LAFAYETTE CHBE NEWS

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THE CHEME CONNECTION

Chemical and Biomolecular Engineering Department Highlights

Dear Alumni and Friends of Lafayette Chemical Engineering,

I hope you are all doing well and looking forward to Spring. It's been a long and tiring year of challenges and disruptions to our personal and professional lives. Here at Lafayette ChBE, we have all missed the in-person classes, student-faculty interactions, and conversations in the Fishbowl. Things are starting to return to normal slowly and we are looking forward to logging off of Zoom and getting back together in physical spaces again.

Although virtual this year, I am excited that we will resume our annual ChBE Symposium on April 9. The event is always the highlight of our Spring semester, as we welcome back several alumni to share their work experiences with the current students. I would like to thank the students on the AIChE Executive Board (Kotoe Abe '21, Sid Vijay '21, Alex Ashley '22, Ryan Berry '22, Maddie Carrol '22, Meg Dodge '23, and Danielle Lemisch '23) and their faculty advisor, Professor Senra, for their tremendous efforts pivoting to a virtual symposium this year.

While the Fall 2020 semester was completely virtual with most students logging into classes from home, this Spring features more students on campus and a mix of in-person and remote courses. Chemical engineering faculty have found creative and innovative ways to preserve the hands-on learning that we are all used to, and to some extent, take for granted. You can read examples of the faculty and student perspective of teaching and learning during the pandemic inside this newsletter. From shifting the sequence of whole courses to mailing home mini lab kits, the faculty have reimagined their courses, engineering resourceful solutions under a new set of constraints. It is likely that many of these adaptations will stick around post-COVID.

I hope you enjoy reading the articles that follow and 'connecting' with our students, alumni, and faculty. Stay well and I hope to see you on campus again soon.

Thank you for your continued support of ChBE,

Lauren Anderson '04

Associate Professor and Department Head

The Polymer Pros

Alex Ashley, '22.

Ryan Van Horn '04, Associate Professor of Chemical and Biomolecular Engineering, was recently awarded a National Science Foundation (NSF) grant for his research project titled RUI: Metastability of Crystals in Double Crystalline PEO-b-PCL Films and Their Role in Transport Properties. However, he was not the only professor in the department to be awarded a grant. In fact, **Melissa Gordon '11**, Assistant Professor of Chemical and Biomolecular engineering, was also recently awarded a grant from the American Chemical Society (ACS) to develop "smart" stimuli-responsive polymers and provide research opportunities for students.

In the case of Van Horn, he is currently completing his previous NSF project titled "Crystallization of Biologically-Relevant Poly(ethylene oxide)-b-poly(caprolactone) Copolymers During Film Preparation" and is expected to publish two papers, one with his current research assistant, **Alex Ashley '22** entitled "Enhancing Minority Block Crystallization in Asymmetric PEO-b-PCL Copolymers", and the other with the recently graduated **Joanna White '20** entitled "Physical Structure Contributions in pH Degradation of PEO-b-PCL Films". Van Horn intends to commence his new project starting Summer 2021 and is hoping to host a local high school student in his research group that summer with the help of the Landis Center. In addition to the high school student, Van Horn will enlist one or two research assistants for the summer to assist in his new project where he will investigate the effects of aging on the crystallinity of PEO-b-PCL films as well as the degradation rate in relation to its crystalline structure. Looking forward to this summer, Van Horn states that he is not only expecting a challenge, but is relishing the opportunity to teach new research techniques to another student starting from ground zero.

Similarly, Gordon is currently working closely with two students, **Abby Devlin '22** and **Jimmy Hastie '22** to initiate her current project in developing carbon-dioxide responsive polymers that stimulate different property changes. She is also working on another research project, funded by the NSF, that overlaps with that of Associate Professor **Lindsay Soh**. Currently, they are developing bio-based plastics using monomers derived from Birch bark and investigating the mechanical and thermal degradation properties of the resulting plastic. **Sarah Burkert '21** will further this project with her senior thesis in the Spring of 2021 in collaboration with **Megan Dodge '23**. Currently, Gordon is currently conducting research at Columbia University in the City of New York in collaboration with Dr. Laura Kaufman. Together they intend to measure and visualize property changes for different polymer networks using confocal rheology. Gordon says that she is "quite excited to try out this new analytical technique and hopes that all goes well considering the pandemic."

Nonetheless, both Van Horn and Gordon are pursuing great achievements to better the world, and the Chemical and Biomolecular Engineering department, as well as the American Institute of Chemical Engineers, are very proud of all that they have accomplished so far and excited for what is to come. Go Pards!

ChBE Department Celebrates Two Named Professorships

Danielle Lemisch, '23.

While 2020 included many challenges, two welcome surprises within the chemical engineering community included current department head **Professor Lauren Anderson '04** being named the James T. Marcus '50 Scholar of Chemical and Biomolecular Engineering and Professor Polly Piergiovanni being awarded the Air Products/Ghasemi Chair in Engineering for Interdisciplinary Teaching.

Due to the generosity of James T. Marcus '50 and his wife, the James T. Marcus and Gladys Edgar Marcus Chemical Engineering Endowment was created. This gift contributed to the purchase of a large piece of equipment for the chemical engineering department and the James T. Marcus '50 Scholar of Chemical and Biomolecular Engineering position, recently awarded to Professor Lauren Anderson. Professor Anderson initially discovered that she had received this award at the May 21st, 2020, faculty meeting led by Provost John Meier. Professor Anderson was surprised and humbled by the announcement, saying, "I hope that I can honor the deed of the gift to continue to 'further and improve the chemical engineering curriculum at the college'".

Professor Anderson will use a portion of the funds for professional development and will participate in the HERS, or Higher Education Resource Services, workshop entitled "Combat Burnout and the Unique Leadership Challenges Faced by Women Through Practical and Action-Oriented Solutions". The HERS organization aims to bring together and support women leaders in higher education. "Being Department Head is only one of my many jobs right now. Having a two-career household with two young children is challenging and I am interested in learning more about leadership resilience so that I can best manage the different roles I play - department head, teacher, researcher, wife, and mom, to name a few", comments Professor Anderson. As Lafayette College recently celebrated fifty years of coeducation, Professor Anderson notes how the gender and racial diversity of the department has increased significantly since she was a student at Lafayette College and how women faculty members now comprise half of the chemical engineering department, far greater than the national average.

While Transport Phenomena is still her favorite course,"I remember working on Transport homework for hours each week – it was so satisfying when three pages of problem-solving revealed the right answer", Professor Anderson currently teaches CHE 412 Integrated Chemical Engineering. Due to the hands-on nature of the class, the course was split into two half-credit courses spanning both the fall and spring semesters. "Experiential learning is the hallmark of Lafayette CHE and although it was challenging to split the course, it was important to preserve the hands-on experience," notes Professor Anderson. Students learned about Hazard and Operability Studies and completed a virtual experiment on a CSTR during the fall semester and will complete several more in-person experiments in the UO lab

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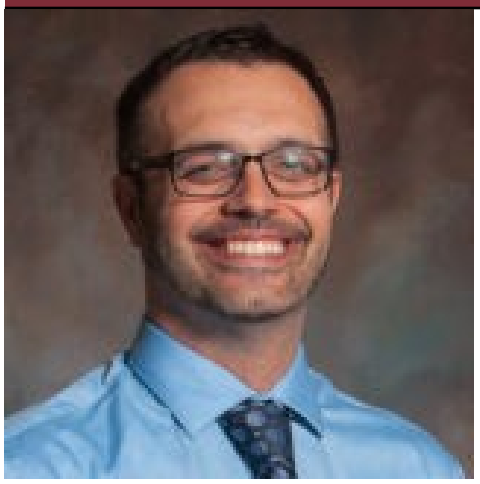
COVID-19: A Faculty Perspective



Associate Professor Michael Senra.

When it was announced right on Thursday, March 12th that classes would be taught in a remote fashion for the two weeks following Spring Break, all members of the Lafayette community were scrambling to determine appropriate strategies for both teaching and learning. Eventually, remote teaching was required for the remainder of the Spring 2020 semester and for the entirety of the Fall 2020 semester. In the current Spring 2021 semester, each faculty member has a choice of how to administer their course and each student has the option of returning to campus. Each faculty member in our department came up with creative and innovative ways to conduct their courses. Here, I will provide some of my experiences as a sample of work done by ChBE faculty.

During the Spring 2020 semester, I was leading a section of a lecture-based course (ChE 324, Process Control) and co-teaching a laboratory-based course with my colleague Professor Ryan Van Horn (ChE 322, Experimental Design II). Clearly, attempting to repackage a laboratory based course was the larger of the two challenges as students were not able to be in the Unit Operations Lab. We utilized videos of the experiments that were developed by students in previous years as project assignments in the laboratory sequence. These videos gave students the opportunity to see how the equipment worked and understand important safety issues with the equipment. On an alternating basis, lab sessions were devoted to students analyzing data or presenting their findings from that data. Groups would be able to meet together via video conferencing (mostly Google Meet in the Spring, with a larger license Zoom in the fall) and could invite their faculty lab supervisor on the conference to ask questions. Another way groups could ask questions was via Slack, a text-based communication platform where images can be uploaded. Each group had their own channel such that their questions would only be seen by the instructor. Slack also became a useful tool for either individual conversations or class-wide announcements outside of class time. Because alumni have heralded the emphasis on oral and written presentation skills in the lab sequence as skills that separate them from their colleagues in the work force, those assignments were still kept. In fact, Professor Van Horn and I developed open-ended style questions that could be seen in job interviews utilizing the equipment that groups worked through and presented their thought process to us.

The lecture portion of ChE 322 was done generally via live meeting using Google Meet with the lectures being recorded for those in distant time zones. Although the atmosphere was certainly different in compared to our in-person classes, we were impressed by the level of student engagement and conversation during the lectures. A unique challenge was handling the troubleshooting exercises when groups and operators could not be in the same room. However, by the use of Google Drive, each troubleshooting team was given their own Word document where they could type their questions and get reasonably live responses. As the Class of 2021 is quite large, this meant juggling as many as 20 groups simultaneously. Although this led to some lag in responses, students still seemed to be able to gain the important aspects of the exercise and students still found them equally rewarding and frustrating.

This approach to lecture was similarly used in ChE 324 during the Spring 2020 semester. With the weekly problem sets, Slack became a crucial means to interact with students to answer problem set questions, check work they would upload there and schedule video conferences for a more interactive discussion of questions. Additionally, Slack could also be used as a conduit to check-in on students' well being during the semester and have a chance to chat about things not related to course content that often happen outside of class. Quizzes and exams were administered with the assistance of Moodle, the online course management system currently being used by Lafayette. Although some things done on Moodle were not as seamless as when done in-person, it worked reasonably well after some trial-and-error based on feedback and insights from the students and my fellow faculty members. A similar approach was used during the Fall 2020 semester when teaching my lecture course (ChE 413 Reaction Kinetics & Reactor Design). The transition to Zoom during this semester allowed for usage of breakout rooms to allow for group problem solving to occur virtually. To maximize time for problem solving in class, some review or more basic concepts were presented in a "flipped classroom" format, where students would watch a 15-25 minute video before coming to class. Additionally, I took advantage of teaching

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DiLillo '18, White '20 Eart Recognition from National Science Foundation

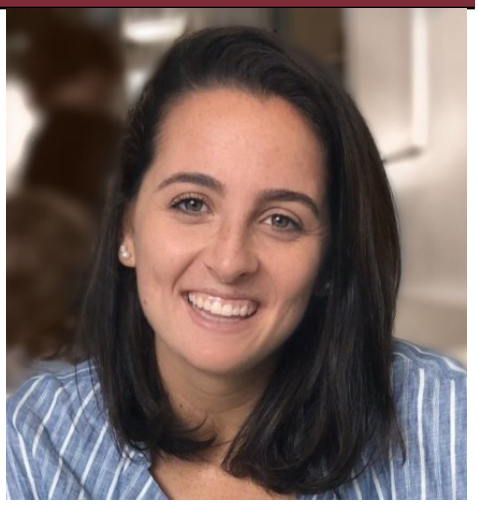
Associate Professor Michael Senra.

Every year, the National Science Foundation selects students from across the country about to pursue or currently pursuing research-based masters or doctoral degrees in STEM fields to receive a research fellowship (NSF-GRFP). Year in and year out, a disproportionate number of Lafayette recipients are ChBE students and this year is no different. Four Lafayette students or alumni earned this prestigious fellowship in 2020. Two of them are ChBE alumni: **Kat DiLillo '18** pursuing a Ph.D. in biomedical engineering at the University of Michigan and **Joanna White '20** pursuing a Ph.D. in chemical engineering at the University of Minnesota.

DiLillo is working for Dr. Kelly Arnold in Ann Arbor, who studies the role inflammation plays in chronic obstructive pulmonary disease (COPD), an ailment that is the 4th leading cause of death in the United States. Specifically, she utilizes machine learning approaches applied to high throughput protein measurements from human blood and tissue to identify how combinations of proteins differ with disease phenotypes as compared to control populations. This identification allows for determining key proteins that could be targets for therapeutics and/or better understanding of the mechanisms underlying disease pathogenesis. When asked about how earning the NSF-GRFP has impacted her studies, DiLillo said that it "undoubtedly offered me a sense of freedom in my work. Being that I am independently funded, I have more autonomy to explore directions of my work that may be more exploratory or of personal interest." She also noted that fellowship provides her unique access to travel grants and non-academic internships, which can further her academic and professional growth. While at Lafayette, she did research with Professor Chris Anderson focusing on the study of thermoresponsive polymers in altering material properties and biological interactions for drug delivery applications.

White has just begun working with Dr. Michelle Calebrese in Minneapolis, who studies the design of novel soft materials whose properties can be optimized for a wide range of applications from polymer processing to drug delivery. White's focus is on developing a thermoresponsive hydrogel to locally treat ear infections. Her overall goal is to "develop a polymer-based antibiotic delivery system that flows when injected into the ear and then solidifies and delivers the drug when it contacts the warm eardrum." It is hoped that this methodology will reduce the development of antibiotic resistance that is associated with repeated uses. She notes that "receiving the GRFP gave me much more flexibility when picking my advisor and project for my PhD... to choose a project that really excited me." White conducted research with Professor Ryan Van Horn at Lafayette, exploring the effect of crystallinity on the degradation of FDA-approved block copolymers, an understanding of which is fundamental in developing tailorable drug delivery systems.

When asked what part of their Lafayette experience was most helpful in their transition to graduate school, DiLillo said that "it was the opportunity to work independently on research... I was afforded the incredible opportunity to be in the driver's seat early on in my research career." By being able to incorporate her ideas into her research,



Kat DiLillo '18 (above) and Joanna White '20 (below), NSF GRFP recipients.

she noted that she "was already confident in my abilities to use my critical thinking and problem-solving skills to lead my own research project upon entering my graduate program." White commented that "the Lafayette ChBE professors work tirelessly to provide a rigorous, individualized, hands-on education to every student. Because of this, I feel I was pushed in both my classes and research more than the majority of my graduate-school peers." She also noted that the relationships developed with professors and classmates at Lafayette helped to build her confidence and attitude about the field.

Faculty Research: Using Computational Methods to Solve Deep Questions

Maddie Carroll, '22.

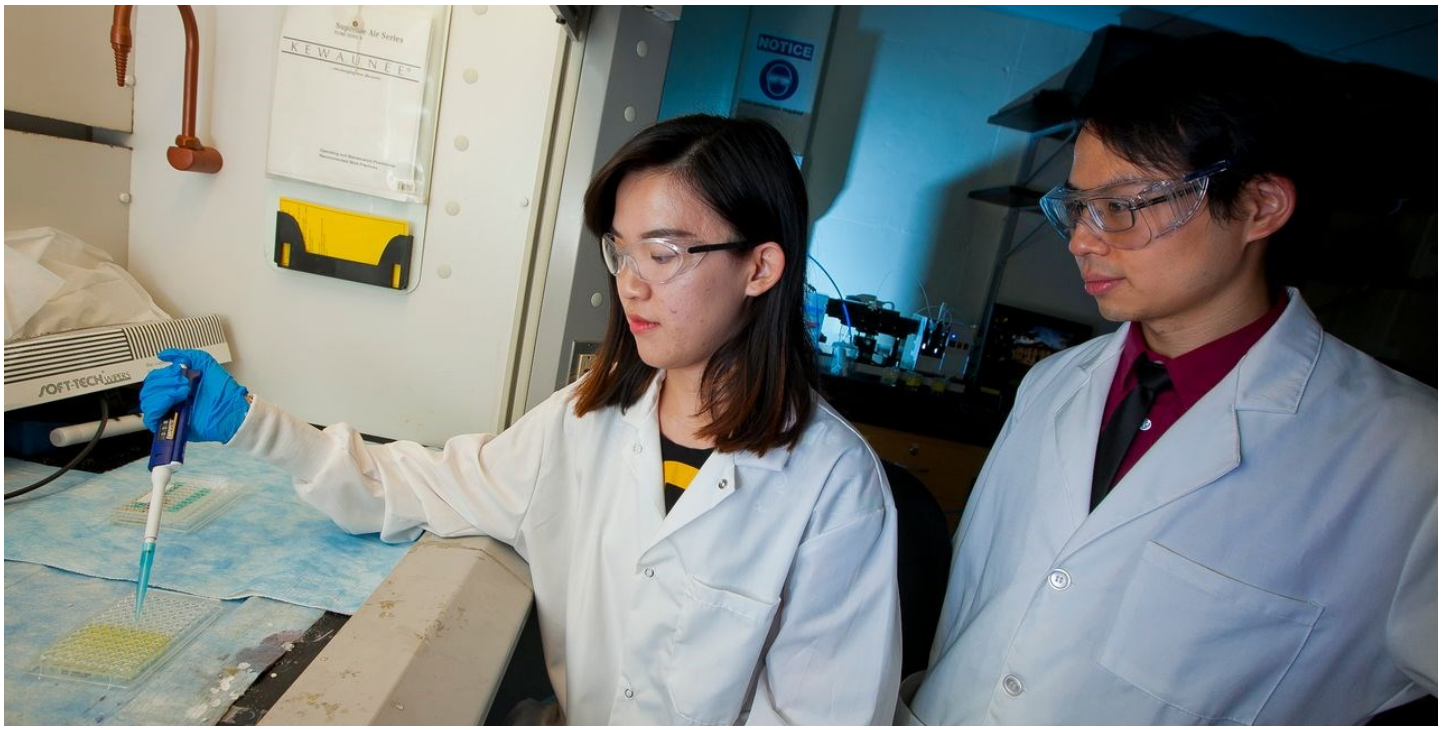
In recent years, both the scientific community and Lafayette ChBE faculty have expanded their use of computational methods in research. Harnessing the power of computers for iterative or complex calculations significantly improves the efficiency of research and broadens the possibilities of what can be achieved. Fortunately, Lafayette College now has a high performing computing (HPC) hardware ecosystem.

In the Chemical and Biomolecular Engineering department, two faculty use computational methods for the majority of their research: **Assistant Professor Aseel Bala** and **Assistant Professor Joseph Woo**. Aware of the importance of computing for both research and industry, both professors have also incorporated coding, data analysis, and data visualization into the classes they teach. Professor Bala for example teaches an elective called Introduction to Numerical Computing for Engineers that teaches students the basics of MATLAB and how it can be used for various engineering applications. Professor Woo incorporates data visualization into his Atmospheric Engineering and Science elective.

Professor Bala's research is in thermodynamic modeling. The idea is to improve thermodynamic models to accurately describe hydrogen bonding systems such as alcohols, water, and carboxylics. Better thermodynamic models would improve cost and efficiency in industry by helping to better size units and have greater knowledge of properties. Because Professor Bala's research involves modeling complex binary and ternary systems, the traditional technique of macro fitting models to experimental data falls short. These traditional models require regression for parameters and thus require a lot of experimental data to develop one specific to each system. Instead, Bala is working to create "ab initio" models that do not presume anything about the interactions and do not intrinsically use experimental data. Therefore, they require less regression, less parameters, and less work for industrial partners.

In previous work, Professor Bala worked with common activity coefficient models such as NRTL and Wilson and added on terms to represent hydrogen bonding. Her current work uses Conductor like Screening Model for Real Solvents (COSMO) in order to eliminate as many parameters as possible. Her research employs quantum mechanical simulations and computational methods to derive models based on what is occurring at the quantum level. In the future, Bala would like to continue to refine the model and code it into ASPEN in order to model thermodynamic properties such as VLE, LLE, and excess properties. Additionally, she hopes to do more work using molecular dynamics and quantum mechanics simulations to get a better understanding of the association parameter used in the hydrogen bonding term of the model.

Professor Woo's research is in atmospheric aerosols. The goal is to better understand the chemical kinetics and light absorbing properties of aqueous atmospheric aerosols in order to improve the accura-



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Professor Lindsay Soh Wins Dreyfus Award

Ryan Berry, '22.

Associate Professor Lindsay Soh of the chemical and biomolecular engineering department has received a 2020 Henry Dreyfus Teacher-Scholar Award for her work in designing sustainable biorefinery processes and products using green chemistry and engineering.

Professor Soh, along with eight others, received the award from the Camille and Henry Dreyfus Foundation, which honors young faculty in the chemical sciences who have created an outstanding independent body of scholarship and are deeply committed to education of undergraduates. Additionally, each scholar receives an unrestricted research grant of $75,000. She says she is "honored to receive this award" and she believes that "These funds will help to support my proposed research in the next five years. The overall objective of my research program is to utilize biological feedstocks to efficiently manufacture renewable fuels and chemicals that are designed for minimal impact over the entire product life cycle".

Professor Soh's current and future research plans will be to build upon her "experience and expertise in green chemistry/engineering, biomass processing, separations, and process design." Soh plans on continuing to bring new research into fruition and improving on her teaching ideas.

Continued from FACULTY

in a classroom, which gave me access to the technology including used the document camera to write in real time when discussing particular concepts or going through sample problems.

Originally, my Fall 2020 semester teaching load was to include the third and final part of the lab sequence (ChE 412 Integrated Chemical Engineering). Co-teaching with Professors Lauren Anderson and Lindsay Soh, we discussed and developed a number of strategies to handle having some students in-person and some students remote while also maintaining social distancing in the lab. However, when the original plan of hybrid learning for the Fall 2020 semester was converted to an all remote environment, both we and the students had concerns that the students who were unable to run the equipment in the last half of ChE 322 would now also not be able to run the equipment in ChE 412 at all. Because of this concern, we developed a strategy where the course was split in half: the fall semester (led by Professors Anderson and Soh) would focus on safety, the Hazards and Operability study and the professional topics found in ChE 412 and the spring semester (led by Professors Anderson and Joseph Woo) would run the equipment. A similar strategy is being used for the Class of 2022 as ChE 322 and ChE 412 are being moved a semester later to ensure that they will have two live laboratory experiences as their first experience ChE 312 (Experimental Design I) was done completely remotely during the Fall 2020 semester.

Overall, the experience has been quite the challenge for both the students and faculty at Lafayette. Numerous students have championed the strategies used by all members of the department as shining examples of the best of what Lafayette professors for all of us. Although the budget for candy has went down, I do look forward to being able to chat with students in my office in a more reduced fashion for the Spring 2021 semester and hopefully something resembling "normal" in subsequent semesters. The pandemic has forced all of us to think about how we approach our classes and our philosophies, which has led to unique ideas that may continue on when all students are back on College Hill.

Elective Focus: CHE 386, Composites

Kotoe Abe, '21.

In the Fall 2020 semester, **Professor James P. Schaffer** taught one of the chemical engineering electives, Composites. This course was first introduced in the 1990's soon after Professor Schaffer joined the ChE department at Lafayette. When the colleges metallurgical program ended, the material science courses and faculty found a home in the department.

One of the things Professor Schaffer finds interesting about composites and enjoys teaching is the use of tensor and applied mathematics. As he would put it, tensor mathematics are simply more elegant and wishes everything would be done in tensors. He also enjoys how there is never a single correct answer in composite design and how there are always tradeoffs that need to be considered in the design process. By taking composites Professor Schaffer hopes that students are able to gain an appreciation for the use of applied mathematics as well as understand the challenge of engineering design. He hopes that students are able to be confident in themselves in identifying one of many possible solutions knowing both the advantages and disadvantages of their design.

A unique and valuable feature of this course is the diverse group of engineers it draws, with students from the civil, chemical, and mechanical engineering departments. It is a great way to learn from each other as each student brings their own experiences and passions to the course. Professor Schaffer looks for opportunities to get students to interact with each other and believes it is beneficial to see these the world from different perspectives. When teaching a diverse group there is the challenge that each discipline has its own language and while they know the same core concepts, the application and terms used may be different. He hopes the students are able to respect the skills and ideas of students from other disciplines.

If given an extra few weeks in the semester, Professor Schaffer would spend the time discussing the student presentations and projects. He believes that we can learn a lot from each other, and it was great to hear about their individual interests. He would want to spend the extra time discussing more of the social, economic, ethical, and environmental issues related to composites today that were touched on in the presentations.

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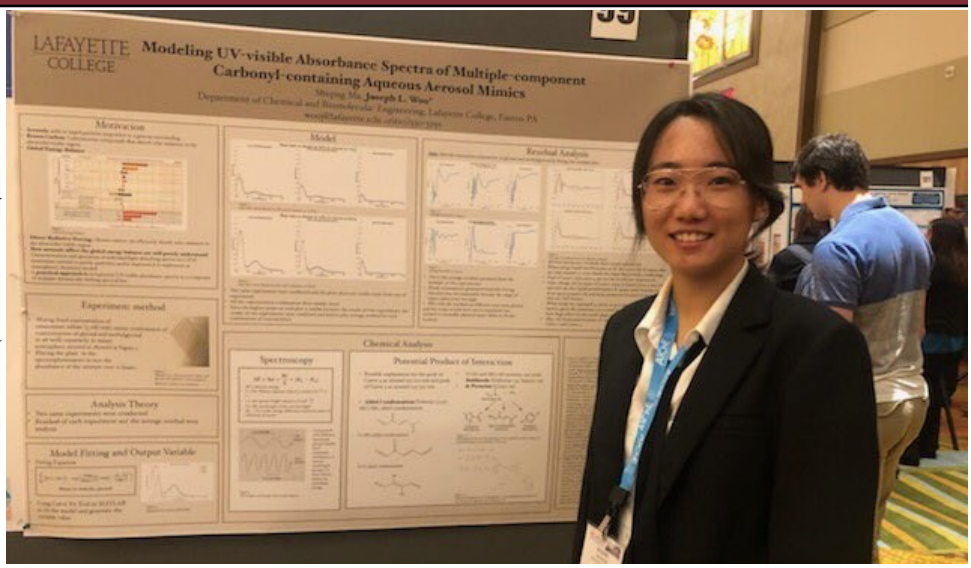
cy of climate models. Some aerosols, such as those in light clouds, reflect light and thus cool the environment while dark ones absorb and thus warm the environment. They therefore contribute an unknown amount to the overall energy balance of the atmosphere and the rates at which they form are unknown. To answer these questions, Professor Woo partners with Professor Galloway, Assistant Professor of Chemistry; Woo works on property characterization while Galloway works on developing the mechanisms. Because the process to determine these properties requires much iteration, it is made more efficient through computational modeling.



Currently, Professor Woo's research is focused on spectral decomposition in which a UV-VIS peak is analyzed to determine what functional groups are present in a molecule. This can be extended by looking at the peaks as a function of time to see if reactions are occurring to create new aerosol species. Computationally, decomposition involves taking a complex function and representing it as a sum of simpler functions. So far, Woo and **Mengjie Fan '18** collected aerosol data for well characterized organics and tested their methodology to prove that it works. Since then, **Shiqing Ma '21** has helped Professor Woo develop a script for the analysis process and begun testing new, uncharacterized organics. They have found rate constants for branches of chemistry that have yet to be characterized in literature. In the future, Woo would like to apply the method to new chemical systems and work with Galloway on modeling the photochemistry (sun bleaching) process. The long term goal is to provide a set of tools that can be implemented in regional and global atmospheric models to estimate how much energy is retained in the atmosphere due to light-absorbing aerosols and calculate the warming effect.

Alumni Focus: Dr. Sandy Chen '13

Megan Dodge '23.

I recently had the pleasure of interviewing Lafayette College alumna Dr. Sandy Chen who graduated with a Bachelor of Science in Chemical Engineering in 2013. We spoke about her serendipitous path to Lafayette, her life since graduating, her approach to the challenges and opportunities that come her way, and her advice to Lafayette students.

Dr. Chen was born in Taiwan, but her family moved to Thailand when she was only two years old. She graduated high school in Thailand, but didn't have a clear picture of what she wanted to do next. Her older brother also attended Lafayette College and paved the way for her to come to the US to get her degree. She told me that originally Lafayette wasn't part of the plan, but life had other plans for her, a common theme in her journey to where she is today.

When she applied to Lafayette, she marked Mathematics as her intended major but once at school, she became interested in astronomy and psychology. She explained how the liberal arts curriculum at Lafayette allowed her to explore her various interests. This also enabled her to pursue a minor in Economics which led her to compete in the Fed Challenge Competition where the Lafayette team went all the way to nationals, one of her favorite Lafayette memories.

One day, while looking for a job on campus, she wandered into Acopian, made her way down to the second floor, and walked into Serena Ashmore's office. She got a job working with Mrs. Ashmore, who introduced her to engineering at Lafayette. She decided she either wanted to major in chemical or mechanical engineering and didn't decide until she saw a flyer advertising petroleum engineering posted on Professor Piergiovanni's office window. This sparked her interest and she decided chemical engineering was the major for her. These fateful moments would impact her life in many ways and eventually lead her to her current job working as a product and process development scientist at The Clorox Company.

Before entering industry, she once again decided to follow in her brother's footsteps and attend graduate school in the US. She was accepted into a program for chemical engineering at the University of California Santa Barbra (UCSB). She was unsure of her path after graduating from Lafayette, but decided to trust life's plan for her, taking on this next step with enthusiasm. At UCSB, she wanted to be a part of a gas and oil-focused research project, but there were none available in the chemical engineering program. She was assigned to a different project but once again, life had other plans. The funding for this project got pulled and she was introduced to another Professor whose project was being funded by Saudi Aramco, the Saudi Arabian oil company. Not only was this project in her area of interest, but it dealt with surface tension properties, which she previously explored through the development of a microfluidic device during her undergraduate research with Professor Josh Levinson.

After earning her PhD, college recruiting led her to her current job working for Clorox. Dr. Chen accepted a job in the broad realm of development, and joked with her family and friends that after graduate school, she had landed a job cleaning toilets. She later found out that she would be developing toilet bowl products with Clorox, her joke coming full circle.

At Clorox, she has enjoyed problem-solving and being challenged as well as the many growing and learning experiences that have come her way. After entering industry, she was surprised at how different a nine to five schedule is compared to classes or research at school, but the tran-

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sition served as a valuable learning experience. She has especially enjoyed working as part of a team where collaboration and communication are valued highly, and the mindset and pace of teamwork has shown her how much she is capable of accomplishing.

I was especially interested to learn about what it has been like working for Clorox during a global pandemic. Dr. Chen described how an important part of her job, brand maintenance, came into play when Clorox products needed to be tested against the virus in order to supply people with effective household cleaners during this time.

Finally, Dr. Chen shared some advice for Lafayette chemical engineers, and all students, tying in our favorite motto, "Cur Non". Dr. Chen embraces and appreciates this motto today even more than she did during her time at Lafayette College. She said, "Anything is possible, so why not do it?" and she explained how this mentality can help one move forward in life and the professional world. She also encourages students to "let life happen", see what life has planned for them, and take opportunities that they're excited about. Finally, she encourages students to make the best of their time at Lafayette, because they only get to experience college once.

Special thanks to Dr. Sandy Chen '13 for being our alumni focus.

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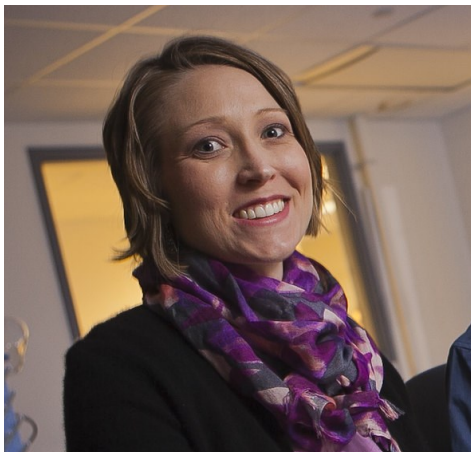

while on campus during the spring semester.

Reflecting on her award and role in the engineering department, Professor Anderson replies,"It has been a privilege to serve as Department Head of chemical engineering. We have a great group of faculty that truly love teaching and motivated students that love learning ... well, most of the time :) ".

Professor Polly Piergiovanni was awarded the Air Products/Ghasemi Chair in Engineering for Interdisciplinary Teaching. Named for Seifi Ghasemi, the current chairman, president, and chief executive officer of Air Products, this position was first endowed in 2017 during Lafayette College's Live Connect, Lead Change Campaign. Ghasemi received an honorary doctorate of science from Lafayette in 2017. Piergiovanni first found out about her award at the conclusion of a faculty meeting conducted over Zoom, saying, "I heard Prof. Anderson was the James T. Marcus '50 Scholar, and was looking for the clapping hands [Zoom feature] to congratulate her. I thought I heard my name next, but was uncertain. Really? Until I started getting chat messages, I didn't believe it".

The Air Products/Ghasemi Chair is Professor Piergiovanni's second endowed position after being named the Metzgar Assistant Professor of Engineering in 1991. She additionally was awarded the William H. Corcoran Award from the American Society for Engineering Education for her peer reviewed article, "Students Learn Without Lectures", and was the first female engineering faculty member to receive tenure. Many of the courses Professor Piergiovanni teaches are interdisciplinary and include hands-on activities to enhance her students' learning experiences. "Two of the courses I have been teaching recently (ES 101 and ES 254) are interdisciplinary, and I enjoy incorporating different aspects of engineering in them and learning new things. For example, ES 254 includes engine cycles that I didn't learn as a ChE, but are fascinating", she comments. Professor Piergiovanni has taught non engineering students and has brought many of these students into her lab as she hopes "they learned something about engineering through these experiences".

In her ES 101 class Films, Foams, and Spheres, concepts such as the creation of films are accompanied by activities in which students mix various food and starch combinations to make their own creative films. To ensure that her students were still able to participate in these innovative experiments remotely during this past semester, Professor Piergiovanni created over forty individual kits, each including containers filled with pre-measured ingredients, that were sent to her students. "The students did the daily activities at home, so I couldn't be there live to explain what was happening or why something didn't work. We discussed it afterwards, but the amount of learning was affected," comments Piergiovanni, but the "class sizes were smaller...so I was able to talk individually with most students which helped". In the spring, Professor Piergiovanni will continue to teach ES 254 Thermodynamics remotely while she teaches ChE 321 Applied Fluid Mechanics and Heat Transfer in LeopardWorks on specific days so students can perform hands-on projects. Professor Piergiovanni's current research focuses on measuring student engagement and learning achieved through hands-on activities in engineering, and hopes to use the funds from the endowment to buy new devices for even more classroom activities. In regard to what these devices will be, Piergiovanni comments, "I have something specific in mind for ChE 321 in Spring 2021. I know what I'd like for ES 254 (Thermodynamics) but I'm not sure it exists!"

Student Perspective: Learning in a Pandemic

Ryan Berry, '21.

My story begins in Bonn Germany during my study abroad semester. I, along with my fellow classmates, traveled all over Europe on weekend excursions and some week-long trips all while taking classes in Bonn at an international university. It was the middle of February when I first heard of the novel SARS COVID-19 virus in Wuhan China. I never gave it much thought other than that the CDC was starting to make warnings on travel. In early March my study abroad group took a week-long trip to Berlin, Copenhagen, Hamburg, and Malmö. The threat of the coronavirus was starting to really pick up when one of my classmates was required by the German government to get tested for COVID at a local hospital while the rest of the group was forced to quarantine in the hotel we were staying at in Berlin.

Luckily, no one was positive but the tone had been set nonetheless that this was not just a distant problem and that COVID was a very real issue. By the time we returned from our trip, travel restrictions were being heavily enforced. On top of the CDC guidelines, Lafayette made it mandatory that we stay within Bonn Germany and to try and stay with our host families as much as possible. Classes were cancelled and instead lectures about the virus and how the school is handling the issue became our daily routine. Three days of uncertainty passed by with the conclusion being that we would stay in Germany and wait for things to calm down. Then with no warning, the following morning we were informed that we had a week to leave the country and return home. Panic, was the natural response for many of our group members as we scrambled to book the last remaining flights to the US. Many of us left without saying goodbye to each other and the wonderful study abroad experience felt squandered.

I live in California so I had to make my trip back home two pronged. The first leg was to Newark international airport where I then stayed at a friends house to quarantine for 14 days during which I began my virtual courses still taught by the professors back in Germany. Fleeing from Germany while settling in to a friends house waiting to hear if the government would ban my flight back home to California made learning almost impossible. When I finally made it back home, I tried my best to create a conducive learning environment where I could engage with the content and with my professor. However, the enthusiasm for lectures quickly waned as the days went on. Frequently, I would find myself muted just passively listening to my professors. I could tell that there was a real disconnect between the professor and the students that was a stark change to the very personal connection we had all experienced when in Germany. This was possibly the hardest part about learning during the pandemic.

After the spring semester ended and I was slated to be one of 650 students to return to campus in the Fall, I began to regain some hope for the upcoming classes. While none of my classes, except for some meetings with my research professor, were in person, I was still happy to be on campus and be in an environment where I felt ready to learn. I felt the professors did an excellent job adapting to the new style of teaching. They fostered learning through breakout rooms and extended office hours and they engaged students through online quizzes and games. While nothing can truly replace in-person classes, this was certainly the next best thing.

The one class that was not virtual was my Independent Research with Professor Soh. This class may have been the saving grace to my Junior Fall semester. Most of my interactions with Professor Soh was on Zoom, but I was actively learning in the lab. This class allowed me to interact with something other than the keys of my laptop each day throughout the semester. It gave me a sense of grounding in these shaken times.

Overall, the coronavirus has no doubt made a difference in the way I learn but I am ready and excited to come back to campus for the Spring semester and continue the good experience I had this past Fall.

Student Spotlight: Ansh Mishra, Class of 2021

Sidharth Vijay, '21.

"Thermo is hard – at least compared to the other facets of chemical engineering". These are the relatable words of the 2020-2021 student focus, Anshuman Mishra '21. While thermo became conceptually clear to him in no time, it was also far from his only focus.

Throughout college, Ansh has proven that he likes to stay busy. Academically, Ansh is pursuing a dual degree involving a B.S. in Chemical Engineering as well as a B.A. in Government and Law, along with a minor in Environmental Science. On top of this, he is involved in several different musical ensembles on campus, namely the Soulfege a capella group, the Semifourmal barbershop quartet, Chamber Singers, Concert Choir, and Marquis Consort. He is also a competitive member of the Lafayette Forensics (Speech and Debate) team. When asked why he does all this, Ansh replied, "I chose Lafayette for a reason". He decided early on to pursue a breadth of academic and extracurricular opportunities unique to college, while also focusing in on his post-college aspirations in energy policy.

In pursuit of his graduate school interests, Ansh has done independent research on global warming modelling, submitting a paper to Consilience: The Journal of Sustainable Development, after review from Professors Bala and Senra. His professional experience includes an energy analyst internship at the National Energy Technology Laboratory in Summer 2020, during which he developed a Python-based utility algorithm to implement the Fenske-Underwood-Gilliland shortcut method for distillation column design in IDAES. A year prior to this, Ansh was an atmospheric air quality research intern at Ohio State University, investigating the water uptake of dust particles. He has also been an extern at Brightmark Energy in January 2020, applying experimental design to the recycling of plastics.

From his background, it becomes apparent that Ansh is building a strong background for his pursuits in energy policy. When asked why he chose this particular niche, Ansh referenced his interdisciplinary dual degree & minor, and how energy policy is almost the natural conclusion of those. "I was interested in policy early on, and with energy policy, the impact is about as big as it gets." Chemical engineers are involved in such a variety of industries, showing the importance of chemical engineering to how the world functions. "The changing energy landscape is a pivotal way chemical engineers can make an impact and the way to do this is becoming inherently interdisciplinary."

Even his experience in Forensics contributes to Ansh's professional interests, with last year's Lincoln-Douglas debate topic revolving around increasing investment in energy policy. As a nationally ranked debater, Ansh dove deep into the policy process, municipal energy relationships, and implications of energy governance through international politics and diplomacy.

After a conversation with Ansh, it quickly becomes clear that he is knowledgeable in matters of energy policy and passionate about putting that knowledge to good use. He is currently waiting to hear back from Master's programs where he can further pursue this passion. When asked whether he anticipates having to learn more thermodynamics, Ansh replied "Probably. But I don't mind – this stuff is cool, and energy is the root of everything."

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