“Musicals aren’t just entertainment. They can tell us who we are, what we’re doing in this world, how to cope with different situations and how to be happy.”

—Alexandre Bádué, Graduate School Dean’s Fellow
Read more on page 25

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On the cover: Maurice Todd, Excellence in Teaching Award recipient.
Back cover: original artwork by Nina Bertaux-Skeirik, Graduate School Dean’s Fellow. Image provided by the artist.
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Letter from the Dean

Dear Friends of the Graduate School,

I hope this Annual Report restores a faith in human nature and human potential that may have been damaged during this 2016 election season.

For me, the inspired scholarship of our faculty and graduate students provides an intellectual salve for the mundane. As you will read in the stories contained herein, a comprehensive research university offers broad opportunities and unusual intersections of passion. This Annual Report highlights the motivation and talent that graduate students bring to the university every day, as well as the breadth of their scholarship.

The Graduate School seeks to support and to recognize the work that makes our university great. In these pages you will read about some of the students who have been recognized by the Graduate School (and prestigious national funding agencies) with a broad array of awards and scholarships to support their work. You will also read about some of our outstanding faculty that create the environment for student success. In the next year, you will be hearing about some new groups on campus. In collaboration with some of our highly accomplished research faculty within the Fellows of the Graduate School, we selected the first set of six Graduate Student Fellows. This group of doctoral students with academic career aspirations are integrating into teams of our most accomplished faculty to learn more about the joys of life in the academy. You will also be hearing about our expanded group of Yates Fellows, 25 accomplished individuals who joined us in fall 2016 to build the strength of diversity in our graduate academic environment.

As we strive for a borderless interdisciplinary environment, a major strength is the diversity of thought and experience our students offer. The University of Cincinnati is enriched and enlivened by our community of over 11,000 graduate students, and the faculty who teach and mentor them. I hope you are equally enriched as you read about their accomplishments.

You are always welcome to visit our Graduate School offices in Van Wormer Hall, and we encourage you to follow our news on social media sites as we continue to develop and engage opportunities for graduate students and faculty.

Chip Montrose
Vice-Provost
Dean of the Graduate School

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In this issue...

UC: EXCELLENCE THROUGH DIVERSITY

In a world that seems to become more divided with every passing day, it’s important to remember that the University of Cincinnati came into being as an assembly of diverse parts. What we now know as a single university was forged over the years from many different schools, each added to give UC greater capacity for research and teaching. The Carl H. Lindner College of Business, College-Conservatory of Music, James L. Winkle College of Pharmacy, College of Law, College of Medicine—all were established separately and brought under the UC banner at a later date.

Over the course of its history, UC also founded new colleges, such as the College of Allied Health Sciences, to address the emerging and growing needs of an ever changing society. Joined together, these colleges form one of the world’s top educational institutions. Yet, it is the way in which these colleges intersect—interdisciplinary research, cross-discipline collaborations and university-wide programs—that makes UC better than the sum of its parts.

This is the power of diversity. By combining different backgrounds and perspectives on a single team, people can achieve successes far beyond their own abilities. The current issue of the Annual Report celebrates the diversity within the UC Graduate School and showcases how that diversity has helped its students thrive.

Hyperloop UC, for example, brings together students of engineering,
business and design to create a fully envisioned prototype for the future of transportation. The UC Open School Clinic draws from the university’s health-related colleges to give students crucial experience in interprofessional healthcare while serving some of Cincinnati’s most in-need residents. Nina Bertaux-Skeirik, one of this year’s eight Graduate School Dean’s Fellows, uses her background in the fine arts to inform creative, groundbreaking research in gastrointestinal science.

Diversity and inclusion make UC a stronger, more capable place. The Graduate School is committed to promoting that diversity for the good of its students, the university and the wider world.
The members of Hyperloop UC had driven a very long way to have an identity crisis. Including bathroom breaks, roadside meals and a frantic three hours of last-minute changes at a Starbucks outside of Nashville, Tenn., the trip from Cincinnati to the SpaceX Hyperloop Pod Competition Design Weekend at Texas A&M University took 25 hours and 17 minutes. Weary but eager, the students set up a booth to share their vision for a new mode of transportation. But many of their visitors, instead of inquiring about the innovative design or technical specifications, asked this: Are you from UC Berkeley, UC Davis or UCLA?

Dhaval Shiyani, the Hyperloop UC team captain, shakes his head in mock frustration as he remembers the mix-up. “No, we’re from Ohio. We are the UC. The only UC!” he laughs. After his team’s performance in Texas, however, he expects far less confusion. Out of the over 1,000 initial submissions to the contest and 115 teams that presented at the design weekend in January 2016, Hyperloop UC was one of only 30 to qualify for the final round in early 2017—a competition of prototypes on a test track outside of SpaceX headquarters in Hawthorne, Calif.

The UC team is putting its own spin on the hyperloop, a transportation concept first developed by SpaceX and Tesla founder Elon Musk. In this system, vehicles called pods would zip through a large steel tube with very low air pressure. Musk’s original design imagined that the pods would float on cushions of pressurized air, much like pucks sliding across an air hockey table, but Hyperloop UC’s version uses magnetic levitation. Because the tube reduces air resistance and the magnets eliminate friction, hyperloop pods could make smooth journeys at speeds of up to 760 miles per hour.

Promising the swiftness of a plane and the convenience of a subway, the hyperloop had excited Shiyani ever since Musk first released the “Hyperloop Alpha” white paper in 2013. When SpaceX announced its competition in the summer of 2015, the master’s student in aerospace engineering immediately gathered a team to explore new ideas for a pod. “It started as a core engineering thing, just me talking with five or six of my friends to compile a rough document of what our design should be,” Shiyani recalls. With that groundwork in hand, the team took to social media to find new members, posting a recruitment flyer that called for “ambitious individuals” to “come design the future.”

The response was overwhelming—more than 170 students expressed their interest in the project. From a handful of engineers, the team has mushroomed to include over 60 members and represent many different disciplines within the university. That versatility has
helped Hyperloop UC become much more than a technical think-tank. “We want to provide our idea of what the hyperloop should look like in every single aspect,” Shiyani says. “How do you get on and off the loop, what do the stations look like and what should the ticket price be? It should be a complete experience.”

Managing the team to create that single vision is the job of Sid Thatham, Hyperloop UC’s director of operations. The master’s student in business administration says that for many students, the hyperloop project is their first exposure to functioning in a large group. “People are getting a taste of what it is to work in real life, in a team this big with people from other countries and diverse backgrounds,” he explains. Like a true tech startup, Hyperloop UC contains subteams for engineering, fundraising and media relations, among other tasks. Thatham organizes technical and nontechnical students together to give each group the necessary expertise for its goals.

Consider the subteam behind the smartphone app that future hyperloop passengers might use to book their tickets. That group includes software engineers and developers with coding prowess, but it also includes Alison McNair, an undergraduate graphic communication design student. She recognizes that the first hyperloop passengers, like the first people to travel by plane, may be wary of this exotic method of transportation. “Because the hyperloop is a very new experience for people, I don’t want my designs to look like they were designed. They should feel as organic, natural and comfortable as possible,” she says.

McNair draws from existing travel experiences that will be familiar to future passengers. Her smartphone app, for example, shares many similarities with apps for airlines such as Delta and Southwest. To capture the long-distance business market that the team envisions for the hyperloop, she is also including options for regular riders that mirror bus and subway cards. “You could buy a pass for Monday through Friday that would get you to Chicago for work and back to Cincinnati in time for dinner,” she says. With a projected travel time of 30 minutes between the two cities, the hyperloop could make a commute from Ohio to Illinois as convenient as one from the suburbs to downtown.

The construction of a full-scale system is still years away, but efforts such as the app serve another valuable purpose: portraying the hyperloop as a reality for possible sponsors. Thatham, who leads Hyperloop UC’s fundraising efforts, notes that the team will need hundreds of thousands of dollars and outside manufacturing help to produce the prototype it will take to the competition weekend in 2017. “Not a lot of people know about hyperloop, so raising awareness about the project itself is important,” he says. The team’s designers, writers and businesspeople help its engineers communicate the potential of the technology.

With contributions from the UC Office of the President and local companies such as Cincinnati Incorporated and Tri-State Fabricators, Hyperloop UC is well on the way to completing its prototype. Shiyani beams with pride as he shows an in-progress photograph of the pod’s skeleton, a towering fifteen feet of silver aluminum tubes. “It just feels good to have something you can handle,” he exclaims. “It’s not 1969, but when people are excited about a thing, you can land on the moon.”
What do Formula One racecars and laundry detergent production have in common? Yes, they both create an array of unmistakable smells. But they’re also both subjects Annette Volk has considered over the course of her studies. Volk, a doctoral candidate in mechanical engineering and a National Science Foundation Graduate Research Fellow, specializes in computational fluid dynamics (CFD). She uses complex mathematical tools to simulate how these physical systems behave in the real world.

Volk says she was drawn to her field by its possibilities for new discovery. “We’re actually just getting to the point where we have the computer power to use [CFD] in a more physical sense, where we can compare actual phenomena with what we expect to happen,” she explains. Simulations help engineers solve problems with less time-consuming and costly trial and error. During her undergraduate years on the University of Evansville’s Formula One “Aces Racing Team,” for example, Volk tweaked computer models of her team’s car body. The results showed her teammates how to reduce the car’s wind resistance without building expensive prototypes.

The engineer now works as a research assistant in the UC Simulation Center, a collaboration between the College of Engineering and Applied Science and the Cincinnati-based multinational Procter & Gamble. This joint research laboratory, located just a few blocks from campus, brings UC students together with P&G employees and gives them exposure to the business side of engineering. The corporate engineers, Volk laughs, “do get excited when they save some money. But they’re also really into what physics are occurring and the actual physical problems.”

Her particular problem, known as elutriation, occurs when P&G manufactures laundry detergent. “If you’ve ever poured laundry powder, and then all of a sudden—” Volk waves her hand over her face as if to ward away a rising cloud of dust. “That happens when they’re drying it, which can clog and corrode their systems,” she says. The tiny particles of detergent behave in unruly ways during turbulent airflow, and their movements inside a large production batch are hard to see through experiments. Volk and her colleagues use CFD modeling to predict elutriation under different conditions.

Engineers base their CFD equations on previous experiments and established physical laws, but every model is limited by computer power and knowledge of the system. Volk’s work aims to quantify how much variation might exist between the model and reality. By comparing parts of the model calculations with known results, she can determine what areas need the most improvement. “If we have those errors, then we know they’re in our system. They’re in how we’re setting the problem up,” she says.

Stronger simulations will make it easier and cheaper for P&G to create more efficient production lines. “We can add internal components that reduce elutriation, and simulations help us decide what sizes we need to actually take care of the problem,” Volk explains. But the implications of her work extend beyond detergent manufacturing; better elutriation models could benefit pharmaceutical makers, who also need to manage large volumes of small particles when forming capsules and tablets. “We want to be able to use this for any particle size, and eventually any geometry,” she says. No matter the application, her work will refine the tools of next-generation engineering.
Imagine the authorities at Rikers Island, the infamous New York City jail complex. The image that leaps to mind is probably some variation on a burly man in blue, with massive arms and a shaved head sprouting from a neck like a tree trunk. It is probably not Susybel “Roxy” Pimentel. The doctoral candidate in criminal justice stands a few inches over five feet, with a crisp black ponytail and round tortoiseshell glasses. But before arriving at UC, she spent nearly two years at the jail, leading daily behavioral therapy classes for teenage male inmates.

“I’d done research and conducted interviews, but I’d never really worked with juveniles,” Pimentel says about her time at Rikers. “I wanted to get a better understanding of some of the challenges that these kids face.” From gang politics to a lack of positive role models, she learned that her inmates encountered a host of issues beyond the punishment of the jail itself. Now, as a National Science Foundation Graduate Research Fellow, she uses that experience to inform her investigations of how juveniles interact with the legal system.

Pimentel is particularly interested in case processing, the legal steps between a juvenile’s initial arrest and the final decision of a court. “The assumption most people have is that if you get arrested today, tomorrow you see the judge, and the next day a decision is made—three days,” she says. “But that’s usually not the case.” Although offenders aren’t considered guilty until conviction, they can be held in jail for months while awaiting trial if judged a risk to the community.

By analyzing legal records, Pimentel measures changes in case processing times over the past several decades. She says that recent societal shifts in the view of juvenile delinquents may have led to longer pretrial jail terms. “Prior to the 60s, the juvenile system focused on rehabilitating youth. But as homicide crime increased in the 80s and 90s, politicians and the public started to think that maybe they were being too easy on these kids,” she explains. This “tough on crime” approach favors jail over alternatives such as probation or electronic monitoring.

Harsher punishments are designed to deter crime, but as Pimentel saw at Rikers, spending time in jail can teach inmates behavior that leads to future problems. “They’re often dealing with gangs, and they may have to join a gang if they want to survive,” she says. Especially for youth from disadvantaged communities, the psychological stresses of the experience can make rehabilitation much more difficult. “Just putting someone in jail doesn’t change their beliefs about the system,” Pimentel emphasizes. “If anything, it harbors more resentment and more anger and more violence.”

Further analysis of the link between pretrial jail terms and future outcomes will allow Pimentel to recommend more effective approaches for the legal system. She points to a successful strategy of youth-oriented policing in New Haven, Conn., which actually involved juveniles in brainstorming new policies and programs. “Building relationships with these kids is vital. We shouldn’t see them as enemies, but instead as people who can work with us to help us resolve crime,” she says. Less detention and more discussion may help youth become better members of society.
Adam Barone is training to become a nutritionist at the UC College of Allied Health Sciences. His coursework includes rigorous studies of macronutrients, pathophysiology and statistical data analysis. When he volunteered with the UC Open School Clinic at the Society of St. Vincent de Paul society food pantry in Cincinnati’s West End, however, all that expert knowledge amounted to a hill of beans. Green beans, black beans and garbanzo beans, to be precise.

“We had a big health fair, and I designed some simple recipes using pantry items,” Barone recalls. “I prepared a big bowl of my bean salad for the clients to sample; they loved it, and I was known as the ‘Bean Guy’ for the rest of the year.” Barone just gained a nickname, but his clients gained a new appreciation for nutritious ingredients they might have otherwise left on the food pantry shelf. It was a small, concrete, achievable step toward better health—the type of success most valued by the UC Open School Clinic.

This student-run organization is a chapter of the Institute for Healthcare Improvement (IHI) Open School, a global nonprofit dedicated to training healthcare professionals in quality, efficiency and safety. The clinic brings together undergraduate and graduate volunteers from across UC to gain real-world experience in skills they may not practice during formal coursework. Together, these students operate a living laboratory for interprofessional collaboration and healthcare improvement.

Every Saturday morning, the clinic volunteers arrive before the food pantry opens and set up shop on St. Vincent de Paul’s second floor. Once people start lining up for the pantry, the students invite them upstairs for free health screenings. New clients receive a comprehensive medical background interview, as well as measurements of height, weight, blood pressure and blood sugar.

Students then talk with the clients to determine their main health concerns and make recommendations. Bethany Tabeling, a second-year student in the James L. Winkle College of Pharmacy and pharmacy recruitment coordinator for the clinic, says that volunteers are trained in an interviewing method called SBIRT (Screening, Brief Intervention and Referral to Treatment). This technique focuses on the clients’ own health priorities and motivates them to develop their own paths to improvement.
“It’s all about reflective listening,” Tabeling explains. “We narrow in on what the clients think is the biggest problem, then use their help to figure out some resolution without us telling them exactly what to do.” For a client with obesity, for example, Tabeling might ask why being overweight affects quality of life, then ask what the client could do to lose weight. “Even if it’s something as little as walking instead of taking the elevator, clients commit to goals that they can actually achieve,” she says.

Barone notes that this approach is also useful for nutrition, especially among the low-income clients the clinic serves. “If you tell them to get tofu, they may not have any exposure to it or know how to cook it in a way that’s actually appetizing. Making small changes is much more appealing,” he says. Instead of prescribing a complete diet overhaul, students could help a client switch from white bread to whole-grain alternatives or reduce processed foods.

Beyond these consultations, the clinic volunteers offer a range of more specialized health services according to their fields of study. The students come from all colleges of UC’s Academic Health Center— allied health, medicine, nursing and pharmacy—as well as the dental hygiene program at UC Blue Ash College. This diversity means that clients can receive mouth screenings, medication counseling, flu shots and referrals to primary care providers under a single roof.

The students also benefit from the array of skills available at the clinic. “As a pharmacy student, I don’t always get that interprofessional experience, especially with people like nutritionists and dental hygienists,” says Tabeling. “I think I learned more about teeth from working in the clinic with a dental hygienist than I’ve ever known in my life!” Like they will in their future careers, students from different backgrounds exchange information and work together to give the best client care.
And just as in a real hospital, the volunteers constantly refine their workflow. Outside of the clinic, students take online classes from the IHI, learning techniques for critiquing healthcare procedures and documents. Two MD students from the UC College of Medicine, Esper Wadih and Michael Petrany, presented a poster about these efforts at a national IHI conference. “We incorporate PDSA cycles (Plan, Do, Study, Act) weekly to improve clinic function,” they reported. “The experience in clinic gives both leaders and volunteers an excellent opportunity to put into practice many of the aspects of quality improvement that come from the IHI coursework.”

One of the biggest changes, says Barone, involved how the students discussed clients with their faculty supervisors. Because the volunteers operate under the licenses of the faculty, they must present each client’s case to a faculty member before the client leaves the clinic. “We used to do that outside of the room, then have the faculty talk with the clients. Now, like in a hospital setting, we present the case in front of the client,” he explains. That change gives the client a chance to correct any volunteer misunderstanding and better mirrors the real-world clinical experience.

This commitment to better care earned the Cincinnati clinic a spotlight feature on the IHI website, but its volunteers are not content to rest on their success. Tabeling notes that the students recently redesigned the handouts it gives to clients after their visits, making them clearer to understand and updating the contact information for area primary care providers. She also says that the clinic has reached out to students from the School of Social Work, which would give an additional dimension to its client services.

Barone agrees that a broader base of expertise will make the clinic an even better experience. “To improve the health and wellness of the clients, you need to approach their issues from all different sides,” he says. By working in this interprofessional model as students, the volunteers of the UC Open School clinic are preparing to change healthcare in the real world.
The Graduate School
BY THE NUMBERS

UC Graduate Student Satisfaction
2015-2016

<table>
<thead>
<tr>
<th>Master's</th>
<th>Doctoral</th>
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<tr>
<td>Overall Satisfaction</td>
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<tr>
<td>Curriculum</td>
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<td>Career Development</td>
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<tr>
<td>Thesis / Dissertation Advising</td>
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</tr>
</tbody>
</table>

Application Trend

Newly Matriculated Students

Enrollment Distribution

*In the fall of 2012, UC transitioned from quarters to semesters. This led to a significant inequality in the reporting period used for our 2012 reports and it affected the numbers given here.
Degrees Awarded

Stipend Support Trend

Tuition Scholarship Trend

2015–2016 Ethnicity Distribution of Enrolled Students

*In the fall of 2012, UC transitioned from quarters to semesters. This led to a significant inequality in the reporting period used for our 2012 reports and it affected the numbers given here.
Each year the UC Graduate Student Governance Association (GSGA) conducts the Graduate Awards Ceremony, where graduate students and graduate organizations are recognized for their excellence in community engagement, service, scholarship, leadership and global engagement.

“It is very important for us to recognize the outstanding graduate students who have been active members of the research and scholarship community here at UC as well as those who excel at service to the graduate student community,” says Ayça Mazman, president of the GSGA for the 2015-16 academic year. “Without their participation and support, it would be impossible for the Graduate Student Governance Association to be successful in the advocacy work we do. We are grateful for their efforts in improving the quality of life for the graduate students and glad that we get the opportunity to celebrate their achievements.”

**GSA OF THE YEAR**

GSA of the Year—Health Sciences Graduate Student Association (HSGA), graduate student government for the College of Medicine

**EXEMPLARY SERVICE AWARD**

Arts and Humanities: Eugenia Mazur, PhD, Romance Languages

Life Sciences: Ryan Makinson, PhD, Neuroscience

Physical Sciences and Engineering: Srinivasa “Sid” Thatham, MEng, Chemical Engineering and MBA, Business Administration

**EXEMPLARY SCHOLARSHIP AWARD**

Arts and Humanities: Vinamarata “Winnie” Kaur, PhD, English and Comparative Literature

Physical Sciences and Engineering: Soumyarwit Manna, PhD, Materials Science and Engineering

Social and Behavioral Sciences: Oladunni Oluwoye, PhD, Health Education

**EXEMPLARY INITIATIVE AWARD**

Matteo Magarotto, PhD, Musicology

**OUTSTANDING INTERNATIONAL GRADUATE STUDENT AWARD**

STEM: Dippy Aggarwal, PhD, Computer Science and Engineering

Non–STEM: Vinamarata “Winnie” Kaur, PhD, English and Comparative Literature
The most eloquent compliment Megan Lamkin’s students pay to her teaching is understood without them saying a word. On this chilly Tuesday morning late in the fall semester, many undergrads would rather be sleeping in or procrastinating under their blankets with Netflix. But the Excellence in Teaching Award winner’s review session for her microbiology class, although both early and optional, is comfortably crowded. Eager science majors gather with their laptops and notebooks around the high, black-topped tables of the laboratory in Rieveschl Hall.

She doesn’t let the students stay quiet for long. As Lamkin goes through the scores of images her class will need to identify for their lab practical exam, she’s constantly questioning, gauging the knowledge of the room and having students fill in key points about what she calls “the story of what’s happening.” On one slide, a series of test tubes with differently colored media becomes a way to tell what nutrients a species of bacteria needs to survive. On another, she gestures to the red color of stained bacterial rods as the critical element in diagnosing a patient with tuberculosis.

Although her class starts out nervous about the volume of information they need to master, Lamkin’s hard-driving confidence is contagious. “You’ve done it so many times before,” she tells her students in reference to Gram staining, a lab technique they’ll need to repeat on the exam, and the group nods in agreement. By the end of the session, the class is laughing at an image of a giant plush microbe while correctly identifying the flagella it uses for mobility. Lamkin even shuffles in front of the whiteboard to drive home the point, her hands gliding outward in a semblance of bacterial motion.

Beyond the Lab

Poise and physicality define Lamkin’s instruction, and as she discusses her path to teaching in the microbiology lab, she shares how she developed those qualities in settings outside of the traditional classroom. Much of her confidence, for example, she attributes to her practice of Jeet Kune Do, the martial arts system founded by Bruce Lee. In Lamkin’s words, the style’s primary philosophy “is being calm under situations of extreme duress and constantly practicing that.” That attitude is equally helpful for facing an opponent in the ring, getting through doctoral qualifying exams or calming a classroom of frazzled microbiology students. In fact, Lamkin leads biweekly Jeet Kune Do classes at a facility she founded in 2013 in the Cincinnati neighborhood of Northside. The material might be different, but Lamkin says she approaches the lab and the dojo in a similar light. “I try to create that bubble of positivity and confidence, reminding [my students] of...
what they can do and how well they’re doing rather than trying to scare them into thinking they’re not good enough,” she explains. Lamkin’s style is also informed by the position she held before her current assistantship: director of the Outdoor Learning Lab gardens and greenhouse at St. Rita’s School for the Deaf. “I didn’t know sign language when I started there,” she says, “so for the first years they gave me interpreters. But I didn’t like teaching through an interpreter, so I would be watching them and trying to figure out how to do lessons.” After two years of observation and night classes, she was teaching sign language herself. That skill in manual communication comes through even when she presents to her hearing students. Her arms are rarely still when running the classroom: she highlights specific parts of slides, draws graphs of data or smacks her hands together to emphasize important facts. At one point in the review session, she reaches up into the air to grab invisible nitrogen molecules and drags them down toward her feet, mirroring her discussion of how soil bacteria supply nitrogen to plant roots.

Lamkin has gone beyond her previous experiences with the help of UC’s Graduate Association for Teaching Enhancement (GATE). This student-run organization encourages graduate teaching assistants to think critically about their instruction and make improvements based on the latest educational research. The principles of active learning Lamkin studied in one GATE workshop drove her to reorganize her use of time in the classroom. Now, she tries to “break the class up into little segments, where you have some group quizzes, some teamwork activities and short lectures in-between.”

Bridge to Biology Success

All of this training came together in one of Lamkin’s most notable achievements, her design of the biology syllabus for the Dr. Edward N. Prather Summer Bridge Scholars Program. This seven-week experience prepares incoming UC freshmen from underrepresented minority groups to succeed in the college environment. Lamkin uses her innovative class organization to cover the full gamut of topics a freshman biology class might encounter, from microscopy to evolution and scientific writing.

Throughout the summer, she weaves in field trips that showcase the real-world applications of biology. “I’ll do a molecular biology week, and at the end of that week we’ll go to Children’s Hospital, UC Medical Center and a biotech startup like Meridian Biosciences,” she says. Her favorite trip is also the least far afield: a walk through Burnet Woods, the Cincinnati city park directly opposite the university. Lamkin teaches her students how to identify local trees, offers them samples of edible redbud flowers and points out the galls made by insect parasites of plants. “When somebody says, ‘Man, I never thought I wanted to learn about plants, but now I do,’ that’s what I want to do.”

Lamkin also uses the Summer Bridge Scholars Program to provide role models for future minority scientists. “If I’m a black or Latino student, and all I hear is this European thread [of scientific figures], I’m not going to envision myself taking part in this process or achieving a leadership role in this field,” she explains. To that end, she introduces figures such as Charles Henry Turner, the first black student to receive a graduate degree in biology from UC. After graduating in 1892, Turner went on to a distinguished career in entomology; among his many accomplishments, he explored the intellectual abilities of insects and discovered that honeybees could see in color.

After she finishes her doctoral program, Lamkin hopes to continue her focus on what she calls motivational teaching. “In a nutshell, I want students to remember my class as one that blew minds, cultivated confidence and inspired a sense of professionalism,” she offers as a teaching philosophy. And based on the smiles of the students who leave her microbiology review session, she’s already putting that philosophy into successful action.

“I try to create that bubble of positivity and confidence...”
“N o one likes to play scales,” Maurice Todd states matter-of-factly. The College-Conservatory of Music master’s student should know—he teaches scale lessons to all undergraduate and first-year graduate students in the CCM double bass studio, under the direction of associate professor Albert Laszlo. But even though these pupils may not like scales, they do like Todd. Words such as “rewarding” and “exemplary” run through the recommendations that helped him earn the Graduate School’s Excellence in Teaching Award.

Standing aside the richly stained poplar body of his instrument, the bassist admits that he was in a similar place to these students ten years ago. “I realized that I wasn’t getting any better and that I had to incorporate scales,” Todd says, “but I had to do it in such a way where I was paying attention and was in the practice session the entire time.” To that end, he developed a series of practice exercises he called the “72s and 88s,” named after the metronome markings at which he played them.

**Moving through Music**

Todd’s routines worked because they combined the notes of the scales with changes to bowing and articulation. “With each rhythmic value I did something different, and I was listening for something different,” he explains; this variety encouraged him to stay constantly involved while playing. By taking better stock of his technique and questioning himself on how best to improve, he was again able to make progress on the bass. Todd now teaches using these exercises, and the hard-earned lessons of working through them help him dissect the performance of his students.

His pedagogy focuses on the crucial links between sound and motion. As he watches students play the 72s and 88s, his eyes critique their fingers on the fretboard, their arms drawing the bow, their bodies slightly swaying with the music. One student looks stiff as he plays a difficult pattern; Todd advises him to shift the weight on his feet to follow his bow motion, and soon the strings resound much more smoothly. “Other string instruments, like the violin and viola, are able to move while they play, and sometimes they have
freer arm movements than we do,” he says. “So I try to incorporate those movements in the scale lessons.”

Professional Preparation

Even while the bass is silent and Todd interacts with his students, the studio constantly echoes with the click of a digital metronome. When asked why, he begins tapping his wide hand in time against his leg. “In any kind of orchestral audition, while you’re up there baring your soul, there’s always one person on the committee doing this,” he clarifies. Because of its size, the bass creates more timing challenges for players than do smaller, nimbler instruments. But Todd, who plays professionally with the Lexington Philharmonic and Cincinnati Symphony Orchestra, tells his pupils that audition committees are unsympathetic. “You have to play in time to be in a professional orchestra. If you can’t, they’re not going to want you.”

Auditions also inform Todd’s approach to the style of the scales in his lessons. Orchestras need their players to cover centuries of musical history, and the works of different composers often call for drastically different techniques. “We have a couple of minutes to show a committee how we can switch from style to style,” he explains before demonstrating two versions of the same scale. The first, appropriate for a Mozart opera, has a certain bounce as the bow “comes out” of the string for each note. The second, in the pattern of a Brahms symphony, is much weightier, with a stronger attack and more forceful stroke. By challenging his students to swap their styles throughout the lesson, Todd trains them in the flexibility they’ll need for professional work.

Todd emphasizes that his method isn’t just a way to teach: it’s a way for students to teach themselves.

To improve in any music, he says, “you have to ask questions of yourself. You have to open your ears and listen.” After his lessons, Todd’s students know to interrogate their playing in motion and rhythm, tonality and style. The base of technique they learn prepares them to scale any musical heights.
Every year, graduate students gather at Graduate Student Expo & Poster Forum to share their research, scholarship and fine art, while honing their presentation skills. As a professional development opportunity hosted by the Graduate School, the Expo rewards outstanding oral and visual communication. UC faculty members and local professionals volunteer to judge research posters, oral presentations and fine art, providing valuable discipline-specific feedback.

The poster forum competition serves as a “dress rehearsal” for many students who are preparing to present at a regional or national conference, and it provides an opportunity for students to network with local scientists and experts. The faculty and local professionals not only provide feedback, but also a score, selecting the students with the most exceptional posters and presentations as winners. Award-winning students presented on a wide range of topics. Alisa Strauss, a master of design student and one of the 2016 winners, presented her research on designing effective icons using consensus analysis techniques.

The 2016 Expo featured UC’s first Three Minute Thesis (3MT®) competition. First developed by The University of Queensland, Australia, this contest challenges students to summarize their research or scholarship for a nonspecialist audience using only three minutes of speech and a single PowerPoint slide. Scholars from all disciplines can compete, as shown by the diversity of UC’s 3MT participants, which included students from chemistry, classics and design. Toritseju Omaghomi, an environmental engineering doctoral student, won the competition.

**WINNERS | February 26, 2016**

**Three Minute Thesis Competition**  
Toritseju Omaghomi  
*Environmental Engineering, PhD*  
Profile on page 21

**POSTER FORUM**

**Arts and Humanities Category**  
Alisa Strauss  
*Design, MDes*  
Profile on page 23

**Life Sciences & Medicine Category**  
Casey Keck  
*Communication Sciences and Disorders, PhD*

**Physical Sciences & Engineering Category**  
Joshua Eby  
*Physics, PhD*

Will Garde  
*Environmental Engineering, MS*

Masoud Kaveh Baghbadorani  
*Physics, PhD*

**Social & Behavioral Sciences Category**  
Kyle Cox  
*Educational Studies, PhD*

**Master of Fine Arts Gallery**  
Christine Kern  
*Fine Arts, MFA*
For most people, the wait for hot water at the showerhead is one of life’s mysterious little inconveniences. For Toritseju Omaghomi, the delay between turning on the tap and hopping beneath the spray is a sign of a much bigger issue. The speed of hot water delivery depends largely on the sizes of pipes in a building—and most of those pipes, she says, are far too big for their job.

The problem is essentially one of keeping up with the times. Plumbers determine how big pipes should be after estimating the water demand for a building. Thanks to high-efficiency fixtures such as low-flush toilets, low-flow fixtures and increased awareness of water conservation, most buildings use less water today than they would have decades ago. But the way plumbers estimate water demand, Omaghomi says, hasn’t substantially changed since first developed by a researcher named Roy Hunter in the 1940s.

“What Hunter did was very clever and convenient,” she explains, but Hunter’s observations came from hotels during morning wake up-calls, when many people used water simultaneously. “Think halftime at the Super Bowl: everybody’s running to the restroom, similar to a business hotel in the morning,” Omaghomi says. “That does not happen in residential buildings, so peak demand really drops down.”

Working from Hunter’s method, plumbers often overestimate water demand, which leads them to install larger pipes for meeting that perceived need. And oversized pipes cause more problems than just a long wait for hot water. Builders spend more on plumbing than necessary, while consumers waste energy heating water that eventually cools off in the pipes and goes down the drain at the next hot water use. Big pipes even pose health hazards when they hold large volumes of warm, stagnant water—the perfect breeding ground for harmful bacteria that cause Legionnaires’ disease and other infections.

Through her research, Omaghomi hopes to modernize the estimation of water demand. She bases her work not on a handful of antiquated hotel observations, but
on a recent water-use survey of over 1,000 single-family homes from across the United States. This massive data set provided a representative sample of diverse water use patterns for analysis. Unlike that of hotel guests or football fans, the peak water use of people at home proved much harder to predict. “At 2 a.m., some home used the most water, and you’re wondering what’s happening there!” she laughs about the data.

No matter the hour of the peak, Omaghomi’s next step was to determine the probability that a given fixture would be in use during that time. For example, if a building has only one showerhead, and it runs for an average of 15 minutes during the peak hour, its probability of use would be 0.25. After calculating this value for every type of fixture in a house, she randomly modeled thousands of water-use scenarios based on probable combinations of fixtures. From those results, she figured out the water supply needed to meet a house’s demand 99 percent of the time, the same reliability achieved using Hunter’s method.

Omaghomi’s presentation of “Water Distribution in Buildings Then and Now” at UC’s inaugural Three Minute Thesis (3MT®) competition took top honors. She admits that the 3MT required a change of pace from her previous presentations at scientific conferences, with less jargon and more concrete examples such as the wait for hot water. But Omaghomi says that attending the 3MT workshop held by the Graduate School prior to the competition improved her approach to communicating research. “For the first time my friends told me, ‘You’ve been presenting to us for a while, but we just now understood what you said!’” she jokes.

Putting numbers on the value of the new method will also help, and Omaghomi plans to quantify the worth of better plumbing design in the next phase of her work. The savings of smaller pipes in construction, combined with energy and water conservation over a building’s lifetime, could add up to significant financial benefits. “You will save millions of dollars!” she imagines exclaiming to a group of plumbers. “That’s the best way for people to welcome change.”

Omaghomi emphasized that those savings would take place around the globe. Plumbers everywhere from Columbia to the United Kingdom use Hunter’s work, so a better method for estimating peak water demand could have a huge impact. A native of Nigeria, Omaghomi is most interested in working for an international organization such as the United Nations after graduation. Informing more sustainable development, she says, is an issue “for change across the board, no matter where people come from.”

\[
p = \frac{t}{T}
\]

The average probability \( p \) that water is flowing at a fixture is given by:

\[
b(x; n, p) = \binom{n}{x} p^x (1-p)^{n-x} \quad x = 0, 1, ..., n
\]
Icons permeate our modern-day lives. Red hexagonal stop signs; no smoking signs with a red circle-backslash; scissors and a clip board for cut and paste in computer software. With these familiar icons, text is unnecessary—we immediately understand their meaning. Icons transcend language barriers, making them useful tools for navigating unfamiliar places and situations, such as hospitals, airports and government offices. So how does one design a new icon that many people will quickly understand? This can be especially challenging when the subject to be represented is a complex idea.

“When you’re designing something, you really should go to actual users before you make it,” says Alisa Strauss, a master’s in design student. Strauss’ approach to icon design turns the design process on its head: rather than developing icons based on what she thinks will resonate with users, Strauss begins by using consensus analysis to gather rich data from users, all before sketching a single line.

Borrowed from cultural anthropology, consensus analysis gets straight to the heart of the matter: What does an audience expect to see in an icon for a specific concept? The idea to use consensus analysis came naturally to Strauss—she earned her PhD in anthropology in 2000 from Penn State University and has taught anthropology at UC since then. Consensus analysis allows Strauss to get inside the audience’s heads, discovering visual clues people need to correctly interpret icons. Strauss put consensus analysis to the test with a redesign of three poorly understood medical icons: outpatient, oncology and psychiatry.

As a first step, Strauss asked users to freelist, writing down what they would expect to see in icons for corresponding terms. Some of the words users listed for psychiatry were “doctor,” “talking” and “emotions.” Strauss then chose the most popular words listed for each term and printed them on separate cards to use in pilesorting. Users were asked to sort these cards into similar groups of words. The user determines the number of groups, the number of items per group and what it means for two words to be similar.

Strauss used a software program to find trends across users’ groups. For example, she found that many people included “stethoscope” in the same group as “doctor.” “That tells you as a designer, if I want a draw a doctor, maybe I should put a stethoscope on him,” Strauss says. Finally, she asked users to rank the words from the pilesorting exercise. Strauss used words ranked in the top quartile to design the new icons.

When Strauss showed users the new icons designed with consensus analysis, she found a significant improvement in comprehension. Compared to the original icons, nearly twice as many people could comprehend the new icons for outpatient and psychiatry, while three times as many people could comprehend the new oncology icon.

Strauss emphasizes that consensus analysis should not replace the graphic designer, but serve as a tool to start the designer’s work on a solid foundation. The new icons Strauss developed and tested “were not modified,” she says. “These were first drafts. So if I’m starting out with 72 percent comprehension [with psychiatry], imagine how high it could be if [we] ask people why they guessed it wrong? You could interview people, modify the icon and test it again.” For graphic designers who are willing to brave a little math, consensus analysis is a useful tool that can make future hospitals, airports and government offices easier to navigate.

Above: Could you guess what these icons represent? L-R: Outpatient, oncology, psychiatry. Top Left: Strauss’ new designs for outpatient, oncology and psychiatry (L-R).
Dissertation completion fellowships support outstanding students during the last stage of their research. Finding a means of support can be difficult for doctoral students who are close to finishing their dissertations, especially during tough economic times.

The Graduate School established the Dean’s Fellowship to make their search for funding a little easier. The fellowship provides students with a $20,000 stipend and a full tuition scholarship to help them complete their dissertations by the end of the 2016-17 academic year.
“We’re sitting and watching,” sings the cast of William Finn’s 1992 musical “Falsettos.” “We’re watching Jewish boys, who cannot play baseball, play baseball!” In the world of the stage, the characters are doing exactly that, belting their lyrics while perched on bleachers before an imaginary New York ballfield. But according to Alexandre Bádue, a doctoral candidate in musicology at the College-Conservatory of Music, the cast’s song is also shifting how theatrical stories can be told.

Bádue’s research examines the sung-through musical, a form of the genre made popular by a group of composers who came of age in the 1980s. “In a traditional musical like ‘Camelot,’” he explains, “you learn a lot about the characters from what they speak. It works, but these composers asked, ‘What can we do to make this different?’” In their musicals, the characters instead deliver all of their lines while singing. Because a sung-through musical can’t rely on dialogue, however, every song must accomplish a lot more dramatic work. Characterization, action and plot: everything must happen through the music.

Consider the baseball scene from “Falsettos.” Through the staging, the audience experiences the action of the characters, but the song itself also narrates the unfolding drama. Especially interesting to Bádue is the commentary folded into the lyrics, which directly addresses the audience to break the so-called fourth wall. “It’s just so clever, and it makes you aware as an audience member that this is a piece of theater,” he says. “If the play comments on itself, it makes you think about how that correlates to your life, how that can change you as a human being.”

Musical theatre composers carefully structure their songs to achieve this narrative sophistication—as Bádue discovered from the composers themselves. In 2015, he made two research trips to New York City, where he interviewed Broadway icons such as Galt McDermot (“Hair”), Andrew Lippa (“The Wild Party”) and Jeanine Tesori (“Shrek The Musical”). In conjunction with archival research into old scripts and scores, these interviews helped Bádue piece together the creative processes and artistic goals for different productions.

Bádue also visited the Library of Congress to study the papers of Jonathan Larson, creator of the landmark musical “Rent.” Larson struggled with the show for over five years, constantly adjusting the structure, order and characters of its songs. Using Larson’s extensive notes and audio recordings, Bádue traced the evolution of Rent through its first off-Broadway preview in January 1996; Larson died the morning of that performance. “I saw the sketchbook that he held the day before he died, with notes that he took the last time he saw the show,” Bádue recalls. “I had goosebumps.”

This close analysis of musicals fills what Bádue sees as a major gap in musicological research. “For a long time, scholars did not believe that you could write a dissertation on the history of the musical, because it was just silly or light entertainment,” he says. But musicals such as “Rent,” which tackles real-world topics such as HIV/AIDS and social inequality, have given the genre more dramatic weight. His research further establishes musical theater as a form worthy of serious academic work.

After he finishes his dissertation, Bádue plans to teach music theory and sight singing for musical theater students. By sharing his deep knowledge of how musicals are constructed, he hopes to help singers better connect with their material and give more meaningful performances. “Musicals aren’t just entertainment,” Bádue says. “They can tell us who we are, what we’re doing in this world, how to cope with different situations and how to be happy.”
The best thing to happen to gastrointestinal science, according to Nina Bertaux-Skeirik, looks a lot like abstract art. Day-Glo clusters of bright teal, green and red stars burst from between dense blocks of technical jargon on the research poster that the doctoral candidate in systems biology and physiology presents in her laboratory at UC's Medical Sciences Building. It's easy to imagine the photographs fitting in at another place she's presented her work: a gallery show at Rohs Street Cafe, a cozy coffee shop just off UC's campus. "I'm kind of an ultra-nerd in that I even like to take pictures we don't use for publication," she admits.

But in the scientific world, Bertaux-Skeirik is recognized for a different kind of artistry. Last year, her research earned her the prestigious Albert J. Ryan Award, which is given to a handful of graduate students from UC, Harvard and Dartmouth. Her brilliantly colored constellations depict a new method to study stomach cancer. Each image shows a miniature model stomach known as a gastric organoid. These microscopic spheres are the closest scientists can get to studying diseased stomachs in the lab.

Before the development of gastric organoids, researchers used stomach cancer stem cell lines as physiological models for the disease. While convenient, Bertaux-Skeirik says, these lines didn't reflect the true nature of stomach cancer. "In the stomach, you don't just have one type of cell. But these cultures are all the exact same cell type. They look like each other and act like each other," she explains. Scientists couldn't answer questions about cancer's impact on the whole stomach due to those limitations.

Gastric organoids, however, contain all the cell types of an actual stomach—because they are derived from actual stomach tissue. Bertaux-Skeirik and her colleagues collaborate closely with surgeons at Cincinnati Children's Hospital Medical Center, who often remove large stomach portions from morbidly obese teenage patients. "Normally, that tissue is just tossed in the trash, but it's so valuable to a scientist!" she says. "We get the actual stomach glands and grow them into miniature organs." The resulting healthy tissue can be genetically manipulated or infected with bacteria, providing the perfect model for the lab's experiments.

In another room of the lab, Bertaux-Skeirik removes a transparent plastic tray of organoids from a tall incubator. Clear pink growth medium, like a crisp white zinfandel, tops a gray smudge of gel at the bottom of each well containing hundreds of the tiny stomachs. The organoids are extremely delicate, each invisible to the naked eye, and she shakes her head as she discusses how fragile they can be. "You look at them the wrong way, they die!" she exclaims. "Because they're so much closer to what's actually going on in your body, they're that much more sensitive to changes."

She is accustomed to the challenges of the creative process. In high school, Bertaux-Skeirik studied ballet and clarinet at Cincinnati's School for Creative and Performing Arts. When an injury sidelined her from the stage, she turned her efforts to science and majored in biology at Xavier University. Although she considered becoming a doctor after college, she found that research gave her more of the freedom she'd experienced as an artist. "I chose graduate school because I wanted to be at the beginnings of discovery, not just work with therapies already in use. I wanted to be a little bit creative," she says.

Her lab's work, like art, gives novel insights into its subject. In one recent study, she used gastric organoids to explore the role a bacterium named Helicobacter pylori plays in stomach cancer. When Helicobacter infects stomach cells, it injects them with a protein
called cagA that causes uncontrolled cell division, leading to ulcers or cancerous tumors. Scientists had been uncertain about how cagA sparked that change, but in her organoid system, Bertaux-Skeirik and her colleagues could identify exactly what parts of the stomach cells cagA targeted.

The team also found that cagA may allow cancerous cells to move more freely throughout the body. “An organoid infected with *Helicobacter* actually goes from 3D to 2D, from a nice spherical shape to a skinny shape. And skinny things can get into small places, travel and break off,” Bertaux-Skeirik explains. Finding a way to stop the formation of this elongated “hummingbird” cell type might help slow the progression of stomach cancer into more serious metastasized tumors.

Not all people infected with *Helicobacter* develop symptoms; over 50 percent of the world population has the bacterium, but less than 8 percent shows signs of infection. Serious cases are more common in Asian countries, and the lab is establishing international connections to help determine why. For example, Bertaux-Skeirik has presented her research at the world’s largest scientific conference on stomach cancer in Singapore. She is also developing methods to safely ship her gastric organoids overseas, spurring research at laboratories closer to patients in need.

Yet her most valued international collaborator is much closer to home: Dr. Yana Zavros, an Australian native, is the lab’s primary investigator. “I actually changed the GPS voice on my phone to be Australian because I love her accent. She calls the cart the trolley,” Bertaux-Skeirik laughs. With Zavros’s encouragement, she was able to publish her first paper within a year and half of joining the lab. “[Zavros] has been a really good role model for me in particular because she’s a successful woman in science,” she says. “She has a family, teaches, does research, writes papers, gets funding—she does everything.”

Bertaux-Skeirik hopes to be as versatile as her mentor in her future career. In addition to her research accomplishments, she has taught Cincinnati-area high school students in UC’s Pathways to Health Careers program and elementary education majors at NKU. She particularly enjoys the challenge of translating her high-level work for students with less of a science background. “You have to be able to put it into simpler terms to make people understand why the research is important and needs to be done,” she says.

She also plans to keep exhibiting the art that emerges from her lab work. Under the colorful pictures of gastric organoids on her poster, she summarizes the motivation for her efforts. “My favorite part is the discovery, the art and creativity. I think when you lose the creative ability in science, you lose its true purpose, which is that humans are curious,” Bertaux-Skeirik says. “They want to know why.”
Joshua Eby knows that what he studies must surround him. Of the mass of the entire universe, his quarry makes up over 80 percent. Its gravitational influence keeps the galaxies from spinning themselves apart and bends the dim light of distant stars. Countless billions of its particles pass through him every day. Yet the doctoral candidate in physics also knows that he will never see the subject of his research. Because these particles do not interact with light, neither the largest telescope nor mightiest microscope would let him directly perceive dark matter.

When asked if his exploration of the invisible ever grows frustrating, Eby pauses to consider, then smiles and shakes a tangle of chestnut curls from side to side. “It’s the nature of the game. Nature is a certain way, and so we just have to play by her rules,” he says. The black slate chalkboard behind him is covered from floor to ceiling in bright orange and green equations that outline his current understanding of those rules as they apply to dark matter. Through his theoretical work, Eby hopes to refine the mathematics of how this matter should behave in the universe.

Although experimental physicists haven’t been able to detect individual particles of dark matter, they have measured its gravitational impacts on visible mass. These results allow theoretical physicists such as Eby to develop models of what these particles could be. Their equations explain the experimental results while predicting more of dark matter’s properties. “That’s what really nice about theory—by putting a small number of constraints on things, sometimes you can really limit what you have to look for,” he explains. “You can make predictions that people can actually go and test.”

Better understanding of dark matter may or may not have practical applications; Eby points out that Einstein’s theory of general relativity, originally pursued for knowledge alone, is now crucial to the accuracy of GPS systems. But he believes that the search is valuable at a deeper level. “Science and physics can help us answer the big philosophical questions,” he says. “What kinds of things exist? Why are we in this place rather than another in the vast expanse of the universe? Everybody wants to know that.”

Eby’s specific model proposes that dark matter exists as particles called axions. Each individual axion would be almost unfathomably light, less than one-billionth the mass of the electrons that whirl inside atoms. But Eby’s calculations suggest that axions might not all exist separately. In the cold depths of space, axions could effectively merge together into spheres as heavy as large asteroids, with diameters exceeding that of the Earth. These massive objects are nicknamed axion stars, and Eby, together with his colleagues in UC’s High Energy Theory Group, was one of the first to estimate their weights and sizes.

He also predicted that axions might not be quite as dark as other candidates for dark matter. “If an axion star is in the vicinity of a strong magnetic field, it could burn up a lot of axions into photons,” Eby says. Like a stream of lighter fluid sprayed into a fire, an axion star colliding with a highly magnetic object (such as a neutron star) would emit a distinctive burst of light. By calculating exactly what that burst should look like, Eby could give experimentalists a way to confirm the existence of axions and solve the mystery of dark matter’s composition.
It’s fitting that the first time Siva Inturi was scheduled to speak with the Graduate School about his work, he had to postpone the meeting—because he was running an experiment. “My committee members say I have done three PhDs,” he jokes. The doctoral candidate in chemical engineering is a tirelessly enthusiastic researcher, with eight journal articles either in print or under review in leading journals. Inturi is also an inventor; he recently applied for a U.S. patent on the unique chemical synthesis he developed over the course of his doctoral program.

Inturi’s innovation refines an existing method of chemical synthesis called flame spray pyrolysis (FSP). In this technique, a liquid solution of chemical raw materials is forced through a nozzle into a very fine aerosol spray by a stream of high-velocity oxygen gas. The spray is then ignited by a methane flame, which burns the raw materials to yield an end product of nanoparticles, as well as carbon dioxide and water vapor. “FSP is a green method because you don’t get any pollutants,” he explains. “And it’s just a one-step process, so it takes much less time and energy than other methods.”

The product Inturi’s research lab makes using FSP is environmentally friendly as well. Titanium dioxide, also known as titania, breaks down organic wastes in the presence of sunlight through the process of photocatalysis. Dr. Gregory Beaucage, one of the members of Inturi’s dissertation committee, says that “such materials might be used to purify water in a third world country simply by flowing water over a shallow bed of nano-titania subjected to solar irradiation.” Because titania naturally harnesses a very limited portion of the sun’s energy, it is often combined with other materials, or “doped,” to increase its light absorption.

The biggest strength of FSP, the use of fire for quick and clean chemical synthesis, becomes a limitation when doping is involved. Although titania can withstand the blistering heat of the flame (roughly 2300 to 3000 degrees Celsius, or 4170 to 5440 degrees Fahrenheit), nonmetals such as nitrogen or sulfur combust at these temperatures in unwanted ways. Inturi hoped to find a method for successfully incorporating nonmetals with titania, but the process proved more difficult than he expected. “For two years I tried working with different solvents, different conditions, different flow rates, different gas velocities, and I was not getting a solution,” he recalls.

Yet Inturi persevered through these countless experiments to develop a workable approach. By chemically treating the raw materials before the FSP process, tweaking the reaction atmosphere and adding different nonmetal sources, he became the first researcher to accomplish nonmetal doping in titania. The resulting patent, “Novel synthesis of Non-Metal Modified Semiconductors by Rapid Flame Spray Pyrolysis Method for Photochemistry,” opens up possibilities for an entirely new field of materials. “Once you get that process, you can dope anything,” Inturi says. “Any nonmetal can be doped in any metal oxide [such as titania] using the method.”

These materials could find a wide array of uses. In addition to the photocatalysis of pollutants, Inturi lists high-performing solar energy cells, cancer therapies, ceramics, water-repellent glass and self-cleaning materials as possible applications. But he acknowledges how much basic research remains to be done before engineers can realize those benefits. In fact, he’s currently planning a research trip to the University of Illinois, one of the few U.S. institutions that house a specialized instrument called an electron paramagnetic resonance spectrometer. This apparatus will help Inturi probe the chemical mechanism by which his doped titania breaks down pollutants. Even with a patent under his belt, he is not content to rest on his success.
“As corny as it sounds, I like getting my hands dirty,” says Mark Mitchell. The biological sciences doctoral candidate steps a well-worn pair of brown boots into one of the planters atop UC’s Zimmer Hall and starts to scoop out soil. A group of passing students gives a confused double take to the impromptu excavation, but Mitchell has a purpose. The Zimmer landscaping is an example of the subject he studies for his dissertation research—green roofs.

These manmade ecosystems cover buildings with plants and soil instead of shingles or asphalt, which gives them several advantages over traditional roofs. During the winter, for example, a green roof’s soil layer acts as better insulation than most other materials. In the summer, the roof’s plants keep a building cool by evaporating water through their leaves, much like sweating cools off the skin. And although green roofs are more costly to install than other types, they also last two to three times longer.

Mitchell first developed an interest in the subject as an educator for the Cincinnati Museum Center, where he instructed visitors about green roofs and other environmental topics. While he loved teaching, he missed the hands-on research he had performed as a master’s student in biology at Loyola University, where he studied the impacts of cattail invasion along the coasts of the Great Lakes. “It’s what I love to do, being a research detective,” Mitchell explains. “Seeing certain patterns and trying to figure out what’s causing them, then what’s going to happen in the future.”

Now back in the field under the guidance of Dr. Ishi Buffam, a professor in the Department of Biological Sciences, Mitchell examines the patterns of nutrient cycling in green roofs. “You can think of nutrients as the currency of life,” he says: a healthy ecosystem builds up a strong bank account of carbon, nitrogen and phosphorus in its soil. Green roofs, however, seem particularly susceptible to losing their wealth of nutrients in runoff water after heavy rainfall. When excess nutrients wind up in area waterways, they can cause algal blooms that disturb the environment for fish and other aquatic life.

One of the main culprits of nutrient runoff from green roofs, according to Mitchell’s research, is overfertilization. Typical rooftop plants include succulent species like sedums, which are drought-tolerant and very hearty but adapted to nutrient-poor soils. When green roof managers overload their ecosystems with fertilizers or rich organic material like compost, these slow-growing plants aren’t able to use all of the nutrients before they get flushed out of the soil by rain. “We’re trying to figure out how to hold on to those nutrients instead of dumping a lot of expensive fertilizer,” he says.

Cincinnati is an excellent place to study green roofs—the Zimmer roof is steps outside of Mitchell’s office, and his main research site is at the Civic Garden Center in Avondale—but the next stage of his work will take him across the Atlantic to the city of Malmö, Sweden. “It’s a perfect experimental setup,” he explains. “Malmö has a collection of green roofs that were all installed in different years, but had the same plant community and soil to begin with.” By comparing systems of different ages, Mitchell can learn how their nutrient dynamics change over time and determine how best to manage a green roof over its entire lifespan.

Mitchell recently received a grant from the American-Scandinavian Foundation to fund his Swedish research trip, and will spend much of the upcoming months gathering plant and runoff samples from the Malmö roofs. “And soil samples,” he’s quick to add. No matter where he goes, it seems, Mitchell wants to keep his hands dirty.
A man walks into a hospital emergency room late one summer night, sweating and agitated and looking over his shoulder every few seconds. Breathlessly, he announces to the attending doctor that the CIA has implanted a microchip inside his brain to spy on his thoughts. She does her best to calm him down, but the man won’t hear any evidence against his belief. All the doctor can do is shake her head and assign him to the psychiatric ward. She turns to a nearby nurse and remarks, “I knew we’d get somebody like that tonight. The weird ones always wander in during the full moon.”

The man’s wild delusion seems distinct from the doctor’s quirky superstition. But Valentina Petrolini, a doctoral candidate in philosophy in the McMicken College of Arts and Sciences, argues that the two thoughts may not be as different as they first appear. Her position, known among philosophers as the continuity thesis, holds that beliefs in CIA microchips and lunar influence on behavior are both powered by the same underlying mental processes.

Dr. Peter Langland-Hassan, assistant professor of philosophy and one of Petrolini’s academic advisors, draws a parallel between the continuity thesis and physical illnesses. “In the view that she advances, having a mental illness is more akin to having high blood pressure, where the disorder amounts to occupying one end of a spectrum, than it is to having a discrete biological disease such as cancer,” he explains. Similarly, conditions such as attention-deficit hyperactivity disorder or obsessive compulsive disorder would represent more severe versions of thoughts and behaviors that everyone experiences from time to time.

Although Petrolini trained exclusively in philosophy before arriving at UC—a native of Italy, she previously studied at the University of Parma—she became interested in the field’s intersection with psychiatry after taking seminars with Langland-Hassan and Dr. Heidi Maibom. “These experiences allowed me to connect my philosophical interest in the nature of the mind with important practical questions,” she says. Petrolini now digs through clinical reports and neurobiological studies to determine how well her ideas explain what psychiatrists see in the real world.

So far, her survey of the literature has strengthened her arguments. Studies of diseases such as depression often find patients with some (but not all) of their symptoms. These intermediate cases place people along a functional spectrum instead of into separate categories of “sick” and “well.” Additionally, factors beyond the brain can push normal responses to the extremes of the spectrum: for example, migrant populations are particularly vulnerable to schizophrenia. Langland-Hassan says of his student’s approach, “There is a growing sense in the community studying these issues that, if we focus on neurobiology alone, we will fail to see the forest for the trees.”

Alongside this modern psychiatric research, Petrolini draws from one of the field’s earliest thinkers, Sigmund Freud. Scientists often discount Freud’s ideas as experimentally unproven, but she finds inspiration in his approach to mental illness. “I admire the way in which he combined theoretical reflections on the nature of the mind with detailed discussions of his patients’ case studies,” she says. That blend of philosophy and empirical observation now informs her own research on the continuity thesis.

Petrolini hopes that her work will change the way society handles mental disorders. Understanding mental health as a spectrum of responses, influenced largely by the environment, could help psychiatrists treat disorders with talk therapy instead of drugs, which are often more expensive. Lawmakers might give more support to preventative measures for at-risk populations. Perhaps most importantly, this view could reduce the social stigma that often accompanies these diseases. Petrolini is fond of Freud’s words on the subject: if everyone lies on a spectrum of mental health, she quotes, “You may quite well say that we are all ill.”
“Comfort-height toilet seats, LOL,” Ruth Pogacar reads from the screen of her silver MacBook. “Yes, I agree with that sentiment!” The doctoral candidate in marketing at the Carl H. Lindner College of Business laughs as she reviews the comments from one of her recent experiments into consumer behavior. The test was simple: she asked two groups of subjects to imagine choosing from a list of premium amenities for a new apartment. All options were included by default, but participants got a modest decrease in rent for each amenity they removed from the list.

One group of participants expressed their thoughts on the comfortable commodes and other options only by clicking to remove the ones they didn’t want. The other group typed out their reasons for or against each amenity before making the choice. Though different by just a few seconds of deliberation, the second group saved money by keeping significantly fewer upgrades than the first group. “If they didn’t do any thinking about it beforehand, a surprising number of people clicked right through—and all of those boxes were already checked,” Pogacar says.

Such is the power of defaults on consumer decision-making. Although a default choice isn’t always in the rational best interest of consumers, it seems instinctively more appealing than other options. “We first think about the positives of the default and the negatives of the alternative, and once we have this reference point, any changes feel like a loss,” Pogacar says. “It’s irrational, but it messes up our decision-making in all kinds of ways.” Her dissertation work explores how that bias operates, along with ways that consumers can fight its influence.

As illustrated by the apartment amenities study, one of the most effective ways to overcome default bias is to list the pros and cons for both options. Even when people are aware of the default, they don’t significantly change their behavior unless they follow the mental exercise. Pogacar believes that this conscious effort counters the instinctive impulse to see only the good of the default and bad of the alternative. “Really thinking about the options in this balanced way helps people reframe the reference point,” she says.

Pogacar’s main research motivation is to protect consumers from exploitative defaults, but she also recognizes the potential of her work to encourage positive social change. In a tweak of the apartment study, she replaced the premium amenities with environmentally friendly options such as compact fluorescent lightbulbs and low-flow toilets. As expected, the opt-out default led participants to make greener choices; just as importantly, the listing of pros and cons didn’t reduce the default’s influence.

After she finishes her dissertation, Pogacar hopes to work in academia while consulting with nonprofits on marketing and consumer welfare. Her future research will expand on her current studies and examine different ways of reducing default bias. Accountability, for example, might drive more conscious decision-making. “That could make people spontaneously go through the pros and cons in a more balanced way,” Pogacar says. “Especially if there’s a person in your life who’s going to be mad if you spend a bunch of money on comfort-height toilet seats!”
Appropriately, a light shower of snow falls outside UC’s Tangeman University Center as Song Shu talks about his research. Cincinnati’s usual response to winter weather is to clear the supermarket shelves of bread, milk and eggs, but the doctoral candidate in geography seems unfazed by the flurries. Perhaps that’s because Shu spends his days considering snowfalls that would send most Ohioans into a sheer panic. His work aims to provide accurate measures of snow accumulation in the Arctic Coastal Plain of Alaska.

“Snow is very sensitive to climate change,” Shu says. “If air temperatures are higher, snow depths will be lower, especially at the end of the winter.” Less snow means less snowmelt in Alaska’s spring and summer months, which shrinks the region’s many lakes and rivers. These aquatic habitats are crucial for wildlife such as caribou, fish and migratory birds, and even small reductions have large ecological impacts. Therefore, understanding the changes of snow due to climate change can help scientists protect the Arctic ecosystem.

Measuring snow may seem simple enough, a matter of reading centimeters off a ruler driven into the ground. But in the harsh, sparsely populated regions of the Arctic Coastal Plain, getting researchers into the field to gather those data can be both costly and dangerous. Average monthly temperatures are below freezing for all but the summer months, and during the winter, conditions can reach -49 degrees Celsius (-56 degrees Fahrenheit). Shu has developed a new approach that sidesteps the risks of such fieldwork; in fact, he’s never set foot in Alaska himself.

Instead, he uses data from NASA satellites such as ICESat (the Ice, Clouds and land Elevation Satellite). In a process called altimetry, a spacecraft beams an infrared laser from its orbit down to Earth, then measures the time it takes for the reflected light from that laser to return to space. The speed of light is constant, and the satellite orbits at a consistent altitude, so any difference in the light’s travel time indicates variation on the ground. When calibrated against sea level, those differences translate into elevation.

By comparing satellite measurements from the start and end of the winter, Shu can use elevation as a proxy for snow accumulation over the season. He focuses specifically on lake surfaces: because the lakes are frozen flat over the winter, he can attribute any change to the winter’s snowfall. Shu is now digging through NASA datasets on Arctic lakes from 1978 through the present day. “If I can chain these missions together, it’s possible to find some kind of trend in snow depth change,” he says. “If I can find it, it’ll be really exciting.”

Shu faces some major challenges on the path to a continuous story for the Arctic Coastal Plain. For example, different satellites use different sensors to collect elevation data, each with their own quirks. Seasonal fluctuations in the atmosphere can create measurement bias as well. But Shu is experienced in wrestling the data into usable form—he actually corrected one of NASA’s own algorithms for its altimetry measurements.

A consistent pattern of snow depth decreases would draw more attention to the impacts of climate change in this vulnerable area. “If you don’t live in that area or in close relation to the lakes, you don’t think about it, but it’s really big problem,” Shu says. He hopes that his work will inspire action to preserve the Arctic Coastal Plain’s natural beauty. After all, although he has studied Alaska from afar, Shu eventually wants to visit in person.
Dr. Evangelia Kranias has a very full calendar. She directs the cardiovascular biology program in the UC Department of Pharmacology and Cell Biophysics, codirects the UC Cardiovascular Center of Excellence and advises a research group at the Academy of Athens in her native Greece. She is also a prolific advisor: during her 37-year career with UC, she has worked with over 70 graduate students and postdoctoral trainees. But even with her time at a premium, Kranias stresses the importance of treating each student as an individual. “They have different personalities, different backgrounds, different needs once they enter the program. One has to be very sensitive with that from day one,” she says.

This balance of professional success and personal attention inspired Kranias’s current and former students to nominate her for the Excellence in Mentoring of Doctoral Students Award. As a research advisor, she pushes her pupils to conduct groundbreaking work on the genetic mechanisms of cardiac failure, and their productivity is impressive. An average PhD candidate under her guidance publishes eight papers before graduation compared to the usual two or three. But Kranias regards the relationships she forges with her students as even more important. “In my lab, everybody becomes part of my family,” she says. “If they are to be my lab, they’re going to be my kids.”

Her attitude to mentoring stems from memories of her own early years as a researcher. Kranias came from Greece to the University of Chicago, where she had no relatives, at the age of 18, and has continued to work mostly in the U.S. Now running a lab that hosts students from across the world, she sympathizes with the stresses they feel as they study in a foreign city. “They often don’t have their families around, whether they’re American or not, and it’s hard,” she says. By making the lab itself feel like a family, she gives students the support they need to mature over their time in graduate school.

Kranias also recognizes that her pupils’ needs extend beyond the lab. Guansheng Liu, a recent PhD graduate from the Kranias group, wrote of her extracurricular
support in a nomination letter for the mentoring award. “In my third year of graduate school, when I suffered from severe insomnia,” he recalls, “she kept encouraging me and even took my MRI results to her personal doctor for a second opinion.” With Kranias’s help, Liu recovered to complete his degree and move on to a postdoctoral position at UC.

Her students have carried those skills on to prestigious academic, clinical and industrial positions around the globe. The ties they keep with the Kranias lab form a widespread network of prospective collaborators for her current trainees. If her space in Cincinnati lacks a crucial instrument or biological model, her students can travel to institutions such as Harvard and Loyola University to perform experiments that they couldn’t otherwise accomplish. “You really cannot move the field that much forward unless you pair up with other strong collaborators and scientists,” Kranias says. She also works to expand collaborations beyond her web of former students: her lab currently partners with at least 10 cardiac research groups in the U.S. and several throughout Europe, China and Japan.

Academically, Kranias instructs her students in all aspects of a research position. “It’s not just doing your own work,” she explains. “You need to put your ideas down in a coherent fashion.” She guides her mentees through grant proposals and journal articles, helping them understand the most effective methods of scientific communication. Her process can be exhaustive: George Gardner, a current third-year PhD student, wrote of exchanging at least 20 drafts back and forth for a critical American Heart Association fellowship application (which he eventually succeeded in winning). “It would be much easier for me to just edit the document,” Kranias laughs, “but they learn how to express themselves, how to make the arguments original and how to approach why somebody should give them the money.”

Her career history has made Kranias particularly attuned to the cultural challenges facing women in science. In 1978, when she first came to UC, she was one of the few women faculty members. At her first scientific conferences, she spent most of her time alone—“with the room service,” she remembers with a smile—unable to break into the circles of her senior male colleagues. When Kranias started teaching her own female students, she worked hard to integrate them into those groups. “At every meeting, I would make sure to have the young women going to lunch, to dinner, to outings, inviting male colleagues along and always spending a lot of time talking about the issues,” she says. Due to these efforts, along with her own scientific accomplishments, she was honored with giving the keynote address on Women Scientists’ Day at the National Institute on Aging in 2001.

Through her academic rigor, individual attention and collaborative spirit, Kranias cares for the whole being of every student she mentors. “Supporting students is the most important aspect for me,” she says. “It’s about making sure they can go out there and face the world.” Under her guidance, students learn that the best approach to cardiac research involves a lot of heart.
The Graduate School is proud of the diverse academic endeavors completed by its master’s and doctoral students during the 2015-16 academic year. University of Cincinnati master’s theses and doctoral dissertations can be found online at etd.ohiolink.edu. The following listing of doctoral dissertations represents the quality, vitality and diversity of graduate research and scholarship at UC.

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Dubey, Prahit  
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Confined Aerosol Jet in Fiber Classification and Dustiness Measurement  
Advisor: Urmila Ghia, PhD

Estefanos, Wessam  
PhD, Spring 2016  
Effects of the Fuel-Air Mixing on Combustion Instabilities and NOx Emissions in Lean Premixed Combustion  
Advisor: San-Mou Jeng, PhD

Gancedo, Matthieu  
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Effect of Self Recirculation Casing Treatment on the Performance of a Turbocharger Centrifugal Compressor  
Advisor: Ephraim Gutmark, PhD, DSc

Ghanem, Amer  
PhD, Fall 2015  
Identifying Patterns of Epistemic Organization through Network-Based Analysis of Text Corpora  
Advisor: Ali Minai, PhD

Gilday, Steven  
PhD, Spring 2016  
The Therapeutic Potential of Indian Hedgehog (IHH) for Tendon-to-Bone Repair  
Advisor: Jason Shearn, PhD

Guo, Jianghao  
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Cross-Layer Fault-Tolerant Design and Analysis for High Manufacturing Yield and System Reliability  
Advisor: Wen-Ben Jone, PhD

Hanlon, Nicholas  
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Simulation Research Framework with Embedded Intelligent Algorithms for Analysis of Multi-Target, Multi-Sensor, High-Cluttered Environments  
Advisor: Kelly Cohen, PhD

Heeb, Nicholas  
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Azimuthally Varying Noise Reduction Techniques Applied to Supersonic Jets  
Advisor: Ephraim Gutmark, PhD, DSc

Holbrook, Chad  
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Advisor: Puneet Boolchand, PhD

Jamthe, Anagha  
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Mitigating Interference in Wireless Body Area Networks and Harnessing Big Data for Healthcare  
Advisor: Dharma Agrawal, DSc

Jiang, Chuan  
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A Smart and Minimally Intrusive Monitoring Framework Design for Health Assessment of the Elderly  
Advisor: Hongdao Huang, PhD

Li, Tongyan  
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The Study of CO2 Removal in slurries with Mg(OH)2 Suspended Particles and the Regeneration of Products  
Advisor: Timothy Keener, PhD

Liu, Yuguang  
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Advisor: Ian Papautsky, PhD

Mancipe Munoz, Nestor Alonso  
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Advisor: Steven Buchberger, PhD

Mishra, Amitabh  
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Modeling and Performance Evaluation of Wireless Body Area Networks for Healthcare Applications  
Advisor: Dharma Agrawal, DSc

Mukherjee, Sayantika  
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Fundamentals and Applications of Large Area Multi-Spectral State Electrophoretic Panels for Displays and Smart Windows  
Advisor: Jason Heikenfeld, PhD

Mun, Kyu-Shik  
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Advisor: Chia Chi Ho, PhD

Murdock, Richard  
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Advisor: Ian Papautsky, PhD

Nagle, Anna  
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Advisor: T. Douglas Mast, PhD

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Advisor: Hongdao Huang, PhD

Nivedita, Nivedita  
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Advisor: Ian Papautsky, PhD

Panhalkar, Neeraj  
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Advisor: Sundaramarman Anand, PhD

Patchala, Jagadeesh  
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Advisor: Raj Bhatnagar, PhD

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Advisor: Ian Papautsky, PhD

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Advisor: Ian Papautsky, PhD
Rawashdeh, Ahmad
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Advisor: Anca Ralescu, PhD

Rojatkar, Prachi
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*Numerical Analysis of Multi-Swirler Aerodynamics*
Advisor: Milind Jog, PhD

Samarasinghe, Kasun
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Advisor: Anastasios Angelopoulos, PhD

Sankar, Abhinandh
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Advisor: Anastasios Angelopoulos, PhD

Santamaria Hernandez, Amilcar
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Advisor: Peter Kosel, PhD

Schroder, Andrew
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Advisor: Mark Turner, ScD

Shaheen, Mohammed
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*Design and Assessment of Vertical Axis Wind Turbine Farms*
Advisor: Shaaban Abdallah, PhD

St. George, Andrew
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*Development and Testing of Pulsed and Rotating Detonation Combustors*
Advisor: Ephraim Gutmark, PhD, DSc

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*Reliability Approach to Risk Management in Watersheds*
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Telang, Abhishek
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Advisor: Vijay Vasudevan, PhD

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*Inertial Microfluidic Vortex Cell Sorter*
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Advisor: Henry Spitz, PhD

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Advisor: George Sorial, PhD

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Advisor: Vikram Kuppa, PhD
### College of Medicine

**Adeyemo, Adeola**  
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Advisor: Jo El Schultz, PhD

**Alqadah, Amel**  
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Advisor: Chio-Fen Chuang, PhD

**Beckwith, Travis**  
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Advisor: James Eliassen, PhD

**Braun, Amanda**  
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*Comparison of the Role of Dopamine in Egocentric and Allocentric Learning, Two Subtypes of Navigation*  
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**Brokamp, Richard**  
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*Land Use Random Forests for Estimation of Exposure to Elemental Components of Particulate Matter*  
Advisor: Patrick Ryan, PhD

**Carreira, Vinicius**  
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*The Aryl Hydrocarbon Receptor Contributions to Cardiovascular Development and Health*  
Advisor: Alvaro Puga, PhD

**Cassella, Sarah**  
PhD, Summer 2015  
*Aging, Stress and Inflammation in a Rat Model of Parkinson’s Disease*  
Advisor: Renu Sah, PhD

**Chella Krishnan, Karthickeyan**  
PhD, Fall 2015  
*Host-Pathogen Interactions Promoting Pathogen Survival and Potentiating Disease Severity and Morbidity in Invasive Group A Streptococcal Necrotizing Soft Tissue Infections*  
Advisor: Rhett Kovall, PhD

**Cookman, Clifford**  
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*Characterization of 17ß-Estradiol Survival Signaling in Medulloblastoma: Relation to Tumor Growth and IGF1 Signaling*  
Advisor: Robert Rapoport, PhD

**Coombs, Kanistha**  
PhD, Fall 2015  
*The Indoor Environment of Green versus Non-green Buildings*  
Advisor: Tiina Reponen, PhD

**Cowan, Jason**  
PhD, Fall 2015  
*The Genetics of Heterotaxy Syndrome*  
Advisor: Stephanie Ware, MD, PhD

**Davis, Benjamin**  
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*Genetic and Functional Analysis of Calpain-14 in Eosinophilic Esophagitis*  
Advisor: Marc Rothenberg, MD, PhD

**D’Mello, Rahul**  
PhD, Fall 2015  
*The Expression and Role of LRRC31 in the Esophageal Epithelium*  
Advisor: Marc Rothenberg, MD, PhD
DuBois, Juwen  
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The Role of Hypoxic Adaptation in the Pathogenesis of Histoplasmosis  
Advisor: Alan Smulian, MD

Estill, Cheryl  
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Advisor: Amit Bhattacharya, PhD

Fang, Ming  
PhD, Spring 2016  
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Advisor: Katherine Yutzey, PhD

Frank, Evan  
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Advisor: Jagjit Yadav, PhD

Gao, Shuang  
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Performance of Filtering Facepieces and Powered Air-Purifying Respirators Challenged with Different Aerosols  
Advisor: Sergey Grinshpun, PhD

Gao, Yuanqing  
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Hypothalamic Glial Cells in Diet Induced Obesity  
Advisor: Silvana Obici, MD

Ghosal, Sriparna  
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The Role of the Nucleus of the Solitary Tract in Stress Integration  
Advisor: James Eliassen, PhD

Hauser, Jennifer  
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Genetic Epidemiology of Radiation Sensitivity and Basal Cell Carcinoma in Childhood Cancer Survivors  
Advisor: Marepalli Rao, PhD

Hsieh, Heidi  
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Advisor: Mary Beth Genter, PhD

Huang, Wenting  
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Advisor: William Ridgway, PhD

Kendzierski, Jessica  
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Characterization of Endocrine Disrupting Effects of Bisphenol A or 17ß-Ethinyl Estradiol in Mouse Uterus  
Advisor: Scott Belcher, PhD

Khoury, Philip  
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Indexing Left Ventricular Heart Mass in Children: Age Specific Reference Intervals  
Advisor: Marepalli Rao, PhD

Liu, Guansheng  
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Studies of Human Mutations in Phospholamban and Heat Shock Protein 20  
Advisors: Evangelia Kranias, PhD and Guo-Chang Fan, PhD

MacMaster, Kayleigh  
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Characterization of Cellular Pathways and Potency of Shiga Toxin on Endothelial Cells  
Advisor: Alison Weiss, PhD

Mandal, Amrita  
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Roles of Retinoic Acid and Wnt Signaling during Zebrafish Development  
Advisor: Joshua Waxman, PhD

Marwaha, Shruti  
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Advisor: Nelson Horsemman, PhD

McCauley, Heather  
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Two Novel Roles for TGFß Signaling in Epithelial Differentiation and Cancer  
Advisor: Geraldine Guasch, PhD

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Investigating the Roles of Neurogenin 3 in Human Pancreas and Intestine Development and Disease  
Advisor: James Wells, PhD

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Advisor: Peter Stambrook, PhD

Phelan, Jordan  
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The Novel Inhibitory Role of CCL20 in Allergic Asthma  
Advisor: Marsha Wills-Karp, PhD

Poole-Wilson, Tiffany  
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Utilization of Activity Monitoring Devices in the Documentation of Patient Fall Occurrences in Long-Term Healthcare Settings  
Advisor: Kermit Davis, PhD

Powell, Eleanor  
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Advisor: Jason Blackard, PhD

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Threshold for Hippocampal Dentate Granule Cell Mediated Epileptogenesis  
Advisor: James Eliassen, PhD

Shahana, Nasrin  
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Sensory Dysfunction in Children with Tourette Syndrome  
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Advisor: Bryan Mackenzie, PhD
Shehata, Hesham
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Advisor: Claire Chougnet, PhD

Simmons, Mark
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Comparison of Weight Loss Outcome Measures in Adolescent Bariatric Surgery Patients Using Growth Curve Modeling
Advisor: Changchun Xie, PhD

Singh, Shatrunjai
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Quantitative Analysis on the Origins of Morphologically Abnormal Cells in Temporal Lobe Epilepsy
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A Probabilistic Approach for Automated Discovery of Biomarkers Using Expression Data from Microarray or RNA-Seq Datasets
Advisor: Steven Kleene, PhD

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Signaling Pathways Controlling CNS Myelin Compaction in Gain-of-Function Rasopathies
Advisor: Kenneth Campbell, PhD

Tiwari, Swati
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Gene Therapy Approaches for Hemophagocytic Lymphohistiocytosis
Advisor: Punam Malik, MD

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Alternatively Spliced Tissue Factor and Pathobiology of Pancreatic Ductal Adenocarcinoma: A Novel Biomarker and Potential Therapeutic Target
Advisor: Vladimir Bogdanov, PhD

Vairamani, Kanimozi
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Advisor: Gary Edward Shull, PhD

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Mechanisms of Cryptosporidium Parvum Invasion Using an Improved Human Epithelial Cell Model
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PXK and Lupus: Novel Immunobiology for a Lupus-Risk Gene
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Molecular Studies of Host-Pathogen Interactions in Human Cytomegalovirus-Infected Myeloid Cells
Advisor: William Miller, PhD

Xiong, Ye
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KLF2: A Krüppel Like Family Transcription Factor in Myeloid Cells Negatively Regulates Th2 Response
Advisor: George Deepe, MD

Zandvakili, Inuk
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Advisor: Yi Zheng, PhD

Zhang, Linda
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Apolipoprotein A-I: A Novel Liver-Gut Signal Protein that Regulates the Production of Chylomicrons
Advisor: Patrick P.W. Tso, PhD

College of Nursing

Berry, Peggy
PhD, Summer 2015
Workplace Bullying: Exploring the Prevalence, Impact and Consequences to Nurses
Advisor: Gordon Gillespie, PhD

Eberwine, Julia
PhD, Spring 2016
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Advisor: Elaine Miller, PhD, RN

Pekar, Bunnany
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Advisor: Beverly Reigle, PhD

Richmond, Misty
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Advisor: Denise Gormley, PhD
James L. Winkle College of Pharmacy

Bhongsatiern, Jiraganya
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Advisor: Pankaj Desai, PhD

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Clinical Pharmacokinetics of the Novel Combination of BEZ235, PI3K/mTOR Inhibitor, and Everolimus, mTOR Inhibitor: Phase I Clinical Studies and Non-clinical Mechanistic Assessment
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Advisor: Gerald Kasting, PhD

Hu, Jing
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Targeting Transcription Factor NF-Kappa B by Dual Functional Oligodeoxynucleotide Complex for Inhibition of Neuroinflammation
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Ramchandani, Divya
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Advisor: Georg Weber, MD, PhD

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Advisor: Jianfei Guo, PhD

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MDMA and Glutamate: Implications for Hippocampal GABAergic Neurotoxicity
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McMicken College of Arts and Sciences

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The Politics of Punishment, Urbanization and Izmir Prison in the Late Ottoman Empire
Advisor: Elizabeth Frierson, PhD

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Synthesis and Catalytic Applications of Nickel and Palladium Pincer Complexes
Advisor: Hairong Guan, PhD

Amaral, Joseph
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What Constrains Adaptive Behavior in ASD? Exploring the Effects of Non-social and Social Factors on Hysteresis in Grasping
Advisor: Adelheid Kloos, PhD

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Quenched Asymptotics for the Discrete Fourier Transforms of a Stationary Process
Advisor: Magda Peligrad, PhD

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Phase Response Optimization of the Circadian Clock in Neurospora crassa
Advisor: Sookkyung Lim, PhD

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Advisor: John Drury, MFA

Butnaru, Mirela
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Confluencias de los Géneros Literarios en la Literatura Centroamericana: Testimonio, Novela y Narrativas del Yo
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Cadena Pardo, Sandra Paola
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<td>Christopher Phillips, PhD</td>
</tr>
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Gong, Jiawei  
PhD, Spring 2016  
Application of Mass Spectrometry in Biology and Physiology  
Advisors: Peng Zhang, PhD and Julio Landero Figueroa, PhD

Grabo, Jennifer  
PhD, Fall 2015  
Structural and Photochemical Properties of Fe(III) Complexes with Mixed Donor α-Hydroxy Acid Chelates  
Advisor: Michael Baldwin, PhD

Graham, Ciera  
PhD, Summer 2015  
Black Spaces at White Institutions: How do Black Students Perceive and Utilize Black Student Organizations at Rural and Urban Predominately White Campuses?  
Advisor: Annulla Linders, PhD

Guo, Yixuan  
PhD, Summer 2015  
Bayesian Model Selection for Poisson and Related Models  
Advisor: Siva Sivaganesan, PhD

Hamilton, Heather  
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Hedge  
Advisor: Donald Bogen, PhD

Hanks, Nicole  
PhD, Fall 2015  
Silver Nanoparticle and Silver Ion Water Contamination: Assessment of Phytoremediation and Point-of-Use Filtration Media  
Advisors: Peng Zhang, PhD and Joseph Caruso, PhD

Hong, Jung-Min  
PhD, Summer 2015  
Political Polarization and Independent Voters in American Politics  
Advisor: Stephen Mockabee, PhD

Jackson, Wesley  
PhD, Summer 2015  
Where Do We Go from Here? Tortured Expressions of Solidarity in the German-Jewish Travelogues of the Weimar Republic  
Advisor: Harold Herzog, PhD

Jaconis, Susan  
PhD, Summer 2015  
The Effects of Diesel Exhaust and Particulate Matter on the Growth, Reproduction and Ecophysiology of Plants  
Advisor: Theresa Culley, PhD

Joshi, Padmanabha  
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Development of Optically Active Nanostructures for Potential Applications in Sensing, Therapeutics and Imaging  
Advisor: Peng Zhang, PhD

Koets, Julia  
PhD, Spring 2016  
A Kind of Flight  
Advisor: John Drury, MFA

Li, Xining  
PhD, Summer 2015  
Preservation of Bounded Geometry under Transformations Metric Spaces  
Advisor: Nageswari Shanmugalingam, PhD

Lopez, Marcos  
PhD, Summer 2015  
Discrete Approximations of Metric Measure Spaces with Controlled Geometry  
Advisor: Nageswari Shanmugalingam, PhD

Luberto, Christina  
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An Experimental Test of the Effects of a Brief Mindfulness Exercise on Distress Tolerance among Adult Cigarette Smokers  
Advisor: Alison Mcleish, PhD

Lyon, Nicole  
PhD, Fall 2015  
Wreaths of Time: Perceiving the Year in Early Modern Germany (1475–1650)  
Advisor: Sigrun Haude, PhD

McKissic, Kelley  
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Understanding the Role of Energy in Chemical Reactions from Mechanics to Photochemistry  
Advisors: James Mack, PhD and Anna Gudmundsdottir, PhD

Neumann, Kristina  
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Mapping the Transformation of Roman Antioch: The Coin Evidence  
Advisor: Barbara Burrell, PhD

Ozdoya Ahmadov, Tevhide  
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Development of Multifunctional Nanoparticles: From Synthesis to Theranostic Applications  
Advisor: Peng Zhang, PhD

Pelley, Terri  
PhD, Summer 2015  
Stress and Coping in Latino Youth Living in a Nontraditional Destination Area  
Advisor: Farrah Jacquez, PhD
Peruzzi, Bice
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Populating Peucetia: Central Apulian Grave Good Assemblages from the Classical Period (Late 6th–3rd Centuries B.C.)
Advisor: Kathleen Lynch, PhD

Petranovich, Christine
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Neuropsychological Functioning, Social Information Processing and Parent-Reported Behavior and Social Competence in Internationally Adopted Girls with a History of Institutionalization
Advisor: Shari Wade, PhD

Plumly, Vanessa
PhD, Summer 2015
BLACK-Red-Gold in “der bunten Republik”: Constructions and Performances of Heimat/en in Post-Wende Afro-/Black German Cultural Productions
Advisor: Tanja Nusser, PhD

Ramos Montes, Manuel
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La Creación Literaria como Búsqueda de Identidad en la Novela Hispanoamericana: Aproximaciones Críticas al Escritor como Personaje a Partir de Juan Carlos Onetti, Josefina Vicens, Roberto Bolaño y Enrique Vila-Matas
Advisor: Nicasio Urbina, PhD

Rohan, Jennifer
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The Relationship of 6-Mercaptopurine Medication Adherence to Clinical Outcomes in Pediatric Cancer
Advisor: Dennis Drotar, PhD

Rothenstein, Rike
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Out of Sync: Is There a Mismatch between the American Environmental Movement and Public Opinion?
Advisor: Stephen Mockabee, PhD

Ryan, John
PhD, Spring 2016
Science and Poetry in the Early Reception of Aratus’ Phaenomena
Advisor: Kathryn Gutzwiller, PhD

Sadat, Md Ehsan
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Probing the Magnetic Relaxation Dynamics and Optical Properties of Superparamagnetic Iron-Oxide (Fe3O4) Nanoparticles for Biomedical Applications
Advisor: David Mast, PhD

Shark, Sujan
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Reaction Mechanism and Detection of Elusive C, N and O Centered Radicals and Intermediates in Solution and Solid State
Advisor: Anna Gudmundsdottir, PhD

Shi, Teng
PhD, Spring 2016
Confined States in GaAs-Based Semiconducting Nanowires
Advisor: Leigh Smith, PhD

Shi, Yu
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Single-Ion Hydration and Ion Association in Aqueous Solutions
Advisor: Thomas Beck, PhD

Shingade, Vikas
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Investigations of the Electronic and Molecular Structures of Luminescent Pt(II) and Pt(IV) Complexes with Triimine Ligands
Advisor: William Connick, PhD

Smith, Nathan
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Computational Studies of Protein Folding Assistance and Conformational Pathways of Biological Nanomachines
Advisor: George Stan, PhD

Stahl, Bethany
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Regressive Evolution of Pigmentation in the Blind Mexican Cavefish Astyanax mexicanus
Advisor: Joshua Gross, PhD

Stoffer, Brent
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Social Context and Mate-Choice Plasticity in a Wolf Spider
Advisor: George Uetz, PhD

Swearingen, Jeremy
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Investigating the Structure of Protoplanetary Disks Using Radiative Transfer Modeling
Advisor: Michael Sitko, PhD

Taghian, Toloo
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Interaction of an Electric Field with Vascular Cells
Advisor: Andrei Kogan, PhD

Thomka, James
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Dynamic Linkages between Stratigraphy, Climate, Oceanography and Biotic Events in the Middle Silurian of Eastern Laurentia
Advisor: Carlton Brett, PhD

Thowfeik, Fathima
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Targeting a Common Enemy: Toxic Cellular Mechanism of Novel Anti-cancer Agents that Alter DNA and Transcription
Advisor: Edward Merino, PhD

Tolston, Michael
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Evaluating the Multi-Scaled Characteristics of Rhythmic Movement
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Wang, Huan
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Elucidating Allosteric Mechanisms of the AAA+ ClpATPases Using Molecular Dynamics Simulations
Advisor: George Stan, PhD

Wang, Tingting
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The Electrochemical and Spectroscopic Characterization of Carbon Nanotube Materials and the Development of Multiple Electrochemical Sensors
Advisor: William Heineman, PhD

Wang, Yuda
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Optical Characterization of Mechanical and Electronic Properties of Visible to Infrared Semiconductor Nanowires
Advisor: Leigh Smith, PhD
Watson, Sara
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Our Imaginary Childhood
Advisors: Rebecca Lindenberg, PhD and James Cummins, MFA

Weragoda, Geethika
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Excited State Intramolecular Proton Transfer (ESIPT) and Trans-Cis Isomerization on the Triplet Excited States
Advisors: Peng Zhang, PhD and Anna Gudmundsdottir, PhD

Wetzel, Collin
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Global Identification and Mass Mapping of tRNA Isoacceptors Using Targeted Tandem Mass Spectrometry
Advisor: Patrick Limbach, PhD

Wickremasinghe, Don Athula
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HARP Targets Pion Production Cross Section and Yield Measurements: Implications for MiniBooNE Neutrino Flux
Advisor: Randy Johnson, PhD

Wickremasinghe, Niranjala
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Optical Properties of Organic Films, Multilayers and Plasmonic Metal-Organic Waveguides Fabricated by Organic Molecular Beam Deposition
Advisor: Hans Peter Wagner, PhD

Wilson, Gleason
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Advisor: Hairong Guan, PhD

Wong, Evan
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DNA-Based Species Delimitation of the Agriculturally Important Genus, Ravinia (Diptera: Sarcophagidae)
Advisor: Ronald W. DeBry, PhD

Wu, Qiusheng
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Hydrological and Ecological Analysis of Topographic Structure and Wetland Landscape
Advisor: Hongxing Liu, PhD

Yadavpauletti, Sunita
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The Influence of Climate and Topography in Modeling Distributions for Species with Restricted Ranges: A Case Study Using the Hawaiian Endemic Plant Genus, Schiedea (Caryophyllaceae)
Advisor: Theresa Culley, PhD

Yu, Xinjun
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Synthesis and Characterization of Self-Assembling Polymers Using Hydrogen Bonding or Hydrophobic Effect
Advisor: Neil Ayres, PhD

Zhang, Jinnan
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Enhancement of Silver Nanoparticles in Fluorescence, Raman and Singlet Oxygen Generation
Advisor: Peng Zhang, PhD

Zhang, Zongjun
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Adaptive Robust Regression Approaches in Data Analysis and Their Applications
Advisor: Seongho Song, PhD

Zhou, Yan
PhD, Spring 2016
Synthesis, Characterization and Application of SERS-Active Metal Nanoparticles
Advisor: Peng Zhang, PhD
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