

Biological Systems Engineering *Newsletter*

SPRING 2018

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Congratulations - BSE Class of 2018!



BSE Celebrates Community Successes

Every Spring the entire BSE community – undergraduates, graduates, faculty, staff, senior design sponsors, friends, and family – joins together to celebrate the many and varied accomplishments of our students during the previous academic year. This year, our celebration began with final Senior Design presentations in the HABB1 building, followed by dinner and awards in the Graduate Life Center’s Reception Room.

Several senior design teams were recognized for exceptional performance, including four teams that were honored with cash awards for their outstanding projects: First place was Reaction Process Design for Drug Loading into PLGA Nanoparticles (**Jihyeon Gong, Andrea Kuliasha, Matthew Pickering, Alexandra Thomasson, Gavin Vess and Lauren Wills**). Chesapeake Campground Stormwater Management Plan (**Timothy Brown, Nikkole Lenardson and Lee Ellen Markley**) took 2nd place and tied for 3rd place were Cattle X: A Multi-use Stream Crossing at the Catawba Sustainability Center (**Nathaniel Orazi, Christopher Perkins, Casey Schradling, Samuel Withers and Joseph Zielinski**) and Reduction of Water Usage During Dialysis Using Raman Spectroscopy and PID Control (**Emmett George,**

- Continued on page 3

DEPARTMENT NEWS



Mary Leigh Wolfe
Professor and
Department Head

Dear BSE Alumni and Friends,

Another academic year has flown by. The spring semester ended with an impressive senior design poster reception held in the HABB1 Atrium, followed by the BSE Annual Awards Banquet (details on p. 3). I want to send a special thank you to the BSE Advisory Board (listed below) for scheduling their spring meeting so that they could participate in both events. The students, faculty, and staff very much appreciated the opportunity to visit with you in those settings.

Speaking of the BSE Advisory Board, I invite you, BSE alumni and friends, to suggest/nominate (including self-nomination) potential board members. Board members can be department alumni or non-alumni. We seek to expand the board and have representation from across the range of industries that employ (or should employ) BSE graduates. A range of experience levels and job responsibilities is also desirable. Please send suggestions/nominations to me at mlwolfe@vt.edu.

Collaborations with alumni and with industry are very important to the department. In addition to the twice-yearly meetings of the Advisory Board, our students are very interested in connecting with and learning from alumni, both recent and more experienced. One goal for the upcoming academic year is to facilitate more interaction of current students with alumni. If you (or any of your colleagues) are interested in participating in one or more of the following (or other ideas you might have), please let me know (mlwolfe@vt.edu; 540-231-6092):

- Visit with students during class or student organization meetings, either in-person or remotely – audio/video capabilities allow us to bring you right into the classroom. Current students are very interested in learning about the work you do and in your advice about how they should prepare for their first jobs.
- Host field trips to production, manufacturing, research, or other sites
- Provide a senior design project for 2018-2019 (can also contact Cully Hession (chession@vt.edu))
- Conduct mock interviews of students (remotely or in person) to help them prepare for career fairs and interviews
- Provide feedback on student resumes
- Provide internships
- Participate in career fair on campus

As we look forward to the 2018-2019 academic year, I am happy to tell you that we will be welcoming another strong class of sophomores who chose BSE as #1. We will also be welcoming new graduate students and a new assistant professor, R. Clay Wright.

Best wishes! Go BSE! Go Hokies!

Mary Leigh



Advisory Board Members 2017-2018

Bernie Engel, Ph.D., Purdue University
Professor and Dept. Head

Bob Hines, NNE Pharmaplan
Sr. Automation Engineer

Amanda Jones, Nestle Purina N.A.
Sr. Scientist, Global Quality & Applied Sciences

Charlotte E. Lukas, MedImmune, Inc.
Associate Director

Matthew Lyons, P.E., USDA - Natural Resources Conservation Service
State Conservation Engineer

Mike Slusher, P.E., Davis-Martin-Powell & Associates
President and Sr. Project Manager

Andy Southerly, Cargill Turkey & Cooked Meats
Vice President - Supply Chain

Janette L. Wolf, P.E., Civil & Environmental Consultants, Inc.
Project Manager

2018 BSE Banquet



- Continued from cover

Austin Gouldin, Alexandra Groen, Aram Hudson, Taylor Lohneis and Meaghan Sullivan). These student teams receive cash awards in recognition of their accomplishments thanks to funds provided by **Drs. Saied and Patti Mostaghimi**.

The ASABE student branch celebrated students from each academic year who were particularly dedicated to the success of the chapter, including **Ryan Miller and Mohammed Bader** (Outstanding Sophomores), **Nick Bohmann** (Outstanding Junior), and **Elaina Passero** (Outstanding Senior).

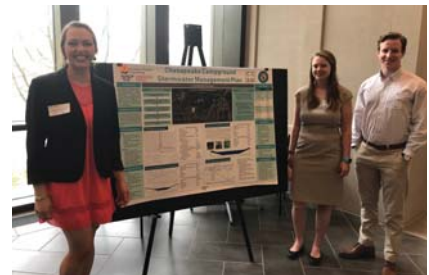
Finally, students were selected by the BSE Honorifics Committee for their outstanding academic performance and university involvement. This year's awardees included **U. Samuel Withers** for Outstanding Senior (more on p. 9), **Christine Ash** for Outstanding Junior, and **Kate Johnson** for Outstanding Sophomore. **Nasrin Alamdari** was recognized as Outstanding Doctoral Student (more on p. 8), and **Morgan DiCarlo** was recognized as Outstanding Masters Student.

We look forward to reconvening in August as a community at our Welcome Back picnic to kick off a new year of success!

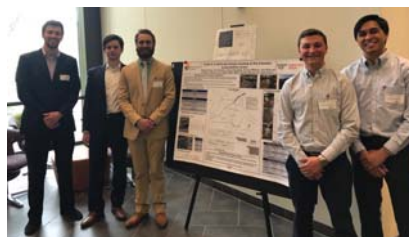
Outstanding Senior Design recipients



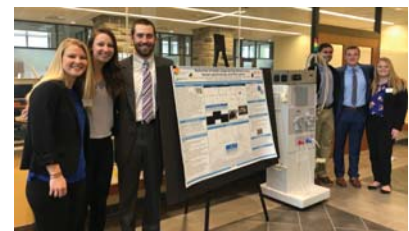
1st Place



2nd Place



3rd Place



3rd Place





ASABE Student Branch News

Spring semester has been packed with social, professional, and service opportunities for ASABE members. In February, we hosted a graduate school panel where BSE MS and PhD students shared their experiences on how to go about finding the right school and program, when to take the GRE, and what graduate school is like. We also held a Deet's coffee and ice cream social for students to mingle and talk about BSE. In March, we heard from Dr. White, who gave us some helpful tips on how to manage our finances after college, went on a tour of Rising Silo brewery here in Blacksburg, and did a neighborhood clean-up to raise money for our annual trip to the ASABE Southeastern Regional Rally. This year, the conference was held at the University of Kentucky over the weekend of April 6th to 8th, and our chapter brought 15 students and 1 faculty member with us on the trip to see the programs and facilities at the university and build connections with other biological engineers. We got to experience horse racing at Keeneland Racecourse, which was a first for most of the students. All of our attendees had a great time and are looking forward to going to North Carolina State University next Spring.

During the month of April, we hosted a HABB1 lab tour night where students had the opportunity to see the facilities that we have in the department and for faculty and graduate students to show off the cutting-edge research being conducted. The goal of this night was to bring to light some of the projects that students can get involved with in the department. We also hosted another Stroubles Creek clean-up with the American Water Resources Association and volunteered with Habitat for Humanity in Roanoke, Virginia to help finish building a house for a family in need.

Congratulations to next year's leadership team, including President **Jessica Slagle**, Vice President **Mohammed Bader**, Treasurer **Nick Bohmann**, Secretary **Dan Irving**, and SEC Representative **Ryan Miller!**

Taylor Lohneis, ASABE President 2017 - 2018



Fall 2017 Dean's List

Congratulations to the BSE undergraduate students who made the Fall 2017 Dean's List. 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 Sophomores

(in fall 2017)

Ben Agnor
Georgie Alvis
Yuanzhi Bian
James Die
Kyle Edson
Sara Freix
Lars Hoffman
Maria Schilling
Tinh Vu
Shuyu Zhang

Anna Dykshorn
Alyssa Ford
Jarek Frankovich
Maria Graber
Jena Hays
Daniel Hildebrand
Maia Huntington
Daniel Irving
Corinne Jacobsen
Kate Johnson
Leila Kamareddine
Kyle Knupp
Matthew Lefkowitz

Rebecca Schmieley
John Schubert
Jessica Slagle
Benjamin Smith
Ethan Smith

Lee Ellen Markley
Colleen McDonald
Elizabeth Merin
Kristen Merrifield
Whitley Miller
Joel Neifert

BSE Juniors

(in fall 2017)

Hailey Alspaugh
Nicklas Bohmann
John Colby
Anthony Coniglio
Hana Coogan
Garrett Craft
Dana Dabson
Antonio De Cecco
Lindsay Dennis
Anna Dipietro
Alex Domiano

Kaila Martin
Grant McMillan
Kevin Miller
Saede Moseley
Seth Oliveira
Megan Paul
Kaitlyn Paulchell
Andrew Penschorn
Dalia Rakha
Isha Rege
Kelsey Reitz
Elijah Rinaldi
Naila Sayani

BSE Seniors

(in fall 2017)

Emilie Baker
Nikita Balani
Emily Berg
Lauren Bochicchio
Julia Chand
Taylor Duncan
Samuel Elizondo Villarreal
Serena Emanuel
Lucy Epshteyn
Emmett George
Austin Gouldin
Alexandra Groen
Aram Hudson
Michael Johnson
Joshua Kennedy
Andrea Kuliasha
Nikkole Lenardson
Taylor Lohneis

Nathaniel Orazi
Joseph Paoletti
Elaina Passero
Jacob Patish
Christopher Perkins
Rebecca Pettit
Matthew Pickering
Dane Pizzo
Abigail Preddy
Sara Prince
Teresa Reiber
Caitlin Steen
Meaghan Sullivan
Alexandra Thomasson
Gavin Vess
Alison Waldman
Daniel Wilkin
Lauren Wills
Austin Wozniak

Valued Contributors to BSE (12/1/17 - 5/31/18)

Thank you to all of our alumni, friends, and organizations who generously support the department through gifts and donations! The long list of contributors so far this year is partly due to strong participation in Virginia Tech's first Giving Day on March 20-21, 2018. Alumni, staff, and faculty participated – thank you!! We also thank continuing contributors to the department. These contributions support activities that enhance the educational and work experience of BSE students, staff, and faculty. Please contact the department (lheanes@vt.edu, mlwolfe@vt.edu) if your name has been omitted from this list.

Timothy Alderson
Charles Austin
Paul Ayers
Pamela Bennett
Patricia Brown
Mark Byerly
Frederick Carbaug
Eldridge Collins
Deborah Cook
Jonathan Czuba
Lauren Dempsey
John & Doris Elliott
Ray & Violet Frith
Joesph Gardner, Jr.

Sara Goodwin
Julius Griles
Charles Hatcher, III
Valentina Heath
Jeff Higgins
Yun Hu
Michael & Lisa Flagg
Hyunwoo Kang
KPMG Foundation
William Krisko
Robert Lane
Thanhchung & Stacey Le
Laura Lehmann
Ling Li

Fred Massie
Merck Company Foundation
Juan Moran-Lopez
Saied Mostaghimi
Jacob Patish
Robert & Helen Pitman
Arthur & Suzanne Pryde
Jonathan & Shannon Resop
Roman Rustia
Durelle Scott
Jesse Sledge
Michael Slusher
Easley Smith
John Smith, Jr.

Teresa Smith
Suraye Solis
Andrew Southerly
Aiden Suiter
Gina Tonn
David & Sarah Vaughan
Edward Vincek
Samuel Winter
Mary Leigh Wolfe
Gene & Carol Yagow
Xinhao Ye
Theresah Zu

BSE Ambassadors

The 2017-2018 BSE Ambassadors have been busy this spring representing the department at various recruiting events. We have had four recruiting events targeting general engineering freshmen and prospective high school and transfer students: the Student Engineers' Council's COE Speed Dating event, Hokie Preview, Hokie Focus, and the full-day COE Open House. The spring is particularly busy with individual tours for high school students and their families. Additionally, the Ambassadors continued visiting classrooms and student clubs at local high schools in Roanoke and all over the New River Valley.



Pictured from left: Samuel Withers, Emily Berg, Daniel Wilkin, Liz Pratt, Jenna O'Brien, Elaina Passero, Taylor Lohneis, and Austin Gouldin

Graduate Student Organization (GSO)

This year's BSE GSO, led by **Laura Hanzly** (President), **Tyler Keys** (Watershed Vice President), **Kyle Saylor** (Bioprocessing Vice President), **Lauren Wind** (Treasurer) and **Cristina Marcillo** (Secretary), organized a wide range of activities for graduate students. From attending a Roanoke Rail Yard Dawgs ice hockey game to promoting happy hours on the weekend, the BSE GSO really made an effort to plan a diverse set of activities that would appeal to everyone. By far the most successful event of the spring semester was an organized game of kickball on the Drillfield. The 2017-2018 BSE GSO enjoyed serving as your officers for this academic year. Thanks for the memories!



NEW GRADUATE STUDENTS - SPRING 2018



Syed Azhar Ali
(Sridhar) MENG,
Indian Institute
of Technology
Gandhinagar, 2016



Parthkumar Modi
(Sridhar)
BTECH, Institute
of Infrastructure
Technology
Research &
Management, 2017



Hannah Patton
(Krometis)
BS, Saint Francis
University, 2017

New Addition to the BSE Family

BSE PhD student, **Stephanie Houston**, gave birth to Zack Xi-Hwai Houston on February 13, 2018 (5 lb 9 oz). Zack is all smiles after his mom defended her dissertation this May!



BSE Undergraduates Compete for Virginia Tech's Soil Judging Team

Several BSE undergraduates are current members of the Virginia Tech Soil Judging Team, including sophomores **Morgan Re** and **Ben Smith**, and this year's outstanding senior, **Samuel Withers** (for more on Samuel, see p. 9). This spring the team took first place among 22 teams in the group judging event at the Soil Science Society of America's National Intercollegiate Soil Judging Contest on March 23 in Martin, Tennessee. BSE's Ben Smith placed 8th overall, earning him a spot on the US soil judging team, which will be competing in Itaguaí and Seropédica, Brazil in August 2018 at the 3rd International Soil Judging Contest, sponsored by the International Union of Soil Scientists.

Some of Ben's reflections on participating on this team: "Soil judging is a club/team where people learn how to interpret soils for their taxonomy and land-use capabilities. I joined my freshman year, and it's the best thing I've done since I came to Virginia Tech. Each fall semester, we attend the southeast regional contest and, if we qualify, the nationals in the spring.

These contests are the best part of soil judging. They're a break from the semester where we get to spend every day outside, learning, with an amazing group of people. Before we go we'll spend months learning about geomorphology, geology, and soils of that region. Our coach, Dr. Galbraith (Virginia Tech's CSES department), is the engine behind it all. Soil judging can be confusing sometimes, and having someone so knowledgeable and encouraging is what keeps the team going.

As a whole, I love studying soils because they're so variable. If there's one thing I know to be true about them, it's that there's always 'something weird going on in that pit...!'"



The VT Soil Judging Team are Triumphant national champions!

Senior Placement

While there's always some wistfulness at the end of the semester as we see yet another class of Biological Systems Engineers graduate, there's also a great deal of excitement among faculty and staff as we learn of all the amazing places our newest alumni are headed! Here's just a sampling of some of our senior placement for 2018:

Industry/Government:

Alliantgroup
Deloitte (Arlington & Rosslyn)
DSM Nutritionals
E&J Gallo Winery
Elviquim
Hazen and Sawyer
Inter-American Development Bank
Johns Hopkins
McKee Foods
Merck (Durham & Elkton)
Naval Facilities Engineering Command
Peace Corps
Pfizer Rotational Development Progra
(Rocky Mount & Sanford)
Plexus
Princeton Hydro, LLC

Resource Environmental Solutions
(Warrenton & Richmond)
U.S. Army
Wetland Studies and Solutions, Inc.

Graduate/Professional School:

Virginia Tech
Colorado State University
Duke University
Georgetown University
North Carolina State University
University of Michigan
Virginia Commonwealth University
Virginia Tech Wake Forest School of
Biomedical Engineering and Sciences
West Virginia University Medical School

Nasrin Alamdari Named Most Outstanding BSE and CALS Doctoral Student for 2018



Nasrin Alamdari, a Ph.D. student in BSE, was recently named the most outstanding Ph.D. student in the BSE Department and in the College of Agriculture and Life Sciences (CALS). Nasrin began her academic career in BSE in January, 2015, having just completed her M.S. at Tennessee Technological University. Nasrin is a student in BSE Associate Professor **David Sample**'s research group. Her work has focused upon assessing the impacts of

climate change on urban runoff water quantity, quality, and the performance of best management practices (BMPs). She has worked on a variety of projects including those sponsored by the National Science Foundation (NSF), U.S. Department of Agriculture National Institute for Food and Agriculture (USDA-NIFA), and National Oceanic and Atmospheric Administration (NOAA) Virginia Sea Grant, and the City of Virginia Beach. Nasrin has used the Storm Water Management Model (SWMM) extensively, and developed tools for automatic calibration, sensitivity analysis, and cost optimization of BMPs. Nasrin assisted in teaching five SWMM workshops across Virginia sponsored by Virginia Cooperative Extension (VCE) and the American Society of Civil Engineers (ASCE), and a workshop in Naperville, IL, sponsored

by the Illinois State Association for Floodplain and Stormwater Management. Nasrin has published two papers in peer-reviewed journals, has another one in review, and a fourth is in development; she has also presented three papers at national conferences. Nasrin is a member of the American Water Resources Association, the American Geophysical Union (AGU), and has been a member of the Urban Water Resources Research Council (UWRRC) of ASCE/EWRI (Environmental Water Resources Institute) since 2015. Commenting on Nasrin's achievements, Dr. Sample, her advisor, stated, "Looking back, I am amazed at the diversity and amount of work Nasrin was able to handle, she is adaptable, positive, and really values the work we do."

A native of Tehran, Iran, Nasrin's family placed a high value on education. Nasrin, the youngest of seven children, has siblings that became physicians and are professors in the top ranked medical schools in Iran; three became engineers. Nasrin's parents cared greatly about education; tried to identify their children's interests, and helped them explore them. Nasrin became interested in physics, mathematics and chemistry in high school, ranking first among her peers, leading her to major in Civil Engineering as she entered college at the University of Tabriz. She later earned an M.S. at Sharif Institute of Technology. After receiving the award, Nasrin commented, "My success would not have been possible without the support of my family. I am especially grateful to my parents, who supported me emotionally and financially. I always knew that they believed in me and wanted the best for me. They taught me that my goal in life was to learn, to be happy, and to be successful." After graduation, Nasrin plans to pursue a post-doctoral research opportunity, and eventually obtain an academic position.



*BSE faculty and newest PhDs
backstage before the Spring
hooding ceremony*

Samuel Withers is BSE's 2018 Outstanding Senior

Choosing one outstanding senior in a class with so many exceptional students was extremely difficult, but **Urban Samuel Withers** is a standout. Academically, Samuel is among the top of his class: he has been on the Dean's List with Distinction all semesters while at Virginia Tech. He is in the University Honors program and has received numerous merit-based awards and scholarships throughout his college career. Samuel is intensely curious about the natural world: he conducted undergraduate research on both natural and constructed wetlands with Drs. Krometis and Thompson and presented the results of this research at two national conferences. In addition to his on-campus efforts, he also participated in international programs, including the Presidential Global Scholars and Rising Sophomores Abroad programs.

Through his campus and community involvement, Samuel truly embodies Ut Prosim. He led the Virginia Tech Soil Judging Team to a first-place victory at the Soil Science Society of America's National Intercollegiate Soil Judging Contest on March 23 in Martin, Tennessee (see full article, p. 7). Samuel also served as a BSE Ambassador, a teaching assistant for two courses, a project leader in Engineers Without Borders, and a peer mentor for the Center for the Enhancement of Engineering Diversity (CEED).

Samuel has effectively put his knowledge to work as an engineering intern with Engineering Consulting Services in Asheville, NC and Wetland Studies and Solutions, Inc. in Gainesville, VA. He will continue his studies in the BSE graduate program, assessing the success of stream restoration practices.



BSE PhD Student Spends Year Promoting Diversity

As a graduate assistant with VT's Center for the Enhancement of Engineering Diversity (CEED), under associate dean Dr. Bevlee Watford, **Cristina Marcillo**, worked with the National Society of Black Engineers' Pre-College Initiative (PCI) and the Network for Engineering Transfer Students (VTNETS). PCI brings underrepresented middle and high school students to VT to learn about different engineering disciplines through lab tours and activities with faculty. Cristina has witnessed students who previously had little interest in STEM leave PCI inspired to study engineering in college. The VTNETS program makes obtaining a VT engineering degree possible for low-income community college students, through scholarship and transfer support programs. She is committed to outreach that enhances diversity/inclusion and invests in future scholars. Her time working with the CEED office has been incredibly rewarding. Cristina has witnessed the incredible impact that educational outreach has on the self-esteem of young students and their visions for their

future. Both programs are effective pathways for first-generation college students to become engineers. Her volunteer work with VT's Partnering with Educators and Engineers in Rural Schools program has allowed her to do similar work in Bedford county middle schools. As she finished her year with the CEED office, she is hoping to bring back to BSE many of the lessons she has learned to inspire the next generation of engineers.



Cristina guides a VT PEERS outreach program at Bedford County Middle School

Degrees Earned

MS Degrees - Fall 2017



Brady Coleman (Advisor: Easton), *Impact of biochar amendment, hydraulic retention time, and influent concentration on N and P removal in horizontal flow-through bioreactors.*



Kyle Jacobs (Advisor: Krometis/Hession), *Recovery of antibiotic resistance genes from agricultural runoff.*



Mehdi Ketabchy (Advisor: Sample/Thompson), *Thermal evaluation an urbanized watershed using SWMM and MINUHET: a case study of Stroubles.*

MS Degrees - Spring 2018



Katherine Bland (Advisor: Senger), *Lignocellulosic fermentation of *Saccharomyces cerevisiae* to produce medium chain fatty alcohols.*



Morgan DiCarlo (Advisor: Shortridge), *Statistically evaluating water consumption historically and across multiple users in Virginia.*



Daniel Robinson (Advisor: Sample), *Assessing green infrastructure needs in Hampton Roads, Virginia and identifying the role of Virginia Cooperative Extension.*



Teneil Sivells, MENG (Advisor: Hession) *Impacts of livestock exclusion on the water quality of small tributaries in southwestern Virginia*

PHD Degrees - Fall 2017



Emily Bock (Advisor: Easton), *Challenges and opportunities for denitrifying bioreactors in the Mid-Atlantic.*



Frank Gillam (Advisor: M. Zhang), *Lessons learned in vaccine design in a novel vaccination strategy against porcine epidemic diarrhea virus utilizing the Hepatitis B core antigen protein.*



Heather Govenor (Advisor: Hession/Krometis), *Sediment management for aquatic life protection under the Clean Water Act.*



Weihua Guo (Advisor: Feng), *Computational modeling of planktonic and biofilm metabolism.*



Rui Huang (Advisor: Senger), *Coenzyme engineering of NAD(P)⁺ dependent dehydrogenases.*



Andrew Sommerlot (Advisor: Easton), *Coupling physical and machine learning models with high resolution information transfer and rapid update frameworks for environmental applications.*

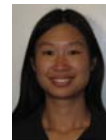


Moges Wagena (Advisor: Easton), *Quantifying the impact of climate change on water availability and water quality in the Chesapeake Bay Watershed.*

PHD Degrees - Spring 2018



Pedro Ivo Guimaraes (Advisor: Senger), *Discovery of a novel microalgal strain *Scenedesmus* sp. A6 and exploration of its potential as a microbial cell factory.*



Stephanie Houston (Advisor: Hession), *Developing a stormwater pond filter to capture phosphorus and other pollutants.*



Tyler Keys (Advisor: Scott), *Monitoring and managing river corridors in the midst of growing water demand.*

BSE Undergraduates Take Advantage of Co-Op Program

Every year several BSE undergraduates take advantage of the Virginia Tech Cooperative Education (Co-Op) program, which helps students find semester (or longer) internship positions. This is an excellent opportunity for students to supplement their classroom learning with real world experience. Some reports from our current co-op students on their experiences:



Matthew Blake, BSE Sophomore: “I am working a co-op at the WestRock paper mill located in Covington, Virginia. I am working on one of the paper machines here at the Covington Mill. I started at the end of January and I am excited to be able to work until I return to Virginia Tech for the fall of 2018. One of my major projects is solving our print register

problem. Some of the rolls that were being sent out to the customers were not printing very well. A couple other co-ops and I were tasked with figuring out a way to determine which properties of the paper were causing the print register problem. Using mainly excel and a few other programs we created a way to extract data from the paper scanners to be able to trend different properties of the paper. We are still working on identifying the problem source. Another project I am working on is figuring out why our paper smoothness has gotten worse over a period of time. This task is harder than it sounds because there are over 300 variables that need to be evaluated. I am in the process of trending some of the variables. Some of the smaller projects I’ve worked on, or been a part of, include a scanner trial, replacing nozzles on the machine, working on a new system that will improve our waste from turn-ups, and performing many lock-out-tag-outs for equipment that needs to be worked on. Overall, I have had a great experience here at the Covington Mill and have gained a lot of knowledge. One of the things I have learned is that communication skills are very important. I have had to communicate with many people to help me understand and finish my projects. I have also learned that excel is a very powerful tool and can be used in many different scenarios. Lastly, I have learned to ask many questions. There are many people that work at the mill

who have a vast knowledge of the machines and I have learned a lot from just asking them questions.”

Christine Ash, BSE Sophomore: “I’m incredibly thankful to have my experiences at two of Sam Adam’s production plants. I began my journey with Sam at their research and development brewery in Boston, working on a 20-gallon system called the Nano. There I had to constantly manage my time keeping track of the brew, any CIP or sanitation cycles going on in the tanks, setting up hoses, kegging, taking cell counts, and cropping yeast. I rarely sat down and typically walked 5 miles in this small room every day. My boss Megan watched me grow throughout the process, helped me isolate issues to improve on, and gave me more responsibility as my understanding blossomed. Towards the end of the co-op, one of the managers flew me to their Pennsylvania brewery to see how I reacted in a larger, fast-paced production facility. The trip went well, and I started as a brewing supervisor in January. I am a technical and interpersonal resource to the brewhouse, yeast and fermentation, cider, mixed blend, and filtration teams, resolving issues as they arise during shift. My days are never boring with a constant mix of planning and adapting to changes from management, packaging, and maintenance. I never saw myself in a supervisor role, it was far outside my comfort zone, but now I see it as a future and career. I am walking away with confidence, adaptability, time management, prioritization; skills that are applicable for the rest of my life. Never forget that you are as much of an investment to the company as they are to you.”



Undergraduates Studying Abroad

Molly Simon, BSE Junior: “From riding camels in Morocco to climbing glaciers in Iceland and finding a new home in Dublin, my study abroad experience has given me countless memories that I will always cherish. In my 5 months I have traveled to 16 countries, giving me the opportunity to learn about so many new cultures, traditions, foods, people, and so much more. Although the abroad part of study abroad is amazing, it is important to include the study part. I am studying at University College Dublin and currently taking 5 classes: Advanced Food Process Engineering, Transport Phenomena, Air Pollution, Ecological Modelling, and Ireland Uncovered. Although the teaching style is slightly different than the continuous assessment that I am used to at Virginia Tech, taking classes here in Dublin is not very different than classes at Tech.”



Maia Huntington, BSE Junior: “It feels so surreal that my semester in Dublin is coming to a close! Studying at UCD has introduced me to a whole different kind of educational experience, with the focus being on independent learning. Being a BSE student here ends up meaning the same thing as it does at Virginia Tech- having small classes with the opportunity to get to know your professors and classmates well. Dublin has some great people, great music (you can find live music on nearly every corner on any night of the week), and an overall feeling that makes you quick to feel at home. It’s also a great place to be based if you’re interested in exploring Europe- I’ve been able to spend time in ten other countries while still getting to experience and enjoy Irish culture too! While I was completely terrified when arriving in Ireland, my time here has been so much more rewarding than I ever could have expected and I’ve become a more adventurous and independent person because of it. I’m going to remember and be thankful for this past semester for the rest of my life!”

Dan Irving, BSE Junior: “Greetings from the land of a thousand welcomes! The Irish are some of the friendliest people, making Dublin feel like home away from my real home. My time abroad has helped me learn a lot about myself and others, from travelling all over Europe to learning a new culture here in Ireland. The teaching style at University College Dublin is different than that at Virginia Tech, with a focus on independent learning, so it has forced me to think and learn in a way which I had not done before. Classes like Ecological Modeling, Air Pollution, and Advanced Food Process Engineering have given me a wide variety of information all within the bounds of BSE, making me appreciate the scope of our major. More than anything, studying abroad has made me realize how amazing Tech is, and I can’t wait to spend another year in Blacksburg!”



Jena Hays, BSE Junior: “Ireland is an absolutely beautiful place with incredibly kind people. The city itself is built very low, with no skyscrapers, so it does not have a caged-in, imposing city vibe to it, which is nice. Classes here are run differently than at Tech, with hardly any continuous assessment or homework and final exams that are worth a tremendous percentage of overall grades. However, the lecturers are, on the whole, competent and more than willing to answer any questions that arise. Overall, I am glad I was able to study abroad, because it has made me think more deeply about my identity as an American citizen and also a world citizen. I have made friends from all over the world at UCD and I am grateful to have had the opportunity.”

Service Without Borders

Service Without Borders (SWB) is a student-led, interdisciplinary organization whose mission is to share the spirit of Virginia Tech's motto, *Ut Prosim*, locally and globally by assisting communities in need through cross-cultural exchanges. Begun in 2014, SWB has over 40 active student members. **Theo Dillaha** (BSE Professor Emeritus) was instrumental in creating SWB. Theo and **Brian Benham** (BSE Professor and Extension Specialist) serve as the current SWB faculty advisors.



Service Without Borders team members w/partners in Nepal in May 2016

SWB students have the opportunity to participate in local service-learning projects throughout Blacksburg and Christiansburg, and international projects in Nepal and Tanzania. A group of SWB students and faculty advisors participate in at least one international service-learning trip annually. These projects provide students with design, project management, construction, marketing, fundraising, and cultural experiences.

SWB's Tanzania project is partnering with a local Tanzanian non-governmental organization (NGO) and a non-profit foundation located in Blacksburg,

the Maasai Education Foundation, to build an English language-based elementary boarding school to educate Maasai youth in Northern Tanzania. The Maasai are one of the most impoverished and poorly educated ethnic groups in Tanzania.



Service Without Borders students with Tanzania community partners

SWB's Nepal project is partnering with the Blacksburg Tshampa Foundation to rehabilitate an irrigation canal that was damaged in the 2015 earthquake that devastated Nepal, and to construct a "warming room" where elderly villagers can escape the high elevation cold temperatures and relentless wind. This work is in the small, culturally Tibetan village of Dhumba, in the Mustang province of Nepal. Culturally, Tibetan Nepalese are one of the most impoverished and poorly educated ethnic groups in Nepal.

Tax deductible donations to support SWB can be made via either the Maasai Education Foundation (<https://maasaieducationfoundation.org>) or the Tshampa Foundation (<https://www.facebook.com/Tshampa-Foundation-293937100664660>).



Graduate Student Appreciation Luncheon

Thinking about grad school... or know of someone who is?
BSE is accepting applications

Application due date for
Spring 2019: September 1, 2018
Fall 2019: January 5, 2019

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

BSE EXTENSION SPECIALIST FOCUSES ON ENERGY

BSE Advanced Extension Specialist **John Ignosh** was part of an extension project team that managed the Agricultural Energy Efficiency Initiative program which was completed in December 2017. The project was supported by the Virginia Tobacco Indemnification and Revitalization Commission and performed in collaboration with the USDA (and their Technical Service Providers), Old Dominion Electric Cooperative, and the VA Department of Mines, Minerals and Energy (DMME). The second phase of the project ('14-'17) completed 64 farm energy audits which identified potential energy savings of 873,968 kWh in electricity and 429,847 gallons of propane, 3,151 MTCO₂e greenhouse gas emissions reductions and annual energy-cost savings of \$850,734. Nearly half of participating farmers implemented one or more energy efficiency recommendations. Several energy-related educational sessions were held in 2017, on topics including solar thermal, solar photovoltaics, dairy energy best management practices, energy project decision support systems (e.g., NREL's System Advisor Model, RETScreen), and irrigation system assessments.

Ignosh is also part of a project team assessing solar-powered water pumping units in a project supported by the Virginia Agricultural Council. Virginia's Watershed Implementation Plan II sets forth a series of sector-specific best management practices (BMPs) related to improving water quality. BMP targets for the agricultural sector include approximately 102 million linear feet of pasture fencing by the year 2025. For some pastures, fencing may require new livestock watering systems. For some locations, the cost to extend the electrical grid to power a pump may be prohibitively expensive and capital intensive, or cost-shared, watering improvements can also be problematic on rented acreage. For these reasons, the project team is evaluating the on-farm performance of these units.



*Project Team discusses siting considerations for unit located on rented pastureland along the Middle River
"Photo Credit - Kenny Fletcher, VA Communications Coordinator, Chesapeake Bay Foundation"*

This needs-based agricultural energy work will continue and focus on leveraging on-farm technologies adopted by collaborating farmers to elucidate farmer experiences and to inform development of future extension demonstrations and materials to best address needs of clientele.

BSE Professor gives talk at the Science Museum

BSE Assistant Professor **Julie Shortridge** gave a talk at the Science Museum of Virginia's Dome Theater in Richmond as part of the Museum's "Climate Connections" lecture series on February 28th. This public lecture series, with titles like "How is Climate Change Affecting Me?" and "What is Climate Change Costing Me?" was focused on all of the ways that climate change is already impacting people's lives. Dr. Shortridge's talk, entitled, "How is Climate Change Impacting My Dinner?" described how climate change is impacting our food system, both globally and here in Virginia. She also discussed how scientists estimate what impacts might be in the future, and the actions that we can take now to help reduce the worst impacts.



*Julie Shortridge lectures at the Science Museum
"Photo courtesy of the Science Museum of Virginia"*

Rural Communities - Destination Area Initiative

Roughly one-fifth of the US population is considered “rural”. However, these rural landscapes comprise 90% of the nation’s land area, and provide the overwhelming majority of the country’s food, energy, and other natural resources. Simultaneously, rural communities are associated with both the lowest rates of access to potable water and the most severe environmental and human health disparities, both domestically and globally. With Virginia Tech colleagues from Civil and Environmental Engineering, Population Health Sciences, Geography, and Appalachian Studies, BSE Associate Professor **Leigh-Anne Krometis** is leading a team funded by the Virginia Tech Global Systems Science Destination Area initiative that aims to bring attention to human and ecological health threats to rural communities and to design solutions to ensure rural sustainability. The broader team is initially focused locally on the Central Appalachian Coalfields, and aims to identify useful ecological indicators of human health, examine the impacts of long-term chronic environmental exposures on burden of disease, and inform local environmental resource and public health decision-making. Central Appalachia, with its limited water infrastructure, dramatic geography, small-scale high-value crop agriculture, and evolving energy extraction practices parallels the physical landscapes of many rural regions globally, and its environmental health disparities echo common public health challenges of the developing world. Ideally, this early focus will provide insights and guidance that can be expanded to rural communities throughout the globe.



Virginia Tech Rural Environments Steering Committee

The group’s work has been highlighted by Virginia Tech News (<https://vtnews.vt.edu/articles/2017/08/080117-fralin-appalachianhealth.html>), Kentucky Public Radio (<http://wfpl.org/new-research-group-aims-to-shed-light-on-appalachian-health-disparities/>), and the Appalachian Voice (<http://appvoices.org/2018/02/19/contaminated-drinking-water-problems-in-appalachia/>).

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BSE is eagerly looking forward to our 100th anniversary!

BSE will soon be celebrating a full century of research, teaching, and extension. Enjoy some of these pictures of our early successes. If you have a BSE memory, photo, or story from our early years, please pass along to BSE Professor Cully Hession at chession@vt.edu.



Tile drain installation, late 1910s



Soil and Water Lab, 1948



Beneficiaries of the Rural Electrification Project, 1940s

Virginia Lakes & Watersheds Association Donation Helps Extend Experiential Education & Well Water Testing to Carroll County High School Students & Families

A recent donation from Virginia Lakes and Watersheds Association (VLWA; <https://www.vlwa.org/>) is helping support an innovative collaboration between BSE's Virginia Household Water Quality Program (VAHWQP) and Carroll County High School (CCHS)'s STEM-Agriculture Lab. Students learn to collect water samples from their homes (with their parents' permission), and visit Virginia Tech with their own water samples in hand. They spend the day on campus doing hands-on lab activities in the BSE Water Quality Lab and hear presentations from water quality and food safety scientists and well drilling contractors. A few weeks later the students learn about the results of the water quality testing from the VAHWQP coordinator, **Erin Ling**, along with options for addressing problems through source water protection or treatment. After studying the materials provided, the students themselves deliver an educational presentation to their parents and guardians at CCHS. Participating parents demonstrated strong increases in knowledge after learning concepts from their children! Since 2015, 95 students from Carroll County and 45 students from other nearby counties have participated in the tours and testing. Financial support has also generously been provided by **Southeast Rural Community Assistance Project** (<http://sercap.org/>) in the past.

Rachelle Rasco, CCHS STEM-Ag Lab manager, stated: "Many families in our community lack the extra income to test their water and may not know it is their own responsibility to do so. Students become public informants to explain these issues to their peers and community members. This experience has also deepened their interest for scientific careers and awareness of scientific applications." One CCHS student, Isabel "Izzy" Largen, participated in this effort for two years, and is now a graduating senior. As a junior, Izzy traveled to Richmond with Ms. Rasco and BSE's Erin Ling to present about VAHWQP at the VLWA annual conference. Starting in the fall, Izzy will attend Virginia Tech to pursue a degree in Water Resources, Policy, and Management. Izzy shared: "Without getting hands-on experience with science and public speaking through this program, I probably would have chosen a different career path." For more information contact Erin Ling at ejling@vt.edu or Rachelle Rasco at rnrasco@ccpsd.k12.va.us.



CCHS students outside HABB1 after a day spent learning about water (BSE's Erin Ling, far right)

Welcome new Administrative Assistant to the Department Head

Laura Eanes has joined BSE! A lifelong resident of the area, Laura joined the department in May. She brings 20 plus years of academic experience with her, including 10 years in the Department of Forestry (now Forest Resources and Environmental Conservation) at Virginia Tech. Laura has returned to Virginia Tech after spending the past 10 years working at National Bank in Blacksburg. Welcome, Laura!

Laura replaces Melody Clark, who has returned to her hometown of Dundee, New York, with her family, after spending two years in BSE. We thank Melody for her outstanding contributions to the department and wish her all the best!



Laura Eanes

1950s

Charles Richard Guthrie (BS '51) passed away on January 28, 2017. Richard was valedictorian of the Agricultural Engineering program at Virginia Tech, after which he served in the US Army and then returned to Dublin, VA to run his family's beef operation. This farm remains run by Guthries today (after five generations)! In addition to putting his agricultural engineering education to work, Richard served on the Pulaski School Board and the Presbyterian Children's Home of the Highlands and of Pulaski Daily Bread, Inc.

James E. Turner, Jr. (BS '56) passed away in Suffolk, VA on December 27, 2017. After earning his degree in Agricultural Engineering, James worked for Newport News Shipbuilding, Westinghouse, and General Dynamics. An avid Hokie and financial supporter of the university, James received numerous awards from Virginia Tech, including: the University Distinguished Achievement Award (1994), the Alumni Distinguished Service Award (2003), and the William H Ruffner Medal (2004).

1960s

Fred B. Givens (BS '62) passed away on April 13, 2017. Fred was known as "Mr. Pumpkin" given his love of pumpkin farming. For most of his life he worked at the Federal Department of Soil and Water Conservation Services in Newport, VA.

Henry J. Balch (BS '64) passed away on March 21, 2017 in Hendersonville, NC. Henry joined the Air Force after graduating from Virginia Tech's Agricultural Engineering program. This inspired a love of aviation and Henry spent most of his career at Pratt & Whitney Aircraft as a Manufacturing Engineer and then Continental Teves as a Quality Engineer. He also put his agricultural experience to work running a family business, Country Walk Farm, that raised llamas.

1990s

Dan Gradishar (BS'99) manages GeoCapitol Engineering, LLC, A Terracon Company in Washington, DC. He opened the GeoCapitol office in 2014 with three other partners where they complete environmental, geotechnical, and construction material consulting services for developers, architects, civil engineers, structural engineers, and local/Federal agencies in the DC Metro region. Currently, GeoCapitol is working on several interesting projects including the Union Station renovations, St. Elizabeths West Campus redevelopment, Walter Reed Medical Campus redevelopment, and Hill East redevelopment, all in DC. He resides in Fairfax, Virginia with his two children and goldendoodle dog, Curly. In his spare time, Dan enjoys boating, camping, the beach, playing softball, traveling, gardening, and being a chauffeur to his kids' activities.



2000s

Rachel Cain Wagner (MS'04) was promoted to Associate Professor of Environmental Engineering at Saint Francis University. Rachel lives in Hollidaysburg, PA, with husband Aaron, kids Caty and Thomas, dog Juno, and turtle BB-9. She and former graduate school cubicle neighbor BSE Associate Professor Leigh-Anne Krometis were able to reconnect this spring when Leigh-Anne gave a guest seminar to the environmental engineering students at SFU. Rachel's advice: stay in touch with your graduate school pals! Rachel is looking forward to living abroad with her family for a semester, teaching at the SFU campus in Ambialet, France, in fall 2019.



2010s
Kathy DeBusk Gee (BS'09, MS'11), husband Kyle, and big brother Daniel were thrilled to welcome little brother Thomas Hunter on April 16, 2018. Kathy is looking forward to a summer in between semesters at Longwood University where she is an assistant professor.



-Continued to top of next page

After graduating in December 2012, **Waverly Parks (BS '11, MS '12)** moved to California with her boyfriend, Jeff. While in CA, Waverly



lived in Santa Barbara and Lancaster while beginning her career with Stantec Consulting Inc. While she worked on a wide variety of projects, Waverly has found herself drawn to Community Development design, primarily residential. Waverly and Jeff got engaged in June 2015 (wine country hot air balloon proposal!) and married in September 2016 in the beautiful foothills of North Carolina. Wave and Jeff now live in Fort Walton Beach, FL with their two cats. Waverly is currently working remotely at home for the same CA office and will be celebrating a 5 year work anniversary soon. When not at work, Wave and Jeff have been working on mini-renovation projects for their home and traveling. So far travel highlights include Alaska, Germany, Spain, France, Scotland, Yosemite, Sequoia, Grand Canyon, Montana, New York City, Portland, Seattle, Chicago, and many more!

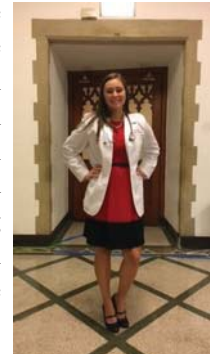
Chris Gilson (BSE '16), after returning from working in China and briefly working as a carpenter, started a job in Asheville, North Carolina with Stantec as a Project Engineer doing stream and wetland restoration. He especially enjoys using the term “fluvial geomorphology”, observing dynamic stream systems over time, and pushing degraded systems towards the balance they seek. Studying natural systems in relatively pristine conditions helps him understand the processes at work in each specific region and therefore better design their restoration projects. Chris likes to get lost and bushwhack in his free time which he never thought could be part of his job!



Corbin Moore (BS '16) has been working as a systems engineer for the US Navy since graduation. He currently lives in San Diego, CA and is slated to return to the DC area this summer. He has continued his learning efforts to obtain several cybersecurity certifications and plans to complete his ASEP certification this summer as well. Outside of work he enjoys taking his lab Skipper to the beach and watching any VT game he can find.



Nicole Fazekas (BS '17) has almost finished her first year as a VCOM medical student. She has enjoyed expanding upon the knowledge she gained while in the BSE program at Virginia Tech and looks forward to representing the Virginia Tech Hokies as a future doctor!



Kd Greenleaf (BS '17) recently got a job with Terumo BCT as a Global Clinical Marketing Operations Specialist in Denver, Colorado and enjoys hiking and the outdoors in her spare time.





Dina Huynh (BS '17) is currently working at Fort Belvoir in Northern Virginia with two fellow BSE graduates! Dina is working in the Fort's Environmental Division on industrial stormwater and MS4 permit compliance.



Hokie Coworkers Kelsey Ross ('08), David Greenspan (BS '12), and Dina Huynh (BS '17).

Continue to stay in touch with BSE:

and/or
 Like us on Facebook
 join our  **Linked in**

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

Outstanding BSE Alumni

Three BSE alumni were recognized as outstanding alumni by the College of Agriculture and Life Sciences (CALs) for their professional achievement, leadership, and service to their home department, the college, and the fields of agriculture and the life sciences. Awards were presented at the CALs annual banquet held in March. Congratulations to Molly, Bethany, and Paul!

Molly Elizabeth Deger (BS '09) was awarded the BSE Outstanding Recent Undergraduate Alumni Award. This award recognizes alumni who have received an undergraduate degree in BSE in the last 10 years. Deger has completed some graduate coursework in Water Resources Engineering at Villanova University. She is a licensed Civil Engineer in Pennsylvania and Delaware. Since 2015, she has been with the Chester County Conservation District as their full-time District Engineer where she provides technical guidance and engineering support for review of erosion and sediment and post-construction stormwater management plans for the NPDES Permit for Stormwater Discharges Associated with Construction Activities in Chester County, PA. Molly enjoys volunteering at community events on behalf of the Conservation District, such as the Kennett Square Mushroom Festival and the PA Farm Show, to spread awareness on water quality issues and current best management practices. She also provides outreach to local designers and engineers by presenting on topics such as engineered soils, rain gardens, and updates to PA DEP policy and regulations (pertaining to the NPDES program). Outside of work, Molly stays busy trying to keep up with her 18th century farmhouse and “farmette” where she enjoys raising chickens for egg production, tending to her vegetable garden, and chasing around her toddler.

Bethany Bezak (MS) was awarded the BSE Outstanding Recent Graduate Alumni Award. This award recognizes alumni who have received a graduate degree in BSE in the last 10 years. Bezak is a registered Professional Engineer in Virginia and the District of Columbia and a LEED Accredited Professional. She currently is the Green Infrastructure Manager for DC Water in Washington, DC, where her primary role is to manage DC Water’s Green Infrastructure implementation as part of the DC Clean Rivers Project. Bethany has long been an advocate of Green Infrastructure. She established the National Green Infrastructure Certification Program and negotiated the Green Jobs Memorandum of Agreement with the office of the Mayor for the District of Columbia. Bethany’s hard work and drive was recently recognized through the 2016 General Manager’s Award for Outstanding Performance.

Paul Ayers, Ph.D., P.E., (BS '78, MS '80) was awarded the BSE Distinguished Alumni Award. After completing a Ph.D. at North Carolina State University in 1984, he joined Colorado State University (CSU) as an assistant professor and extension agricultural engineer. Since 2002, Paul has been a professor with the Department of Biosystems Engineering and Environmental Science at the University of Tennessee in Knoxville (UTK). He has received several teaching, advising, and research awards from CSU and UTK.

Paul has made a significant impact on tractor safety throughout his career. His research over 30 years has ranged from providing means to judge the suitability of fitting older tractors with retrofit roll-over protective structures (ROPS), developing a computer-based ROPS design program, to the development of ROPS designs for non-tractor applications such as zero turn lawnmowers. Paul’s work on assistive devices for raising and lowering foldable ROPS has improved both the ergonomics and safety of such ROPS. Much of his work has been successfully translated into practice, resulting in fewer deaths and injuries from equipment overturns.

Paul is a member of the Steering Committee of the National ROPS Rebate Program (NRRP) for the National Tractor Safety Coalition, and is chair of the Taskforce for ROPS Technology and Manufacturing. He was the special editor for the ROPS and stability research issue of the Journal of Agriculture, Safety, and Health. Recognizing his outstanding achievements, Paul received the SMV Technologies Ergonomics, Safety, and Health award from ASABE in 2017.



BSE Outstanding Alumni Bethany Bezak, Paul Ayers, and Molly Deger at the CALS awards presentation.

Biological Systems Engineering Dept. (MC0303)

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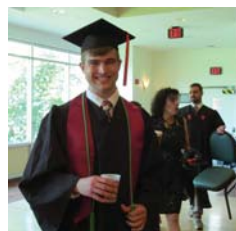
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***BSE 2018 Spring
Commencement
Reception***



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