laos. After graduation, she served as a postdoctoral research scientist at Columbia University, studying infectious disease transmission, patterns, and environments that accelerate or inhibit transmission. As a postdoctoral research associate working with Professor Shortridge in Biological Systems Engineering at Virginia Tech, Julia will analyze water resources systems and conduct sensitivity analyses to better understand how various modeling assumptions impact economic and environmental outcomes.



Ling wins Diversity Award

Erin Ling, Senior Extension Associate in BSE, along with Dr. Kim Niewolny in the Virginia Tech Agricultural, Leadership, and Community Education Department were co-awarded the College of Agriculture and Life Sciences (CALS) Diversity Incentive Award for 2017. Both women are members of the CALS Diversity Council, and are actively involved with promoting diversity and inclusion at Virginia Tech.



This award supports new, innovative, and creative approaches to build awareness, engage students, faculty and staff, and change behaviors about diversity and inclusion at Virginia Tech and within other stakeholder groups. Ling and Niewolny brought Navina Khanna, director of the Health, Environment, Agriculture, Labor Food Alliance (<http://healfoodalliance.org/>), a national food and farm justice coalition, to campus for several speaking engagements and interaction opportunities in November. A graduate of the land-grant system at UC-Davis, Khanna discussed food and agriculture policy, science as a public good, and leadership for social justice. She represents the perspective of a first-generation South Asian American woman who works on the front lines of food system change.

KROMETIS RECEIVES ASABE AW FARRALL YOUNG EDUCATOR AWARD

Associate Professor **Leigh-Anne Krometis** was awarded the ASABE AW Farrall Young Educator award for 2017. Since 1972 this award has served to “recognize and honor members under 40 years of age for outstanding contributions to the advancement of the profession and to stimulate professional achievement.” Krometis has cultivated a learner-centered instructional environment in her courses, integrating new pedagogical approaches and embedding her assessments in learning activities, while also valuing and emphasizing the individual student. She creatively fosters critical thinking and relational knowledge through the use of metacognitive strategy development, concept maps, ill-structured problem engagement, and reciprocal teaching. Her teaching style and course design focuses on lecture in addition to problem solving and has transformed her courses into design based learning environments, where content is not simply transferred professor to student, but where students develop deep and flexible understandings and opportunities to implement knowledge and skills. She has authored or co-authored eleven conference presentations related to classroom assessment and student mentoring, and authored one peer-reviewed article on interdisciplinary teaching across traditional science/ humanities boundaries. During her time at Virginia Tech, Krometis has received several teaching awards, including recognition as “Teacher of the Week” (2014), “VT Favorite Faculty” (2015 and 2012), and Alpha Epsilon’s “Outstanding Faculty” Award (2012).



Krometis receives AW Farrall Award from ASABE President Maynard Herron at the ASABE Annual International meeting in Spokane, WA in July 2017



Shortridge & Scott Begin Funded VADEQ project focused on state water supplies

Although Virginia has historically been considered a water-rich state, recent droughts have highlighted the need for better management of the state’s water supply. However, spatially- and temporally-explicit data on water use and consumption is not always available and or well integrated with water supply modeling and planning. This creates a key challenge in understanding the risk of water shortages in the short term (due to drought), and in the long term due to issues like population growth and climate change. To help address this challenge, BSE Assistant Professor **Julie Shortridge** and Associate Professor **Durelle Scott** have been awarded a grant from the Virginia Department of Environmental Quality to develop software and predictive models that evaluate water consumption and discharge across Virginia. The project, titled “Consumptive Use Data Transfer, Export, and Analysis” is aimed at improving our understanding of consumptive water use - how much withdrawn water is “lost” from the system and how much is returned as wastewater. This work will develop open-source data transfer tools and analyses that leverage nationally maintained data on point source discharges to estimate consumptive use across different sectors and regions of the state. Developing these estimates will result in important insights into the consumptive use of water in different sectors and under different environmental and climatic conditions. It will also improve modeling capabilities necessary to improve management of water supply and quality.

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And always feel free to send your alumni updates to
Leigh-Anne Krometis at krometis@vt.edu.

NEW CURRENTS ON CAMPUS

As global population swells from 7 billion today to an estimated 9 billion by 2050, increasing pressure will be placed on freshwater ecosystems to provide water, food, and energy. Unless we have a holistic perspective on how to manage our water resources, maintaining a vibrant economy, clean water, and productive and diverse ecosystems will become increasingly difficult. BSE faculty are now working with colleagues from across campus to develop an interdisciplinary program that bridges research, policy, and practice to meet pressing challenges facing freshwater ecosystems (lakes, river networks, and wetlands) as part of the Global Systems Science “Destination Area.” Four BSE faculty currently serve on the steering committee of this initiative (**Cully Hession, Leigh-Anne Krometis, Durelle Scott, and Tess Thompson**).

Over the next year, we will be organizing faculty experts from departments as diverse as Appalachian Studies, Fisheries Science, and Music to develop research, education, and outreach programs that provide multidisciplinary solutions to restore our freshwater resources. An example of such a “silo” breaking endeavor is the interdisciplinary B.S. degree, Water: Resources, Policy, and Management. Our initial

step is developing a vision, proposed structure, and strategic opportunities. Then, at a Freshwater Summit planned for March 2018 we will work with stakeholders to refine our vision and to identify the needs and opportunities for multidisciplinary teams of “water” experts. Ultimately, our goal is to put integrated, scientific knowledge to work solving real-world problems within Virginia and the US.



BSE ALUMNI NEWS

1960s

Joseph Gardner (BS '62) recently retired from NASA-Houston after nearly thirty years as a project engineer and project manager. Prior to working at NASA, Joseph worked as an HVAC engineer in Richmond, VA, completed a tour in the US Army, worked for the VA Administration in Houston, TX, and worked as a private construction consultant. Joseph states that the personal and academic support he received from the Agricultural Engineering Department faculty and staff at Virginia Tech was very beneficial to his career's success. We wish Joseph a hearty congratulations

on his retirement and best wishes for his life post-retirement!

2000s

Kevin Goerger (BS '03) and his wife Catherine's family pumpkin business was recently profiled in an issue of the Virginia-Pilot! Kevin and Catherine (a fellow Hokie alum!) were married in 2015, and have been raising pumpkins in Windsor, VA on the Goerger family farm ever since. You can read more about Goerger Farm's history, farm practices, and devotion to pumpkins in the full article here: [https://pilotonline.com/business/field-notes/for-goerger-clan-pump-](https://pilotonline.com/business/field-notes/for-goerger-clan-pumpkins-are-a-fun-family-affair/article4150ccbe-39dd-5e70-bc8a-f44c-6c74275a.html)

[kins-are-a-fun-family-affair/article4150ccbe-39dd-5e70-bc8a-f44c-6c74275a.html](https://pilotonline.com/business/field-notes/for-goerger-clan-pumpkins-are-a-fun-family-affair/article4150ccbe-39dd-5e70-bc8a-f44c-6c74275a.html). You can also follow the Goerger's family farm tradition on Facebook at <https://www.facebook.com/GoergerFarms/>.



Kevin & Catherine Goerger

2010s



*Andrea & Ryan
heading to their
reception*

Andrea Ludwig (PhD '10) celebrated 7 years at the University of Tennessee, where she was granted tenure in 2016. This past year, she married Knoxville-native, Ryan O'Connor.

Rain at the reception was fitting for her role as the Stormwater Management Specialist for UT Extension.

This was a big year for **Karen Hall** (BS '11, MS '12) who earned an MBA from VCU in December 2016 and had a daughter, Merritt, in June!



Sarah Steinke (BS '15) is currently working for Accenture on projects related to their global supply chain initiative.

Yoon Kyu Lee (BS '15) is currently working for a company named Nongshim, a noodle and snack manufacturing company headquartered in South Korea. He is working under the production department of the company, taking care of overall production processes. He is currently residing in Rancho Cucamonga, California, a peaceful but hot and dry city. He is working hard at this position as well as enjoying the weather of California.



*Yoon enjoying
some wall
climbing*

David Roth (MS F'15, BS S'15) is a management consultant in the greater Boston area. He is responsible for project management, fundraising for growth, and market strategy. In addition to consulting, David wrote music that was performed for the NASA Langley Research Center Centennial Tribute. NRP Affiliate WVTf reported on the music and dance performance titled "Remember the Future". David, Along with Boston BSE alumni **Jacob Cantor** (MS '16, BS '15) and **Matt Stauffer** (BS '11), showed support for the Hokies in their victory at Boston College in October.



*Jake & David supporting VT @
Boston College*

Alexander Padilla (BS '16) is a Physical Scientist for the Department of the Treasury at the Bureau of Engraving and Printing in Washington, DC. He was converted to full time, from a general engineering internship position, when he graduated. He is currently working in the Office of Quality Operations testing for quality and developing new security features for American currency to deter counterfeiting.

Hani Mustafa (BS '17) is currently working for Plexus in Raleigh, NC and sporting his Biological Systems Engineering gear whenever he can!



Matt Kapinos (BS '17) is preparing to start working for Capital One in their CODA program. This is an intensive six month program dedicated to learning various coding languages, as well as front and back-end web development, and cloud services. Upon completion of this program, he will enter into Capital One's technology development program for two years. He is currently working in their Northern Virginia office.

Marisa Cole (BS '17) received her EIT certification after passing the FE Exam this summer. She now works as a Biomedical Engineer with ivWatch, LLC, a medical device and biosensor company focused on improving the safety and effectiveness of intravenous (IV) therapy through the early detection of infiltrations. She recently moved to Newport News, VA and is excited to be a part of the Hampton Roads community.

Sara Petersen (BS '17) is a first year Masters student in Bioengineering at UC San Diego (Go Tritons!). Sara is focusing her studies on tissue engineering approaches to implantable devices and is actively engaged in challenging coursework to learn how to design and develop novel devices for regenerative medicine. Outside her education, Sara is involved in a contemporary dance company, does outreach with the Bioengineering Graduate Society, loves going to the beach and hammocking while reading a good book. Sara is enjoying beautiful San Diego sunsets and awesome food, but will always be thankful for Virginia Tech for giving her the incredible Hokie community that continues to support her all the way across the country!



Biological Systems Engineering Dept. (MC0303)

Seitz Hall, Room 200, Virginia Tech

155 Ag Quad Lane

Blacksburg, VA 24061

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BLACKSBURG VA
PERMIT NO. 28

BSE Newsletter Staff:

Editor-in-chief

Leigh-Anne Krometis

Email: krometis@vt.edu

Managing Editor

Design & Layout Editor

Distribution

Melody Clark

Assistant Editor

Karen Kline

Current Issue Contributors:

Priscilla Baker

Jon Czuba

Zach Easton

John Ignosh

Erin Ling

Julie Shortridge

Tess Thompson

Mary Leigh Wolfe

Mike Zhang



BSE Fall 2017 Welcome Picnic and Expo

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