

uncg research

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Research, Scholarship, and Creative Activity

INTO THE REEDS

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UNC Greensboro is redefining the public research university for the 21st century. With over \$36 million annually in external funding and a rich array of scholarship, we are making a difference in lives and communities in North Carolina and beyond.

But what does that really look like?

First, there's our primary mission: fostering student success, to ensure a well-prepared workforce for the future. The student scholarship in this issue illustrates not only the quality of the students graduating from UNCG, but also the critical skills, honed by research experience, that our students bring to their careers and employers. Engaging undergraduate and graduate students in their own research – not just in the research of their professors but also in crafting their own questions and lines of inquiry – is transformational.

Then, there's our commitment to advancing knowledge, to being drivers of discovery. You'll meet just a few of the passionate faculty and students creating groundbreaking innovations at UNCG in our feature story "The Tell-Tale Heart." These researchers, from nanoscience to nursing, are attacking cardiovascular disease – the leading cause of death across the world – from all angles.

Next, we extend and apply that knowledge through engagement with community partners. At UNCG, researchers from disciplines across campus are collaborating with local stakeholders to harness the power of big data and generate innovative solutions to both age-old challenges and new epidemics. The projects, many part of the nationwide MetroLab initiative, range from improved hospital outcomes, to county budget management, to the opioid crisis.

Finally, there's our shared emphasis on enhancing lives and building resilient communities. Whether we're working to lower obesity rates, discovering the secrets to productive ecosystems, or giving voice to those who need it most through poetry, music, and books, UNCG researchers are improving the quality of life in our communities. And sharing lessons learned across the state, nation, and world.

Real-world challenges. Real-world solutions. Real-world impact.

You see it every day in the hard work, inventive ideas, and powerful collaborations that define us. The everyday and extraordinary achievements that add up to the remarkable impact of UNC Greensboro.

TERRI L. SHELTON, PHD
Vice Chancellor for Research and Engagement

UNCG Research has launched a new website. Enjoy additional photography, shareable stories, and more at researchmagazine.uncg.edu.

FEATURES



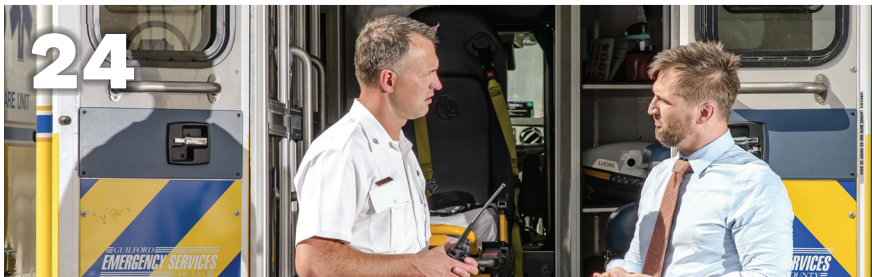
Into the Reeds

A living laboratory for students of all ages. Fertile ground for critical research. Improved water quality and biodiversity. The newly constructed UNCG wetlands have become a nexus of research and learning.



Real Big Data

Scientists are scooping up vast amounts of data and training computers to uncover hidden patterns. Researchers across campus work with partners in Guilford County and beyond to bring big data solutions to real-world problems.



The Tell-Tale Heart

Call it a campus-wide assault on cardiovascular disease. From early interventions to a device to identify a heart attack in progress, research initiatives across UNCG tackle the number one cause of death from a variety of angles.

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Does a *Baby* Good

In 1963, President and Mrs. John F. Kennedy welcomed their third child, five weeks before his due date. Barely two days later, their baby's heart stopped. "To show you how far we've come, today if a woman gives birth 16 weeks early, there's a chance the NICU can take care of that baby," says Maryanne Perrin, assistant professor in UNCC's School of Health and Human Sciences.

What NICUs feed preemies during this critical window has immediate health implications, adds Perrin, whose research on infant nutrition guides hospitals' practices. With an industrial engineering degree, a doctorate in nutrition, and an MBA, she is one of the first researchers to study the comprehensive process of milk banking.

Best-case scenario, Perrin says, a baby drinks its mother's milk. But that's not always possible, especially for preemies, because the mother's mammary glands don't fully develop until the end of pregnancy.

"That's where donor milk comes in," she says.

Breast milk is especially important for the over 15 million infants born prematurely each year. Because preemies' digestive tracts aren't fully developed, toxic bacteria can penetrate weak gut linings. "Breast milk contains proteins that bind pathogenic bacteria, so they can't get through," Perrin explains. It also delivers healthy bacteria that reduce GI infections and disease.

In the four years after the Surgeon General issued a call to advance donor milk access, NICU use increased by 75 percent. The trend is encouraging, but it brings up a host of questions that, until now, have not been explored.

"There are over 40 studies on how pasteurization affects donor milk – but what happens at the milk bank prior to pasteurization, and what happens to the milk afterwards, at the hospital?" asks Perrin. "Are we mixing, fortifying, and storing it correctly?"

Add to that the variability in human milk's nutritional value.

"If you think you are giving a preemie 67-calorie milk and instead the milk is 54 calories, it can have a big impact on their growth," Perrin explains. "You have a small window of time for infants to grow, and if they miss that window, they can't catch up."

In a recent study, Perrin and her collaborators found that a common fortifier – added to breast milk to provide more nutrition for preemies – likely interferes with the milk's immune benefits.

Perrin's research, such as a recent study documenting the impact of maternal diet on milk composition, aids milk banks as they assess donor eligibility and sort milk to provide more uniform nutritional content.

She also applies her unique expertise on the board of directors for the Human Milk Banking Association of North America, where she helps set guidelines and develop answers to complex questions related to collection, screening, processing, and distribution. These include whether women should be paid for their breast milk and who should use the milk. "Groups other than infants want breast milk, like athletes and cancer patients," she says.

Last October, Perrin attended a summit at Oxford University where global milk-banking representatives and the World Health Organization discussed ethical considerations that will guide future public health recommendations around access to human milk. "Human milk has been used outside the maternal-child relationship as far back as we know – the first U.S. milk banks formed in 1919. But the bioethics component is new," says Perrin.

"It's an exciting time to be in this field."

By Robin Sutton Anders • Learn more at go.uncg.edu/perrin



Tipping the Scales

The United States has an obesity epidemic, and the impact is expanding.

According to the Robert Wood Johnson Foundation, approximately 40 percent of American adults are obese. That struggle comes with increased risks for a host of illnesses, and even with a \$3 billion diet industry, the price tag of obesity-related medical care weighs in at \$147 billion to \$210 billion annually.

How do we address this thorny issue that can lead to lifelong health problems, reduced work capacity, and even death?

“Evidence shows it’s hard to alter obesity once it exists,” says Human Development and Family Studies Professor Esther Leerkes. So how do we intervene before the scales tip too far?

Much of existing research focuses on preschool-aged children and older, but that,

Leerkes says, may be too late. Almost 40 percent of American children between the ages of 2 and 5

are already overweight or obese, explains Nutrition’s Dr. Lenka Shriver. By their teenage years, they can develop hypertension and insulin resistance, increasing their heart disease and diabetes risks.

For some people, the foundation for weight gain could be laid even before birth.

That’s why a group of UNCG researchers, with a \$2.8 million grant from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, are launching a study that will follow mothers and their children from the third trimester of pregnancy to age two.

The project is among the first to simultaneously examine the biological, psychological, and social factors that could raise obesity risk, from infancy through toddlerhood, says Leerkes’ departmental colleague Dr. Susan Calkins. A multidisciplinary collaboration of researchers from the Departments of Human Development and Family Studies, Kinesiology, and Nutrition made the complex study possible.

The investigators will recruit 300 families from prenatal classes, obstetric-gynecologist offices, and breastfeeding classes. Undergraduate and graduate students will conduct five two-hour observational visits — prenatal and then at 2, 6, 12, and 24 months — to gather a wealth of biological and behavioral data.

Researchers will collect blood samples from mothers, and saliva and urine from children to analyze which biomarkers can impact a child’s obesity risk. They’ll also measure whether pregnant mothers’ hormone levels, such as leptin and adiponectin, impact children’s hormone levels after birth. These hormones influence metabolism, explains Kinesiology’s

Dr. Laurie Wideman, and play a role in the inflammation that increases our long-term risk for cardiovascular disease. “Currently, we don’t know how early that inflammation begins.”

The team will examine parent-child feeding behaviors, such as whether parents offer food to soothe a distressed child. And they’ll assess development of the children’s self-regulation abilities. “Early self-regulation skills,” says Calkins, “influence how well a child can control their impulses to overeat, eat unhealthy foods, or eat when they are upset.”

The ultimate goal, Leerkes says, is to put children on the right track for healthy weight, right from the start.

“We’re all hoping our findings will influence interventions in the future,” she says. “We’re hopeful the knowledge will be useful to pediatricians, nurses, child development specialists, parents, and educators.”

By Whitney J. Palmer • Learn more at igrow.uncg.edu

The iGrow team’s combined expertise in parenting, child health, and nutrition research was critical to securing NIH funding, says Calkins. Cheryl Buehler, Susan Calkins, Esther Leerkes, Lenka Shriver, and Laurie Wideman lead the ambitious study.





LIFE *after* LOSS

Look no further than your local drug store's sympathy card section for a host of euphemisms for death. "We are a death-denying society," says Dr. Denise Côté-Arsenault. We say people "rest in peace" or "pass away."

"We don't want to talk about somebody dying."

That conversation becomes even more difficult for loved ones — and medical professionals — of parents who lose a child during pregnancy. "Those babies have not been part of society; people haven't seen them pushed down the street in a stroller. It's easy to ignore those deaths," the nursing professor says. "But they are very real to the mother and the father."

Maybe it's because she spent the first 20 years of her research career working with mothers who became pregnant again after losing a child. Or maybe it's because she now studies perinatal palliative care programs, which support parents who know their babies will not survive. But Côté-Arsenault doesn't shy away from the death conversation — she knows it's the only way to ensure that life goes on for the survivors.

"When parents lose a baby, they feel the loss of their future," says Côté-Arsenault. "They thought they would have their whole lives with these children. When you can't talk about it, it makes it difficult to grieve, which can lead to depression and anxiety — and fear during future pregnancies."

When Côté-Arsenault came to UNCG seven years ago, she won National Institutes of Health funding to follow 30 parents after they discovered, mid-pregnancy, that their babies wouldn't live. She and her physician colleague interviewed parents who

chose not to terminate through the ensuing months to better understand their experiences, including interactions with doctors and nurses.

Their findings now help inform health providers and the United States' 136 perinatal palliative care programs — a small but growing field providing care for these parents. "I think most people have the impression that parents try to get on with their lives as quickly as possible and not think about the baby, but the exact opposite can be true," Côté-Arsenault says. "Many try to make the most of every day. They read to their babies in utero, they play music for them, and they are so thrilled to actually meet their baby at birth, even if their baby dies very quickly."

Côté-Arsenault's pioneering research has also helped health providers understand why, when caring for pregnant couples, they should recognize previous losses. "Women who've lost a child have specific pregnancy anxiety," she found, in an earlier NIH study. This anxiety can lead to detrimental outcomes for both the mother and her current child.

"It's not just the baby that parents are pregnant with right this minute that needs to be the focus," Côté-Arsenault says. "We need to give much more holistic care."

Next, Côté-Arsenault plans to travel to Scotland, to study approaches to perinatal loss in a different culture.

"People ask me why I do this research," she says. "At least 25 percent of all conceptions end in a loss. It's important to recognize that pregnancy doesn't always end the way we hope, and these parents deserve the best care we can possibly give."

By Robin Sutton Anders • Learn more at go.uncg.edu/cote-arsenault

Weighing What You Think

Stephanie Pickett saw many patients with end-stage renal failure while working as a nurse at Duke University Medical Center in vascular radiology. A large portion of those patients were African American.

“It was very striking,” says Dr. Pickett, now an assistant professor in nursing. “They had lost kidney function due to diabetes or high blood pressure. It moved me to want to do something about it.”

She went back to school, becoming a nurse practitioner and ultimately earning her Ph.D. Now she conducts research examining cardiovascular risk factors, with a particular interest in obesity and obesity-related chronic illnesses among young African American women.

“Fifty-seven percent of African American women between 20 and 39 are obese, compared to 33 percent of white women,” Pickett says. “Excess weight is a major risk factor for cardiovascular disease.”

While many scientists look at behaviors leading to obesity, Pickett has taken a different tack. A large section of her research has focused on beliefs people have concerning their weight and overall health, and the impact of those beliefs.

Rosalind Peters, a Fellow of the American Academy of Nursing who chaired Pickett’s doctoral committee, says her research has filled a gap in the field.

“She realized no one had developed a scale about one’s beliefs about personal weight,” Dr. Peters says. “There were scales about what people believed about obesity in general, but there were no scales that measured what people believe



regarding the causes and consequences of their own weight.”

Pickett found that culturally-related beliefs about personal weight affect eating behaviors and body mass index. African American women who pointed to life circumstances and other factors out of their control as the cause of their weight, for example, were more likely to be obese.

“Surveys on beliefs about personal weight

should be used as a component of weight management interventions,” she says.

More recently, Pickett has looked at stress, emotions, and eating patterns among young African American women. She found perceived stress and depression are significantly associated with emotional eating, sweet snacking, and haphazard meal planning. These findings, she says, have important clinical implications. When African American women say they are stressed or depressed, providers may need to ask more specific questions about food habits.

In her latest project, Pickett is taking hair samples to look at chronic stress and psychosocial factors associated with eating behaviors.

“Chronic stress can be measured by looking at cortisol in hair samples. Hair grows about one centimeter a month, and we’re taking three centimeters,” she says. “This allows us to compare physical indicators of stress over three months with the results of questionnaires asking about stress and emotions.”

In addition to helping prevent weight issues, Pickett said she would like for her research to create increased awareness of health concerns in African American communities.

“This is an opportunity to put a spotlight on certain problems that African Americans have, like chronic stress, and how they can negatively impact health long term,” she says. “And it’s an opportunity to develop interventions that have an impact.”

By Robert Lopez • Learn more at nursing.uncg.edu/faculty-res

“One in three African Americans has high blood pressure,” says Pickett. In one of her first studies, she found that African American women were more likely than men to attribute high blood pressure to stress. People who attributed hypertension to an external factor like stress, she found, were also less likely to engage in healthy self-care behaviors.



MAN IN THE MACHINE

Context is key for Dhillon, whose recent work includes an exploration of cyberstalking in the *Journal of Business Ethics*. That focus has also led him to critical work on the uses of information systems theories. "If we come up with a theory in North Carolina," he asks, "how well does that apply in Hong Kong?"

When it comes to cybersecurity, everyone has skin in the game.

Individuals worry that their financial data and social media identities won't remain private and secure. Corporations spend millions to shield their computer systems against hackers and intellectual property thieves. Governments may play both sides of the issue, seeking to spy on the computer systems of friend and foe alike while struggling to protect their own data systems from unauthorized entry.

Long before cybersecurity was the stuff of daily headlines, long before average citizens worried about protecting their Facebook data, Professor Gurpreet Dhillon was focused on nuanced security factors not usually considered in information systems curricula.

Dhillon, head of the Bryan School's Department of Information Systems and Supply Chain Management, theorized early in his career that human factors – social and behavioral aspects – are as critical to cybersecurity as technical elements.

"The nature of the technology is that we get consumed in the knowledge and the technical controls," he says, "and we ignore everything else."

But no computer, he wrote in a textbook over 20 years ago, has ever been arrested for a computer crime.

The gray area between technology and people continues to drive his research. It's an increasingly challenging field, he explains, as data platforms with global reach – such as Facebook and LinkedIn – grow ever larger. Swimming in this giant data ocean are hundreds of millions of individuals, as well as the businesses that want to connect with them. Though international borders disappear in this cyber universe, different cultures, societies, and people bring their own values, standards, and assumptions to the mix.

The result, Dhillon observes, is a digital world fraught with chasms, places where security provisions of digital service providers and corporations don't intersect with expectations of individuals. Dhillon calls these chasms "value gaps."

Much of his current research involves identifying value gaps, determining methods to measure them, and offering alternatives. In 2002, Dhillon introduced the concept of value-focused thinking to the field of information systems research. It provided the foundation for his research into social identity threat assessment. One of his most recent publications, for the journal *Decision Sciences*, offers policy makers guidance on assessing value gaps.

"What information do users want publicly available? What information are companies making available? How well does intent compare to reality?"

Businesses and governments are human constructs, Dhillon points out. They are by nature imperfect and fluid. Cybersecurity challenges, he notes, often result from misinterpretations and missteps by the organizations entrusted with handling information.

Dhillon, who earned his Ph.D. from the London School of Economics and Political Science, seems to be both behavioral scientist and statistician, analyzing patterns of seemingly unrelated data to make statistically accurate predictions. During the Arab Spring, he was among the experts tapped to predict where North African rebels would move and strike next.

Governments still seek Dhillon's counsel on security issues. Just don't ask which ones. That information is secure.

By Tom Lassiter • Learn more at go.uncg.edu/isscm



WOMEN'S WORK

Having grown up on a tobacco farm, UNCG Archivist Erin Lawrimore understands how important that cash crop was for North Carolina. The associate professor knows the impact the once-booming textile industry had on our state. And over the years, she's witnessed both industries collapse and North Carolina search to replace them.

There's education, technology, and medical research. And a new, burgeoning industry with an estimated \$2 billion annual economic impact: craft beer.

It's a dispersed industry, with more than 250 small business owners scattered across the state. Which is why, in the fall of 2017, Lawrimore and her colleagues set out to systematically document the history, business, and culture of beer and brewing in North Carolina, starting in downtown Greensboro.

The digital project – Well Crafted NC – was made possible through a University Libraries Innovation and Enrichment Grant.

After months of oral interviews with local brewers and brewery owners, historical research, and a successful community launch event, something caught Lawrimore's attention: old beer recipes dating back to the 1800s.

The home brewers behind these recipes? Women.

"Until the brewing industry was industrialized after Prohibition, women

brewers were plentiful," she says. "Brewing was considered 'women's work.'"

As brewing turned into big business, women's roles were minimized. When craft beer began to grow in popularity, women remained underrepresented, with the burly, bearded man becoming the stereotypical "brewmaster" image.

Last summer, Lawrimore decided to expand Well Crafted NC to explore the role of women in the industry today.

"A 2014 survey found that 21 percent of craft breweries had at least one woman founder, owner, CEO, or head brewer," says Lawrimore. "It's more than I think most people would assume – and that was five years ago. I would think that number has gone up."

She argues that women have remained an integral part of the industry since industrialization – they just haven't always been as visible as men. But with the shift to craft beer and the recent focus on the "craftsperson," we're starting to see the women behind the beer.

"The brewer has gone from someone quietly brewing beer in the back to a public face for the business."

With support from a UNCG Faculty

Lawrimore launched Well Crafted NC with colleagues Richard Cox and David Gwynn, who work on University Libraries' digital projects. "We're bringing university resources to local groups to help them tell and preserve their stories," she explains. "We're also expanding access and creating more robust, representative historical records."

First grant, Lawrimore interviewed 23 women brewers and brewery owners across the state. Several themes emerged. First, many women have come to brewing from other traditionally male-dominated industries, including construction and IT. Also, most of the women have completed formal education programs. And finally, they rely on a strong support network.

"Women are still fighting stereotypes. They have to have the formal training and work really hard to prove that they belong."

While many of the previous Well Crafted oral history interviews focused on the history of the breweries, Lawrimore is focused on the personal stories of these women, all of which are available online.

"A lot of breweries are following that trend of local, craft, with a focus on story, and that's what Well Crafted NC is trying to capture," she says.

"This project allows these women to share their stories in their words, without any editing. Fifty years down the road, we'll have a snapshot of this industry in this moment in time – the women and men who are driving it and how the industry came to be."

By Alyssa Bedrosian • Learn more at library.uncg.edu/dp/wellcraftednc

DOCTORED MOLECULES

Associate Professor Mitchell Croatt is a rising star in the field of synthetic organic chemistry, designing and developing new reactions with a focus on medicinal applications. Over the last five years, the Department of Chemistry and Biochemistry head has published 20 papers and received over \$815,000 from funders including the National Institutes of Health, the North Carolina Biotechnology Center, and the American Chemical Society. He is a recipient of the CAREER award, the National Science Foundation's most prestigious grant for early-career faculty.

BETTER, STRONGER, FASTER

"In my lab, we do medicinal chemistry, tinker with new biofuels or compounds made from renewable sources, and more – but the overarching philosophy is to make molecules in fewer steps.

"For example, in a recent Stanford collaboration, we worked on a compound thought to have potential to reduce oxidative damage after a stroke. We cut the steps to produce it in half. And developed a method to produce several similar molecules in one or two additional steps.

"The fewer the steps, the less waste. More steps lengthen the time to make a compound, decrease chances a pharmaceutical company will be interested, and so on. We're trying to make molecules more efficiently."

FINE-TUNING NATURE

"As part of UNCG's Medicinal Chemistry Collaborative, I work with scholars on campus and at other universities, and industrial partners, to improve the ways we treat disease. Several of my studies, conducted with Dr. Nicholas Oberlies in our department, focus on optimizing naturally occurring compounds.

"Oberlies' research group has isolated compounds from fungi that have anti-cancer properties. But fungi don't really care about curing cancer in humans, so they haven't exactly honed those compounds for anti-cancer activity. Our lab modifies those molecules to try to make better drugs.

"In one project, we created six fluorinated versions of a molecule currently used as an antifungal drug in humans and animals. By adding fluorine to that compound, which has also been reported to have anti-cancer effects, we make it harder for the body to metabolize. Imagine taking one pill a week instead of two pills a day. That's the kind of thing we're aiming for.

"In a different project, we selectively modified different functional groups of a very complex natural molecule, to understand which parts make it toxic – and to increase and decrease its toxicity.

"Another way we improve compounds is in collaboration with UNCG's Dr. Patricia Reggio, who specializes in computational chemistry and computer-aided drug design. Her lab creates models that help us understand why a molecule, or a modification to a molecule, works the way it does."

GOING WITH THE FLOW

"We were collaborating with Dr. Reggio – on creating molecules that more specifically target pain receptors – when we started to delve into flow chemistry. That has been an unexpected and fun avenue of work.

"Flow chemistry is a different way to do reactions. In your typical experiment, you add reagents to a flask, they react, you stop the reaction at a certain time, etc. In flow chemistry, you're running reagents through tiny tubes and where they meet, they mix. The length of tubing where they interact is the reaction time length.

"There are major benefits. You can heat, cool, and pressurize reagents better and much more easily. It's also safer. We have had to work behind a blast shield when we use explosive reagents, but if you do it with flow chemistry, the volume is so low that the tube will just pop if it explodes.

"Flow chemistry is very popular in the pharmaceutical industry, but our lab is one of just a few in the UNC System currently using it.

"We use a 3D printer and parts bought easily online to create our instruments, and we've developed an app to run them.

"We're trying to make it accessible to more researchers. You can buy a flow syringe pump for around \$10,000, or you can check out our lab's YouTube videos and make your own for under \$100. A lab in Germany has already built one of our systems. And a local biotech company is using one."

SYNTHESIZING NEW SCIENTISTS

"The products of my research I am proudest of are the researchers themselves. I've mentored over 65 so far, including more than 40 undergraduates and 12 graduate students. It's the part of the job I look forward to the most.

"I received the NSF CAREER award partly for my lab's work on cyanocarbenes, which opened up a new pathway to assembling all sorts of molecules. The reaction we designed gave us access to a whole new area of research and landed us the cover of a top journal in organic chemistry. But the award also required a strong teaching component. It's the teacher-scholar model.

"For me, UNCG offers the perfect balance of teaching and research. We have great students and the research infrastructure to do great things. We're competing with the top universities for all these grants, and we're getting them – so we're really doing cutting-edge research with our students.

"Being able to position these students for success has been fantastic. I wouldn't be where I am if not for my mentors, and it's great to pay that back. I pursue diverse research projects because I want my students to be thinking about the different ways organic chemistry can impact projects and society in general. We want to help out humanity."

Interview by Sangeetha Shivaji • Learn more at chem.uncg.edu/croatt





PLUCKY PEDAGOGY

Dixie Ortiz, undergraduate researcher

Dixie Ortiz was a fifth-grader when she first heard the violin.

A teacher at her elementary school in Winter Haven, Florida, was performing to generate interest in the orchestra program. Ortiz was captivated.

"I thought it was the most beautiful, wonderful sound I had ever heard in my life," recalls the UNCG senior.

Ortiz had grown up listening to mariachi music and Mexican artists. Classical music was a new discovery for the young girl. That was 11 years ago.

She's now on track to earn a music education degree this spring.

Ortiz chose UNCG, she says, because of Associate Professor of Music Education Rebecca MacLeod and her work on the Lillian Rauch Beginning Strings Program. The ambitious project has provided free music instruction to hundreds of local children over the years, many from groups underrepresented in string education. The program, which involves a partnership between UNCG, the Greensboro Symphony, and two Guilford County schools, also allows music education majors the opportunity to develop as teachers in a diverse setting.

Ortiz, whose family couldn't afford music lessons, turned to YouTube videos for further instruction. Understanding how hard it is for some students to access music education has fueled her desire to teach music in underserved public schools.

"I knew that I wanted to come here and make a difference," she says.

She's made a difference at Guilford County's Peck Elementary, through teaching but also through scholarship. As a freshman, Ortiz examined how families from diverse backgrounds prefer to communicate with teachers. The study, funded by a UNCG Undergraduate Research, Scholarship, and Creativity Office grant, aimed to increase parental involvement in school-related activities.

"I had no idea what research was

about," Ortiz recalls. "I understood that it was to increase knowledge and understanding, but I didn't know what it would look like in the context of orchestras."

She found that preferred forms of communication – from text messages to calls to email – varied by cultural group. She also learned it was easier to connect with parents during the day, because many worked at night.

Ortiz's latest research project looks at peer mentorship as a model for private music instruction. In near-peer mentoring, an older student mentors a younger student. At Peck, middle and high school students who graduated from the elementary school's violin program return to help mentor and teach.

She found that near-peer mentorship benefits both mentees and mentors. Younger students experienced greater success with their instruments. Mentors reported improved communication and leadership skills and increased interest in playing and in collaborating with others. They found that teaching helped them better relate to their own teachers. The experience also made mentors more attentive to their own performance, raising their own skills.

The research, which she plans to present this spring at the annual American String Teachers Association Conference, won third place in the arts and humanities category of UNCG's undergraduate research expo last year. She also presented it at the SoCon Undergraduate Research Forum.

Ortiz hopes her findings will lead to more funding for programs in socioeconomically disadvantaged schools like Peck, so students from any background can get instruction previously only available to people with means.

By Tina Firesheets

Learn more at ursco.uncg.edu

THINGS FALL APART

Matt Phillips, graduate researcher

As a rising literature scholar and doctoral student in English, Matt Phillips is used to examining how meaning comes together in literature.

These days, however, he's more interested in how things fall apart and, perhaps more importantly, how that decay affects us.

"I'm interested in entropy and empathy and the interplay there between," says the recipient of UNCG's Lisbeth V. Stevens Scholarship. "Those are the two things I'm always looking for in literature. How can this concept of thermodynamics inform us about a very human concept like empathy?"

Entropy, the notoriously complex principle at the center of Phillips' scholarship, can be described as chaos or the tendency of the universe to decline into disorder. Where physicists and chemists examine entropy in the context of thermodynamics, Phillips investigates it in fiction and nonfiction.

What happens when social structures, political systems, racial identity, or interpersonal relationships break down? Entropy can explain a cup of coffee cooling and ice melting in a glass, but can it offer insight into what happens to a person whose identity dissolves under the pressure of changing social norms or a British conqueror displaced from his place of power?

His hypothesis so far? Entropy results in an increased capacity for human compassion and empathy.

"It's essentially the degradation or breakdown of a closed system, whether that system is a universe or a person," Phillips says. "For example, in Toomer's 'Cane,' I looked at that degradation in terms of violence. By the end of 'Blood-Burning Moon,' a very violent short story in the book, we see an overt merging of characters who were once diametrically opposed. There's no happy ending at all, but you can see increased potential for interpersonal understanding."

Phillips, who also earned his master's degree at UNCG, presented his thesis

"Entropy and Equilibrium in Jean Toomer's 'Cane'" at the Society for the Study of Southern Literature Conference.

Entropy isn't the first scientific concept to arrest Phillips' attention and inspire his scholarship. He's presented on Mary Shelley's "Frankenstein" at the British Women Writers Association conference, and his essay on cryostasis and preservation of modernism in Don DeLillo's "Zero K" won the UNCG English department's Graduate Student Essay Award.

The breadth of works he explores is one reason his scholarship receives interest. Phillips' latest examination of empathy and the noble savage myth, which took UNCG's Atlantic World Research Network Graduate Student Research Prize, contrasts texts written four centuries apart. "I think if we're noticing repeating patterns throughout centuries of artistic production, that may hold some truth we could use."

A lifelong lover of sci-fi novels, Phillips was first inspired to explore entropy after reading Philip K. Dick's novel "Do Androids Dream of Electric Sheep?" He believes scientific principles can be used to great effect in literature to illuminate the human condition.

"What's more important than empathy, really?" Phillips asks. "If we can use a quantifiable scientific principle like entropy and filter it through literature, we might be able to further understand human connections and further understand each other."

By Victor Ayala

Learn more at grs.uncg.edu





INTO THE REEDS


IN TWO SEPARATE, QUIET CORNERS OF UNCG'S PEABODY PARK there lies exquisitely fertile terrain – for wildlife, for native plants, and for research. The work that takes place there spans from water quality to mammal diversity to STEM education to recreational therapy.

Wetlands are among the most productive ecosystems in the world. They provide numerous environmental services, raising runoff water quality and increasing biotic diversity. And when used as living laboratories, wetlands are also extremely productive academic ecosystems.

UNCG's two wetlands, created in 2017, have quickly become a nexus of research and learning, for the university community and beyond.

Peabody Park dates back to 1901, when the first university president Charles Duncan McIver established it as a place for recreation and hands-on learning for students. Part of the park held a man-made lake, which was drained in 1954.

Sixty years later, Dr. Lynn Sametz – co-director of the UNCG Research and Instruction in STEM Education Network – took a stroll through the park with John Byrd, who had just led a workshop on campus. Sametz and Byrd were discussing creating a wetland as a living laboratory at a nearby high school, and then it occurred to Sametz: why don't we have them here?



“To love a swamp, however, is to love what is muted and marginal, what exists in the shadows, what shoulders its way out of mud and scurries along the damp edges of what is most commonly praised. And sometimes its invisibility is a blessing. Swamps and bogs are places of transition and wild growth, breeding grounds, experimental labs where organisms and ideas have the luxury of being out of the spotlight, where the imagination can mutate and mate, send tendrils into and out of the water.” — BARBARA HURD, “STIRRING THE MUD”

The idea of wetlands on campus caught on quickly. The next year, in 2015, the Wetlands Committee was formed. It included faculty and staff from the College of Arts and Sciences, the School of Education, the School of Health and Human Sciences, and the Joint School of Nanoscience and Nanoengineering, as well as representatives from the Peabody Park Committee, City of Greensboro Water Resources, Greensboro Science Center, and Audubon Society. The committee brought internationally renowned wetlands restoration expert Tom Biebighauser to campus to scout potential locations.

In March of 2016, Sametz, Associate Professor of Biology Malcolm Schug, and now-Provost Emeritus of Biology Parke Rublee submitted a proposal to Provost Dana Dunn, who approved the project. The committee secured a \$46,112 grant from Duke Energy Water Resources, as well as support from the UNCG Green Fund.

The following March, Biebighauser led a two-day workshop for more than 100 volunteers made up of facilities staff, faculty, students, and community members. They worked together to construct the two wetlands – one in Peabody Park Woods and one in an open area on the recreation field, the same location Sametz and Byrd had identified when they first conceived the idea.

With opportunities for research and teaching in biology, chemistry, environmental studies, recreational therapy, creative writing, and beyond, the construction of the UNCG Wetlands has revived McIver’s original intention for Peabody Park, and spurred new developments across disciplines.

“Our goal was to put these wetlands on our campus as a resource, for all our faculty doing any kind of research or teaching,” said Schug. “What we see is that there’s a large variety of interested parties.”

The wetlands play an essential part in implementing the National Science Foundation-funded Council for Undergraduate Research Transformations Project, to develop and expand curricula related to undergraduate, high-impact learning. They are a site for multiple high-stakes research projects in biology, chemistry, and education, and their potential for science outreach activities grows daily as more educators from UNCG and across the county learn about them.

To help monitor the health of the new ecosystems and establish and operate outreach programs, the biology department recruited doctoral student Kristina Morales to serve as the UNCG Wetlands graduate assistant. Morales grew up in Florida, near the Everglades. With a close view of how development has affected water quality and environments near her home, Morales feels strongly connected to wetland areas and what can be learned from them.

“I knew I wanted to place myself between human impacts and ecosystem impacts, somewhere between human health and nature’s health.”

On the campus wetlands, Schug, Sametz, Morales, and others help students become contributors to online data collections such as eMammal, known in North Carolina as “Candid Critters.” Through this database, users capture photos of organisms they spot and submit them for identification by expert biologists, so they are stored and available for other researchers and citizen-scientists.

Undergraduates monitor motion-activated cameras to track animal activity. So far, they have logged grey and red foxes, coyote, deer, racoons, rabbits, box turtles, mice, a variety of birds including owls and hawks, and bats.



GETTING YOUR FEET WET Wetlands graduate assistant Kristina Morales (center) tests water quality with young students as part of a Saturday Academy, a learning experience designed to engage middle school teachers and students in STEM.

“We’ve made interesting discoveries about what bats do in different parts of the state,” says Kalcounis-Rüppell. “Some bat species that normally hibernate aren’t doing so on the warmer, coastal plains.”

That could have important implications for species threatened by white nose syndrome, a disease killing millions of North American bats. It only attacks during hibernation.

CALLS OF THE WILD

Acoustic data gathered from the UNCG Wetlands are part of an ambitious effort to amass data related to bats across the continent.

Of the approximately 5,000 species of mammals, nearly a quarter are bats. They trail just behind rodents, to form the second largest group of mammals across the globe. Despite that diversity, and the fact that bats are an essential part of many ecosystems, they are elusive to most people, including wildlife specialists.

"They're awake when you're asleep and when you're awake, they're gone. Nocturnal animals are really hard to study," says Professor and Biology Department Head Matina Kalcounis-Rüppell. "Our research is about opening a new window of observation."

With funding from the U.S. Fish & Wildlife Service, and in partnership with the North Carolina Resources Commission, Clemson University, and the South Carolina Division of Natural Resources, UNCG biology researchers from Kalcounis-Rüppell's Bat and Mouse Lab are monitoring 161 bat research sites across North Carolina, a number that has more than doubled over the past two years.

Their work on the Carolinas Regional Acoustic Bat Survey has also served as a pilot for the North American Bat Monitoring Program, or NABat, a survey effort that spans the continent to promote bat conservation.

The North Carolina sites range from sea level at Fort Fisher to the Blue Ridge Parkway at 6,000 feet, to downtown Charlotte, and everywhere in between. As home to both northern and southern distributions of bat populations and a wildly varying range of ecosystems, the Carolinas are extremely fertile for biological research. North Carolina boasts 17 different species of bats, the largest number on the East Coast.

Data collected by UNCG are useful to groups interested in bat distribution, from the U.S. Forest Service to the State of North Carolina and the Eastern Band of Cherokees. The information can affect land use

decisions and priority management of wildlife.

"The work is really interesting because of the scale," says Kalcounis-Rüppell. "We can say what's important to bats at a larger scale – say, across the state – instead of at just one or a few sites."

The data are also used by scientists at UNCG to answer important ecological questions, from studies on bat social behavior to questions about how water quality affects animal populations.

Postdoctoral researcher Han Li compares bat populations to assess the impact of human activities. He also trains state biologists working with bats. In 2017, Li received the Golden Bat Award from the North Carolina Bat Working Group, in recognition of his contributions to bat conservation.

"We really can't take the risk of losing them," he states in the UNC-TV documentary "Saving Bats," which also aired on PBS. "Just based on pest control, bats can save billions a year for the farming industry of the United States."

Researchers know bats are essential to human health.

"The job that bats are doing is really critical for ecosystem functioning around the world," says Kalcounis-Rüppell. "Without bats, we'd be overrun by insects. If bats were taken out of the environment, it would be devastating – for agriculture, for disease control, for plants. They're providing a major service."

They're also an excellent bioindicator species.

"If bats are doing well, that's a good indicator of the health of the environment," she says.

On campus, the researchers are tracking bats to measure the restored wetlands' impact on biodiversity. Over the last year, they have analyzed nearly half a million bat calls from the UNCG Wetlands.

"Studies on bats are a powerful way to ask questions about these broader issues," says Kalcounis-Rüppell. "It's not just about bats."



GOOD LISTENERS Bats use ultra-high frequency sound waves to find prey and avoid obstacles in the dark. Kalcounis-Rüppell (left), Li (right), and their collaborators set up recording equipment at research sites, capturing every ultrasound produced from dusk to dawn. Back at the lab, they comb through hours of bioacoustic data to identify bats in the area.

Kalcounis-Rüppell has developed a similar system to study wild mice. "We know mice use ultrasound to communicate, but researchers don't really know what they're saying to each other," she says. As one of the only scientists studying mouse ultrasound in the wild, she's at the leading edge of her field. "We're seeing what these animals are doing in the dark."

Since the time of European settlement in America, more than 50 percent of the country's wetlands have been destroyed by commercial and agricultural development, removing crucial ecosystem services and much biotic diversity. Wetlands are also threatened by pollution, climate change and rising seas, and drought. Wetland restoration and construction are growing sustainable practices internationally.

OUTWARD GROWTH

The university wetlands are an important site for Dr. Heidi Carlone's "BRIDGES for socio-environmental good," a project awarded \$1.2 million from the National Science Foundation in 2018.

The Hooks Distinguished Professor of STEM Education works with her co-principal investigators – Dr. Sara Heredia and Appalachian State University's Dr. Lakshmi Iyer – to direct "Saturday Academies" for middle school students and teachers from Guilford, Randolph, and Rockingham Counties.

The researchers engage young students as "stormwater sleuths," who track where stormwater goes on campus and how it affects water quality, wildlife, and the ecosystem, in addition to how it could be managed through innovative building design.

"These are the experiences that they remember," says Carlone (photo right). "There is a visceral, emotional experience that occurs when we get kids outside and investigating."

The teaching model engages middle schoolers in environmental problems, and serves as a rigorous study on how to trigger and sustain STEM-related identities among diverse youth – and enhance teachers' STEM professional learning.



"Every kid has proclivities, interests, and curiosities that can be linked to STEM," says Carlone.

"We're not trying to make every kid into a scientist, but we are trying to cultivate a scientifically literate citizenry that appreciates what science and engineering do for our lives – for the betterment of our communities, our personal lives, and our environment."

ARE THEY BITING?

Another concern about constructing wetlands in populated areas? The potential for more mosquitos and associated public health risks. Associate Professor of Biology Gideon Wasserberg engaged students in his Landscape Ecology and Ecoepidemiology of Infectious Diseases courses in evaluating if the campus wetlands increase mosquito populations.

At wetlands and control sites, students positioned cups of water containing germination paper, which they collected weekly and studied in the lab, assessing numbers of eggs laid and rearing larvae to adulthood for species identification. Students also sampled the ponds, to assess them as potential breeding sites.

“Mosquito abundance is indeed higher,” says Wasserberg (photo right). The predominant species was the Asian tiger mosquito. “But surprisingly, larval yield from the actual ponds was negligible, probably due to the presence of natural enemies such as fish and dragonfly nymphs.”

The ponds don’t seem to be significant breeding grounds, he explains. But increased humidity and decomposing leaf litter around the ponds may be attracting mosquitos from nearby areas.



MERCURY RISING

Wetlands benefit water quality and biodiversity in many significant ways, but there is a flip side, and UNCG scientists are examining that too.

Unexpectedly, the biggest drawback isn’t mosquitoes, but methylmercury – a toxic, organic form of mercury produced by microbes in aquatic systems. Advisories about consuming fish and seafood refer to this type of mercury, a neurotoxin that has a longer residual life in the body than inorganic forms.

Assistant Professor of Biology Martin Tsz-Ki Tsui has studied mercury since 2002. The element netted his interest because of its complicated chemistry and the fact that it is the only heavy metal that can travel around the world in the form of gas.

“Even after four to five decades of research on mercury, there are still new things coming out,” he says. “Isotope analyses – which allow us to understand the sources of mercury we find – have only been used during the last 10 years.”

Tsui’s latest work focuses on mercury cycling in wetlands and identifying sources of methylmercury found in songbirds who inhabit wetlands.

“Recently it was recognized that mercury can interrupt the endocrine system in birds and mammals,” he explains. “Songbirds are quite sensitive.” Like bats, they are a valuable indicator species.

Graduate students in Tsui’s lab are carrying out their own projects on methylmercury in wetlands.

Kristina Morales collects monthly water samples and sediment from the campus wetlands and surrounding sites at Buffalo Creek, Guilford Technical Community College, and the Greensboro Science Center. She and Tsui are studying the connectivity of wetland sites and nearby waterways, and the potential for breakdown of methylmercury by sunlight.

Their latest results show the forested campus wetland area has slightly higher concentrations of methylmercury than the open field site.

Findings like these could contribute to future restoration techniques that decrease human mercury exposure.

Next, Morales hopes to compare mercury cycling in the recently restored wetlands to older, established wetlands. She suspects the newer sites are producing more methylmercury.

“You can’t simply replace ecosystem services,” she says. “They are of a certain age, and with the nutrient cycling and the way it’s functioning, it’s not something you can cut and paste.”

Further east, Ph.D. student Yener Ulus is examining whether saltwater intrusion caused by rising sea levels is raising the amount of methylmercury produced in coastal wetlands.

In the lab, Tsui and his students have found that adding seawater to freshwater wetland soils produces large amounts of methylmercury. That could have grave implications for coastal wetlands, Tsui says, as sea levels rise due to climate change.

Ulus, who comes from a coastal region of Turkey, is collecting samples from three types of landscapes in North and South Carolina: coastal wetlands, degraded coastal wetlands, and salt marshes. Results of his early analyses, he says, support their laboratory findings.

Ulus hopes to one day conduct similar research in his home country, with an eye on how coastal construction could affect health, fishing, and the economy. “My hometown is right on the ocean, and it relies on fishing and farming. Construction is going on right next to the ocean, and I believe this will be a big problem in my town and country in the future.”

While specifics of projects differ, the many students and faculty working at the UNCG wetlands all have similar goals. “It’s about filling in knowledge gaps,” says Tsui, “and promoting practices that improve human and ecosystem health.”

By Susan Kirby-Smith • Photography by Martin W. Kane • Learn more at wetlands.uncg.edu | biology.uncg.edu | soe.uncg.edu



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Data scientists can help us make smarter decisions about some of society's most vexing problems

If we have to be hospitalized, most of us hope to leave healthier than when we entered – or at least well on the road to recovery. But not everyone does.

Some patients head home and find themselves getting sicker instead of better, requiring even more treatment. Some even end up back in the hospital. What's the difference between patients who make a full recovery and patients who don't? One major factor is what doctors and nurses call "frailty" – a constellation of factors that include age, nutrition, psychological health, social supports and more.

When UNCG Assistant Professor of Nursing Deborah Lekan did her dissertation on frailty several years ago, she did a painstaking analysis of information drawn from electronic health records, which

had just begun to change how nurses and other providers cared for patients.

"I basically had PDF copies of nursing documentation and physician notes," she says.

Getting the information was time consuming and limited by how many records she could analyze herself.

But now, she and collaborators at UNCG and in Greensboro's Cone Health System are harnessing the power of computers, sophisticated statistical techniques, and machine learning to dive much deeper.

The goal: Identify patients at risk of not fully recovering, in real time, and improve the care nurses and others provide for them.

"The tool we're working on would allow clinicians to strategically target interventions

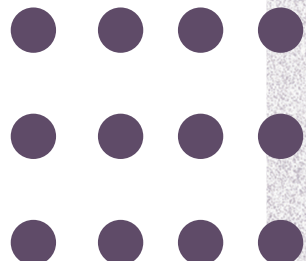
based on the risk factors present for an individual," Lekan says.

Her collaborators include Cone Health's Director of Nursing Research Marjorie Jenkins, as well as statistician Thomas McCoy and computer scientists Somya Mohanty and Prashanti Manda at UNCG.

Using cutting-edge data science techniques, the team is analyzing reams of information from patients – everything from physician notes to lab results and medications.

The idea is to develop machine learning techniques that can uncover patterns and insights that human practitioners might miss on their own.

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BIG DATA

It's part of a burgeoning field of research in "big data" that allows scientists to scoop up the vast amounts of data increasingly available in our digital world, discover new insights, and even train computers to make predictions – such as which patients aren't ready to leave the hospital.

The work often requires cross-disciplinary collaborations among computer scientists, statisticians, and specialists in academic fields as diverse as public health, government finance, and social justice. The techniques are being used to better diagnose disease, direct disaster response efforts, understand how social media drives news coverage and public opinion, and much more.

"I can train an algorithm to tell me certain inferences about data that are not possible when we look at it through human eyes," says Assistant Professor Somya Mohanty. "You need machine learning to help you out with that."

Dr. Mohanty has applied machine learning methods to a diverse set of problems. In cybersecurity research funded by the U.S. Department of Energy, he worked to use machine learning to predict attacks on computer networks. He's also part of an effort – funded first by the National Oceanic and Atmospheric Administration and now a UNCG Giant Steps Research Development Grant – to track tweets during and after hurricanes, to help identify areas of focus for disaster recovery efforts.

You can't do this work on a desktop. At UNCG, researchers harness powerful computers on campus, access

cloud computing capabilities, or use UNC System supercomputers. The files can be so huge that only part of a given set of data can be processed at any time – there simply isn't enough memory.

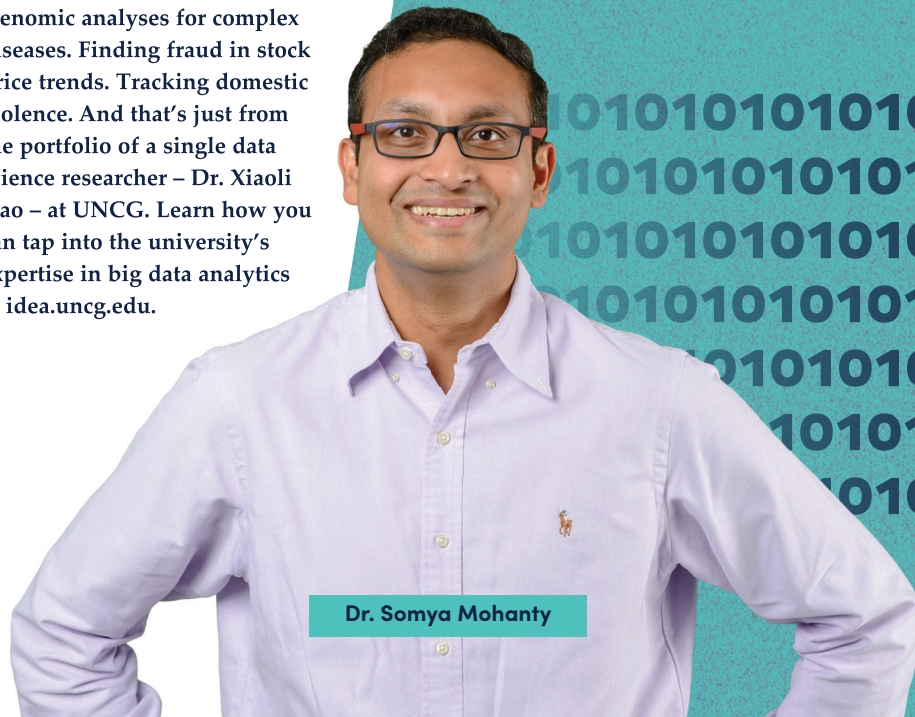
Much of that work is facilitated through UNCG's Institute for Data, Evaluation and Analytics, or IDEA. The institute connects data scientists and researchers from other fields – economics, education, sociology, nursing, kinesiology, geography, and more – to collaborate on data-focused projects. It also helps connect scientists with individuals and organizations outside the university that need help with data-focused research and data-informed decision making.

Big data applications are limitless: Gas detection technology. Genomic analyses for complex diseases. Finding fraud in stock price trends. Tracking domestic violence. And that's just from the portfolio of a single data science researcher – Dr. Xiaoli Gao – at UNCG. Learn how you can tap into the university's expertise in big data analytics at idea.uncg.edu.

WANT TO LEARN DATA SCIENCE?

UNCG is launching a master's degree with a concentration in data analytics and informatics. The interdisciplinary program gives students grounding in the math, statistics, and computer science needed to tackle a wide range of data-focused challenges, in areas ranging from business and social media to health care and genetics.

UNCG students, under the supervision of Mohanty, are working with local government agencies to help them develop software to analyze spending patterns, identify anomalous expenditures, and predict future spending. Another project focuses on bettering access to often messy courthouse data.



Dr. Somya Mohanty

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Dr. Prashanti Manda

Manda and Mohanty are mining more than a century's worth of academic journal papers across several fields to better understand what factors make some papers so influential, while so many others are published and then virtually disappear from collective academic memory. The work is supported by a Microsoft grant and includes access to the software giant's Azure cloud computing platform.

TEACHING COMPUTERS TO READ

UNCG researchers are also using big data to turn an inquisitive lens on academia itself.

Assistant Professor Prashanti Manda, in collaboration with Mohanty, is teaching computers how to read complex academic journal articles. The goal is to make research more accessible, cut down on duplicative research, and help scientists expand their knowledge faster.

In the last few decades, academics have published increasing numbers of papers on all sorts of topics. That means that while there's more knowledge out there, it's also harder to sort through the volume of information available.

A scientist focused on honeybee genetics, for example, might be interested in a very narrow topic, such as the role of a specific gene or a certain protein. But finding the relevant research can be very time consuming.

Papers are sometimes marked up in ways that make searching them electronically easier. In those cases, a person can go through and tag parts of the paper with specific terms, say "protein" or "disease." While that makes the papers more searchable, it is tedious and time consuming.

"With how many papers get published each day, each year, nobody can keep up," Manda says. "I want to develop text mining and natural language processing methods that can automatically 'read papers' and do this annotation themselves."

While the results of that process won't be perfect, it will produce annotated papers that people can double-check for accuracy much faster than they can do markups from scratch.



With support from a UNCG Giant Steps Research Development Grant, Manda is working with Dr. Olav Rueppell, a UNCG biologist and honeybee expert, to make the large volume of bee research more accessible to scientists.

TACKLING COMMUNITY CHALLENGES

Researchers at UNCG are using data science to deepen their impact on some of our region's most vexing issues, in areas such as housing, opioid abuse, and even government budgets.

Many of these projects are part of the MetroLab initiative, a partnership between the University and Guilford County. (Photo: UNCG researchers meet with Guilford County Budget Director Michael Halford.) Through the initiative, students and professors are developing tools to help local government understand the data they have better, and in the process create better solutions to community problems.

In one of the first MetroLab projects, researchers at UNCG partnered with local law enforcement, emergency medical services, and other first responders in Guilford County to tackle opioid overdoses.

The ambitious GCSTOP program, funded by an N.C. General Assembly allocation, collects and shares

data across agencies to allow for rapid, targeted interventions. "In year one, we want to reduce opioid-related deaths in the county by 20 percent," says program leader Chase Holleman.

Researchers are also tracking evictions in the county and what happens to those evicted. The data help guide the decisions of the pilot Eviction Diversion Program, a collaboration among UNCG, the Greensboro Housing Coalitions, the 18th Judicial District, and Guilford County.

"We're uncovering inequalities and opportunities for investment," says Center for Housing and Community Studies Director Stephen Sills. "It helps us understand what we can do differently."

As a MetroLab participant, UNCG belongs to a network of 44 cities, five counties, and 59 research universities. The research-driven, town-gown partnerships serve as testbeds for urban innovation.



TRENDING QUESTIONS

Across campus, Dr. Aaron Beveridge in the Department of English is using home-brewed software to better understand how social media influences the media and popular opinion.

The project sparked a few years ago, while Beveridge was in graduate school, when he watched “Tonight Show” host Jimmy Fallon make a claim without any discernible evidence.

“He said something like, ‘We just caused this to trend worldwide,’” Beveridge recalls. The assistant professor, who focuses on digital rhetoric, was skeptical. “Is that true? Can I question that? Because to say that something trends worldwide would be such a cultural phenomenon and so powerful – to make that claim without giving data is an unfair thing to do.”

The notion that a particular idea is “trending” – in recent years, based on lists of trending items that show up in social media networks and online platforms – is used for more than just late-night laughs. Journalists cite the idea that something is trending in news stories to explain why it might be important. Politicians tout trends as social proof to buttress their positions.

Beveridge wanted to know what it really means when we say something is trending and what that might tell us – or not tell us – about how widespread an idea is.

But there were some roadblocks.

The sources of online trend data, social networks like Twitter and search engines like Google, produce far more information than a single professor like Beveridge – or even a whole building of professors – could realistically expect to digest just by clicking refresh in a web browser. Social media companies sell access to their aggregated data, but it’s expensive.

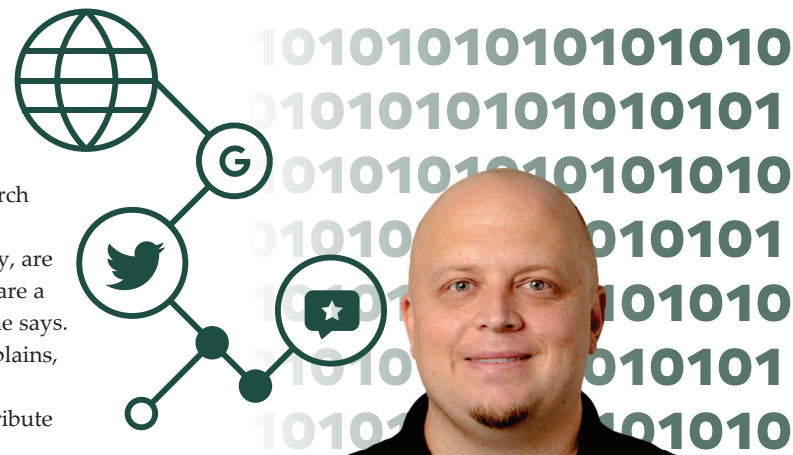
Beveridge, though, turned this problem into an opportunity. Working with a technically savvy collaborator, he helped produce free software that can be used to vacuum up data from Twitter, Google, Tumblr, and other sites. The software, MassMine, was developed with funding from the National Endowment for the Humanities.

It’s been invaluable to his research since graduate school.

“What I’m interested in, broadly, are the ways in which social networks are a macroscopic form of persuasion,” he says. Seeing something as a trend, he explains, creates authority behind it. Calling something a trend could even contribute to it trending.

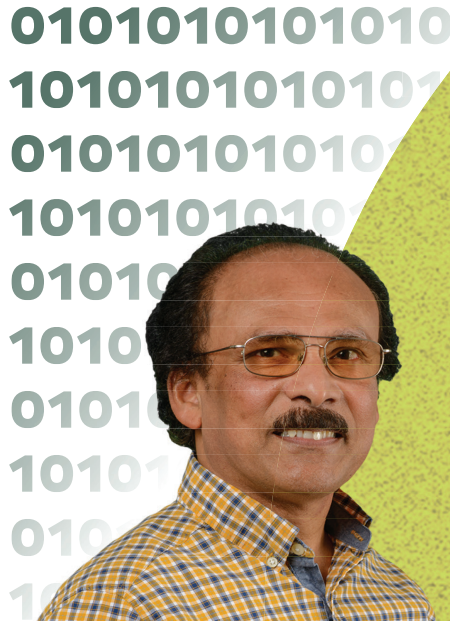
Beveridge is now conducting a study on news articles that use tweets as evidence that a particular topic or idea is “trending.” He’s compiling data from Twitter to see if those topics are, in fact, a major part of online conversations.

“We’re going to show how often tweets become the implied evidence for a trend or a public opinion when it’s actually not a significant public opinion from a data standpoint,” he says. “Or maybe it is. We’re going to let the data speak.”



Dr. Aaron Beveridge

SPINNING DATA •••



Dr. Shan Suthaharan

Modern computing has created a world where reams of data are being collected by millions of devices on a seemingly endless array of topics – consumer purchasing patterns, electronic patient records, electricity consumption, and more.

Machine learning techniques allow computers to plow through large datasets and discover hidden connections, yielding insights that allow aspects of business, society, or human behavior to be improved. “It’s the kind of knowledge that can cause a noticeable impact on something,” says Shan Suthaharan, a computer science professor and author of Springer’s 2016 “Machine Learning Models and Big Data Classification.”

But right now, those techniques are typically designed to tackle specific problems – whether it’s mining health information or power records. And that limits how fast society can find the digital gold buried in all the data that’s being collected.

Suthaharan is focused on developing intelligent machine learning models that function like master keys – a concept he calls “transformative knowledge discovery.” “You want to make the machine smarter,” Suthaharan says. “And you want the model to work across multiple disciplines and domains.”

In his quest to develop models that can be applied to many different datasets and address wildly different questions, Suthaharan is working on a wide array of projects – from detecting retinal diseases using images of eyes to classifying fruits and vegetables according to nutrition content. The common thread

SPEAKING FOR PATIENTS

In Lekan and Jenkins' patient frailty project, the goal is to let data speak for patients in a way that patients themselves and their providers might not always be able to.

The project pulls together clinical measurements, notes from nurses and doctors, demographic information, and other data – and sets machine learning algorithms loose on them to see if they can predict which patients will need additional care to properly recover.

“One of the benefits of our models is they actually tell us how important different features or variables are in making this decision,” Mohanty says. “We will be able to tell them ‘OK, this is a particular key variable which makes this a person who is at high risk of readmission.’”

The project started about two years ago and is still in the early stages. Just navigating the legal and technical issues involved in using large amounts of real patient data has taken some time. This summer, analysis was done on a subset of the entire data, and now the researchers are adding more records.

Patient readmission, especially among older patients, is a critical issue. Because of changes to how Medicare pays hospitals, they can

face penalties if patients leave and then must be readmitted within a month.

But the frailty project will break ground in other ways, too. One of the first research outcomes will be a kind of roadmap, illustrating how UNCG and Cone Health collaborated to tap into the massive amounts of data in Cone's electronic health record system. It will provide a guide to the legal and technical issues that researchers and hospitals face in using such data.

Electronic health record systems have been widely adopted in the last 10 years, and the software Cone uses is one of the most commonly used systems, so the research could have applications at thousands of hospitals.

Lekan's vision is an app on a hospital's electronic health records that could improve care. “It could red-alert the nurse,” she says. “It could prioritize treatments and flag the care specialists we want to loop in. Timely interventions are critical.”

By Mark Tosczak • Photography by Jiyoung Park, contributing photography by Martin W. Kane • Learn more at idea.uncg.edu | compsci.uncg.edu | english.uncg.edu | nursing.uncg.edu



Dr. Marjorie Jenkins & Dr. Deborah Lekan

INTO GOLD

is his interest in figuring out how to train computers to intelligently deal with very different kinds of data and still find meaningful patterns.

Suthaharan is also working on a second obstacle to widespread use of big data applications: privacy. As big data techniques uncover hidden connections in complex datasets, they can sometimes uncover hidden identities.

There are two kinds of information that can be private, he says. One is categorical information, such as someone's age or whether they have a certain disease. But the other type is numerical pattern information – patterns of data that can unintentionally reveal things someone does not want known.

Imagine, for example, data that a power company collects on household electricity use. Patterns in power usage could reveal when someone isn't home, making their homes more vulnerable to burglary.

“Privacy may be compromised,” Suthaharan says.

How do you protect privacy when the whole point of big data is to ferret out actionable insights and make predictions based on hidden patterns?

Suthaharan is working on smarter machine learning techniques that take privacy into consideration. You have to teach the computer to weigh security concerns, he says, while searching for useful insights. “It's about optimization.”

There's a trade-off with this approach – the more accurate a model is, the less able it is to protect privacy. His solution to that tricky question? Flexible mechanisms that allow individual data owners to decide how much they want to share.



THE TELL-TALE HEART

THEY ARE DIAGNOSES THAT NO ONE WANTS TO HEAR: heart failure, stroke, heart attack.

Heart-wrenching words – in more ways than one – that make up what we call cardiovascular disease, or CVD.

Most of us have a personal connection with CVD – a friend whose life was cut too short, or a family member who was able to identify risk factors early on and make lifestyle changes.

While the field of cardiology continues to grow, there's still a lot to learn about the leading cause of death among men and women worldwide.

That's where UNC Greensboro comes in. It's the kind of research that falls right in our sweet spot – real-world, high-impact, with scientists working across disciplines and with community partners to improve health and wellness in our state and beyond.

UNCG researchers are coming at this problem from a variety of angles. One group is working on a device to monitor CVD risk and identify a heart attack when it's happening. Another team is investigating how self-regulatory behaviors in early childhood affect cardiometabolic risk later in life. Other researchers are targeting interventions for specific populations, such as women and individuals with type 1 diabetes.

Call it a campus-wide assault on CVD – one that's poised to make an impact.

TICK-TOCK

During a heart attack, the phrase “every minute matters” is not a cliché. It’s a harsh reality with what can be deadly consequences.

Cardiologists will tell you that “time is muscle.” The longer you wait before getting treatment for a heart attack, the more heart tissue dies.

Typically, when emergency personnel arrive at the scene of someone experiencing heart attack symptoms, they use an electrocardiogram, or EKG, to measure the heart’s electric activity and determine if a heart attack is taking place. But here’s the catch: For about half of individuals experiencing a heart attack, an EKG won’t detect abnormalities.

If the EKG confirms a heart attack, emergency personnel can activate a system in which the hospital swiftly prepares for the incoming patient. If not, the patient has to go through the emergency department and do additional testing to confirm the heart attack.

Meanwhile, tick-tock goes the clock. And more heart muscle dies.

UNCG’s Dr. Jianjun Wei in the Joint School of Nanoscience and Nanoengineering has found a potential solution in a point-of-care biosensor built with nanostructures.

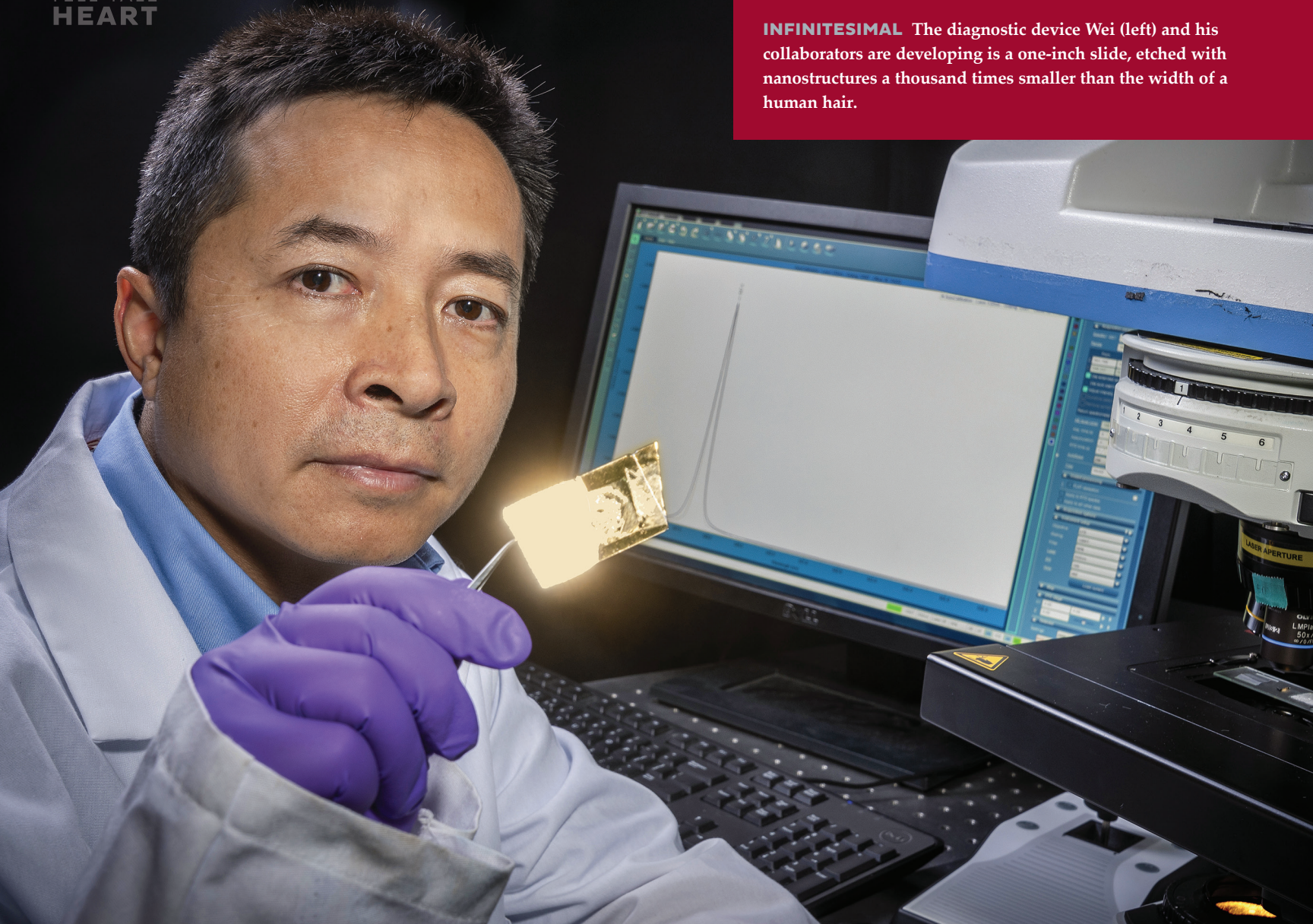
It all starts with biomarkers: substances in an organism whose presence, in this case, is indicative of disease.

Troponin, a family of proteins found in the cardiac and skeletal muscles, has been identified as a biomarker for CVD and can be measured in a simple blood sample. When the EKG results are inconclusive and patients head to the hospital for more blood work, this is the biomarker that medical professionals are looking at. But again, it takes too much time. And time is muscle.

Wei’s solution is a biosensor that, with the simple prick of a finger, would detect high troponin levels almost immediately, right at the scene.



INFINITESIMAL The diagnostic device Wei (left) and his collaborators are developing is a one-inch slide, etched with nanostructures a thousand times smaller than the width of a human hair.



In 2015, Wei received a \$306,000 National Science Foundation (NSF) grant to focus on the first step in the process: perfecting the protein detection chip. In 2018, Wei's team received a \$50,000 NSF I-Corps grant to conduct customer discovery interviews and begin commercialization of their technology.

Wei and his team are designing the device specifically for the pre-hospital setting – for the paramedics and EMTs serving on the front lines. Wei is focused on the protein delivery and detection technology, while Dr. Taylor Mabe – who completed his Ph.D. in Wei's lab in 2018 – serves as the entrepreneurial lead.

As Mabe gets feedback from potential customers and partners in the community, Wei makes appropriate changes to the chip, with additional guidance from Glenn

Seymour, a senior-level sales and business development executive with decades of experience in bringing products like this to market.

In the fall, Mabe participated in a ride-along with Chris Wilson, Guilford County Emergency Services manager and public information officer. The experience showed Mabe just how chaotic these emergency situations can be – and how well the final device will need to hold up in these conditions.

"The device will need to be durable, easy to use, and accurate. It needs to withstand temperature changes and motion – these are things we didn't think about at first," Mabe says.

The goal is to complete the device in the

next three to five years. Currently, the group is exploring a variety of funding opportunities to secure investment from a company with the engineering capabilities to design the device, which will include the sensor, a light source, a signal detector, and data processor.

Wei doesn't view the biosensor as a replacement to current methods. Rather, it would be used as a complementary technology – one that would increase accuracy and save time.

Down the road, there could be broader applications.

"It's not only for hospitals or medical professionals – it could be for individuals in their home," Wei says. "Eventually, maybe it's something that is integrated in your phone."



TAILORED FOR THE REAL WORLD Mabe (top left) says his experiences with Wilson (right) and Guilford County Emergency Services played a major role in the evolution of the device plans. Wei and Mabe have completed over 200 customer discovery interviews.

Wei isn't the only UNCG nanoscientist tackling cardiovascular health. Dr. Joseph Starobin has recently patented a new method of assessing how well our hearts are working. The associate professor, who is also an NSF I-Corps awardee, is working with Monebo Technologies, Rhythm Diagnostic Systems, and Unifi Manufacturing to develop the system into a wearable monitor of heart health.

BACK TO THE BEGINNING

Let's take a step back and rewind – from the 60-year-old with high CVD risk to the child who is just beginning to form healthy, or unhealthy, habits.

UNCG's Dr. Laurie Wideman is adamant: When it comes to CVD, it matters what parents are doing with their children, and it starts younger than they may expect.

The Safrit-Ennis Distinguished Professor of Kinesiology is part of a team that is looking at how self-regulation – our ability to manage our emotions and behaviors appropriately – in childhood impacts cardiometabolic risk development in adolescents.

It's a massive undertaking funded by a five-year, \$3.6 million grant from the Eunice Kennedy Shriver National Institute of Child Health and

Human Development. Yet it was a chance conversation between Wideman and fellow faculty member Susan Calkins that sparked the work.

Calkins and a team had been working for years on the RIGHT Track study, a project examining self-regulation and psychosocial outcomes in children over time. The human development and family studies professor had noticed that many of the children were becoming obese, and she began to wonder if there was a relationship between obesity and self-regulatory behaviors.

"Susan mentioned some of the results, and said she wasn't exactly sure what was going on," Wideman said. "I thought, 'this is amazing – no one in our field has this kind of rich data set involving hundreds of families across time.'"

FROM LAB TO LIFE

Wei and Mabe began their commercialization journey locally, as members of the 2017 Greensboro I-Corps cohort.

UNCG and N.C. A&T's joint Greensboro I-Corps program, part of the NSF's Innovation Corps initiative and one of only four sites in the state, helps faculty, students, and alumni figure out the best real-world applications of their research.

During the five-week program, researchers conduct interviews with potential customers, identify applications for their innovations, and then modify technology based on feedback.

Successful teams might advance to the national I-Corps program, as Wei and Mabe did. They also have access to a strong startup framework at home.

This fall, UNCG received \$100,000 from NC IDEA to launch a new program – NC I-Corps Next Step. The program will support scientists who have completed training at any of the four North Carolina I-Corps sites, in their company formation and fundraising efforts.

THINKING SMALL

As the use of manmade nanomaterials increases in modern life, scientists are beginning to wonder how these tiny structures will interact with our bodies and how they might impact our health. Recently, Wei began work with colleagues at North Carolina Central University on a \$1 million NSF study of carbon nanodots. The tiny carbon particles appear to have antioxidant properties – like polyphenols in blackberries, they could help protect our cells from damage. One day, says Wei, carbon nanodots may be helpful in treating CVD and a host of other diseases.

With more than \$10 million in National Institutes of Health funding, the UNCG RIGHT Track study has examined emotion regulation and development in children from 450 families, across two decades.

Wideman teamed up with Calkins and other UNCG researchers – Dr. Cheryl Lovelady and Dr. Lenka Shriver in nutrition, Dr. Susan Keane in psychology, and former UNCG Professor Lilly Shanahan – to focus on health outcomes in a second study: RIGHT Track Health.

There is a lot of data in human development literature regarding self-regulation, but very little on related health outcomes.

In kinesiology, there's been significant work on health-related cardiometabolic risk in adolescence. "But what our field is lacking is historic information about why certain kids may have higher risks than others," Wideman says.

"This study allows us to look at this problem from a cross-disciplinary perspective."

Here's what they've found so far: Children who have poor self-regulation are more likely to have poor cardiometabolic outcomes – obesity, hypertension, insulin resistance, etc. – in



adolescence. Children that showed high emotion regulation at age two only had a 5.5 percent chance of being in the high risk cardiometabolic group 14 years later.

"It makes sense that children who have trouble regulating emotion and behavior may not be good at regulating what they eat, how much sleep they get, and how active they are," says Wideman.

Wideman's team is now working to secure additional funding to follow these individuals into adulthood. Ultimately, the goal is to develop prevention and intervention strategies that help people become better self-regulators and minimize poor health outcomes.

BEYOND CVD As RIGHT Track participants enter young adulthood, Wideman (below, center) and her students track their fitness – measuring oxygen consumption, using "the Bodpod" to assess body fat (above), and more. In her work, Wideman uses the term "cardiometabolic risk" instead of cardiovascular risk. Factors like obesity and high blood pressure, she explains, up your chances for diabetes as well as heart disease and stroke.

But that's still years down the road. Given the study's findings, what should parents be doing now?

"We have to help our kids be better self-regulators," Wideman says. "It will look different for every child, but parents should be aware of this. It's important that we start to pattern healthy habits for our kids."

TAKING ACTION

It's been called the "silent killer of women."

"Women's No. 1 health threat."

Often, it's our fathers, brothers, husbands, and sons who worry about CVD. But it's also the number one killer of women worldwide.

When it comes to recognizing symptoms, identifying a heart attack, and getting the appropriate care, the stats are unsettling: On average, women delay 30 minutes longer than men in seeking treatment. And every 30-minute delay increases mortality risk by 7.5 percent.

The longstanding myth is that women ignore symptoms because they are in denial or too busy caring for others. But Dr. Leslie Davis, a longtime nurse turned UNCG associate professor who has



INCREASED RISK

There's no one-size-fits-all approach for CVD interventions – different groups of people have varying needs.

Dr. Qibin Zhang is another UNCG researcher working with biomarkers in blood, but he's looking beyond troponin to identify other proteins that can best predict CVD for individuals with type 1 diabetes.

If you have type 1 diabetes, your risk for CVD increases by two- to four-fold, and only half of this excess risk is explained by known factors. That's why Zhang and his team at UNCG's Center for Translational Biomedical Research at the NC Research Campus are working to detect novel

biomarkers that can explain why these individuals have such a higher risk.

"If we can detect the biomarkers before the symptoms appear, then interventions could be applied early on to prevent a heart attack," Zhang says.

Zhang's research lab is focused on glycosylated proteins, or proteins modified by sugars, as potential markers for CVD and other diabetic complications. With a pilot grant from the Helmsley Charitable Trust in 2015, Zhang's team developed a technique to accurately measure glycosylated proteins in human plasma. The pilot's success has resulted in two large, three-year grants to further the research:

\$496,000 from the American Heart Association and \$742,000 from the National Institutes of Health.

It's work that has the potential to impact millions of lives – type 1 diabetes affects approximately 1.4 million people in the United States and 30 million people globally. CVD is the main cause of death for individuals with type 1 diabetes, and often CVD occurs earlier in life for this population.

"The ultimate goal is to be able to cure these horrible diseases," Zhang says. "This is work that spans generations – it takes generations of scientists to address these issues."



BRINGING NURSES TO THE TABLE Davis' research is making its mark in the field of cardiology. Her work was cited in the 2016 American Heart Association statement on women and heart disease, and she serves as the only nurse on the board of the National Cardiovascular Data Registry of the American College of Cardiology.

dedicated years to this research, says no.

"It all starts with recognizing symptoms, interpreting them, and then acting," she says. "My research and that of others have shown that this process is complicated."

In general, women are less likely to experience chest pain than men, and have a greater number of symptoms. And for women who have had a heart attack, symptoms of a second or third attack may differ from the first.

"Women aren't just sitting at home – they're doing a lot of work mentally to recognize and

interpret what's going on."

Davis' approach is unique in that it focuses on teaching women the skills to identify and interpret symptoms. Over the past several years, she's been piloting an educational intervention study – funded by a Sigma Theta Tau International Honor Society of Nursing grant and two UNCG faculty grants – in which she goes into the homes of women who are heart attack survivors and teaches them how to recognize and interpret symptoms.

Why focus on women who have already

experienced a heart attack? Because one in five of these women will have another heart attack within a year, Davis says.

If women can accurately recognize and interpret symptoms, they are more likely to take appropriate action – which often means calling 911.

"If you have had a heart attack, and you feel symptoms that you believe are heart-related, you need to call 911," Davis says. "Most people think their spouse can drive them to the hospital quicker. But it's important to call an ambulance because you can get life-saving treatment in the ambulance. Once you arrive at the hospital, the medical team will be prepared."

Davis is translating her findings for health care providers, so they too understand the issues surrounding recognition of symptoms.

"Many women have symptoms that are slow and intermittent, and health care providers need to realize that these symptoms can still be indicative of a heart attack. I've found that even knowledgeable nurse practitioners have recommended that patients drive to the hospital instead of calling 911, because the symptoms didn't seem that bad."

The next step? A randomized control experiment to test the effectiveness of the educational intervention with a larger group.

"It's a great time to make a difference in health care, particularly with women," she says. "If this educational intervention works, it could change what we do across the nation."

By Alyssa Bedrosian • Photography by Martin W. Kane • Learn more at jsnm.ncat.uncg.edu | icorps.uncg.edu | kin.uncg.edu | www.righttrack-uncg.org | ctbr.uncg.edu | nursing.uncg.edu

Yet, she'll speak

How do we confront what threatens us, as a society and as human bodies?

Emilia Phillips doesn't claim to have the answer, but her poems in "Empty Clip," published by University of Akron Press, wrestle with the question.

In her third full-length book, the assistant professor of creative writing turns a high-powered lens on both external and internal dangers, and how we survive them. The poems reckon with physical and emotional intimidation and abuse, with sexual violence, and with gun violence.

"All of the above," she says.

The book's epigraph comes from "Othello" – the words of Phillips' namesake, Emilia. "Let heaven and men and devils, let them all/ All, all, cry shame against me, yet I'll speak."

That was no casual decision for the prolific writer, who is currently at work on a book of essays, including one focused on Shakespeare's Emilia.

"My experience in the world is that it's shameful for women to talk about violence that's been committed against them," she says. "That quote of Emilia's says 'I'm going to say what you did. I'm going to speak. I'm going to call out these behaviors.' I wanted to embody that heroism."

The book's cover depicts a man and a woman almost dancing but actually colliding, at cross-purposes under a red target.

"I chose the image because a lot of the book deals with men and women and particularly toxic masculinity and violence," says Phillips.

Social pressures of womanhood are also central, with the poem "Pica of unsaid things" preceding "Barista," in which a young woman receives the unwanted gift of a customer's kidney stones.

"It's about being uncomfortable and thinking it's normal," Phillips says.

While some of Phillips' work may draw from personal experience, she never fully re-inhabits traumatic material. She writes as a witness, so poems can thrive as poems.

"I'm not pledging allegiance to autobiography," she says. "'Autobiographical' poems can have so many lies in them. They can be rewritten memories, which is kind of wonderful – to write a traumatic memory on your own terms is empowering."

In "Empty Clip," "The truth is / a broken bone that can't be / set."

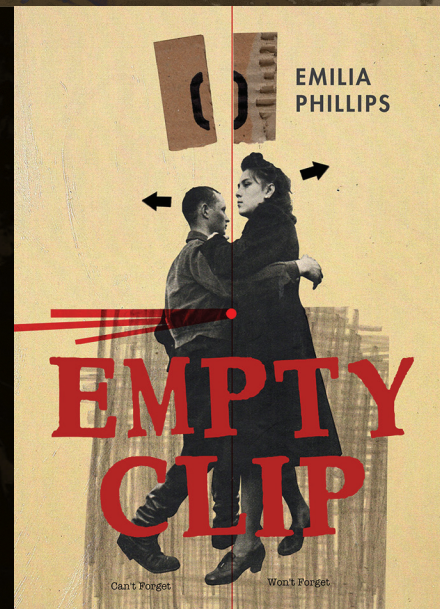
Phillips' literary scope is wide – influences include Polish Nobel Prize-winner Wislawa Szymborska and Hungarian Miklós Radnóti, whose final poems were found in his pocket after he died in a concentration camp. But as a Tennessee native, she counts Southern literature as one of her biggest interests. She's particularly invested in broadening ideas of who is authorized to write it.

"Southern literature comes across as a monolithic and static category. I want to help change those expectations. I want to see more writers of color and LGBTQIA+ writers included in our conversations."

Phillips, whose poetry and essays have appeared in Ploughshares, Poetry Magazine, and more, also appreciates UNCG's history of literary citizenship, going back to the work of Poet Laureate Randall Jarrell.

"It was important to me to teach in a program that values engagement among a wider audience. I see that in this program's history – reaching outward."

By Susan Kirby-Smith • Learn more at emiliaphillips.com



Phillips' poems such as "Campus Shooter and PowerPoint Information Session" reflect dystopic realities of everyday life. In "The Uncanny Valley," the speaker is a "blue dot nosed by an arrow," seen on a map via drone or thermal sensor. Things that can't, she explains, "tell the difference between someone intending to do harm and someone who needs help."





THE OTHER SIDE OF MY HEART

Guillén is a classically trained singer, artistic director, and musicologist. Her scholarly work focuses on tango and oral history in music.

For UNCG musicology lecturer Dr. Lorena Guillén, the beauty and power of speech goes beyond the semantic. Where one might hear simple conversation, Guillén hears music. Every inflection, pause, and emphasis is rich with melody, contour, and color.

Her recent album, “The Other Side of My Heart,” connects this passion for speech and music with another, more personal story. Through the album, Latina immigrants tell the story of their journeys from their countries of origin to North Carolina’s Piedmont Triad.

“As a person who immigrated to the United States from Argentina, I have a personal interest in this piece,” Guillén says. “I feel this was an artistic conversation that helped me to talk about myself as well.”

Lyrics were taken verbatim from approximately 12 hours of interviews Guillén conducted with six Latina immigrants in the Triad, and the piece even features direct audio samples of the women’s voices as they share their experiences.

“After hours of listening to the recordings over and over, a number of common themes became apparent,” Guillén says. “Looking for a better life, reunion with family, what could be brought and what was left behind, the struggle to learn a new language, feeling between two worlds, where is home?”

Each song sets the stories of these women against a vibrant musical backdrop, written and composed by Guillén and UNCG associate professor of music composition Alejandro Ruty, and performed by the Lorena Guillén Tango Ensemble. Guillén and Ruty masterfully blend Guillén’s celebrated soprano with interview excerpts and a variety of Latin American styles to create a haunting and heartfelt interpretation of her subjects’ experiences.

“I really wanted to give artistic voice to these women,” Guillén says. “Music can carry messages and really bring to people issues that otherwise they may only be reading about through newspapers. Music opens other channels of reception. The hope of the piece is that people will receive this, absorb it, and open new dialogues on this important issue.”

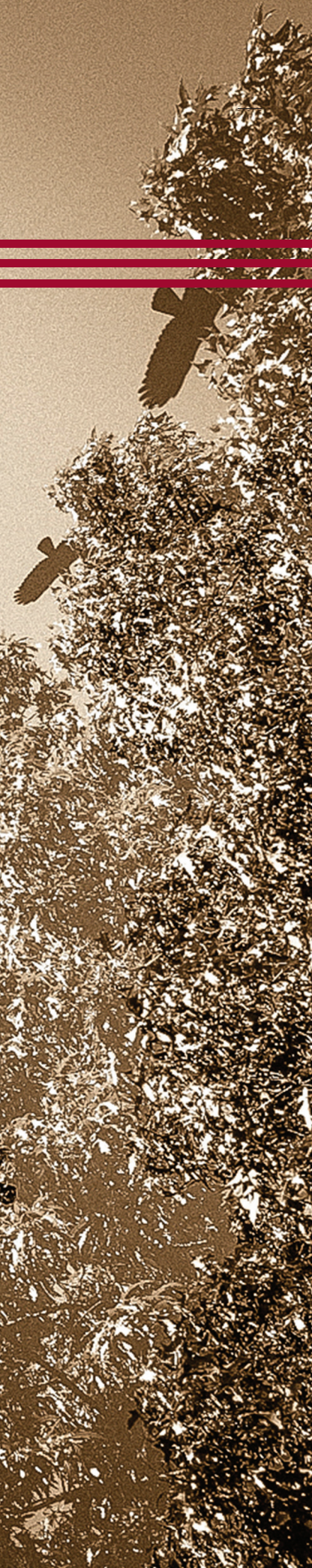
Using music to open dialogues is a recurring theme in Guillén’s career. In a project for the Triangle

Jewish Chorale, Guillén and Ruty developed “Down Home: The Cantata Project,” which gave voice to Jewish immigrants and residents of North Carolina through the use of archival and new interviews woven together into a choral-orchestral-audio collage.

With grants from ArtsGreensboro, New Music USA, and UNCG’s own College of Visual and Performing Arts, Guillén and Ruty released “The Other Side of My Heart” last year. Since debuting the album with a performance at UNCG, Guillén has performed the music all over North Carolina and as far away as Los Angeles.

“I feel that these women come alive in front of the audience every time we play the music,” Guillén says. “I am tremendously grateful to these six women who found value in sharing their stories. This was part of my promise to them from the very beginning: to bring this piece everywhere possible.”

By Victor Ayala • Photographer Felipe Troncoso, another UNCG lecturer, collaborated on the project, producing the photography seen here. • Learn more at www.lorenaguillen.com



Far away from HOME

More than 12 million enslaved Africans endured the horrific Middle Passage to the Americas. For their descendants, there's power in remembering.

When your ancestral home is well beyond the ocean's horizon – and the horizon was the scene of unspeakable trauma for your ancestors – the ocean swirls with mythic power.

"River rise, carry me back home," says Dr. Tara T. Green, quoting an India Arie song. "There's this whole idea of water being the medium to take us back to a place where we want to be."

The professor of African American and African Diaspora Studies and Linda Carlisle Excellence Professor of Women's and Gender Studies recently published the book "Reimagining the Middle Passage: Black Resistance in Literature, Television, and Song."

For Green, who grew up close to the former slave port of New Orleans, Black resistance and water are inextricably joined. "What does water mean to African descendants?" she asks. "What does death mean? What does home mean? That's what I tease out in the book, because it's clear to me that Black artists try to do that as well."

There's physical death, but also "social death," she explains, when the enslaved accept and internalize their oppressors' viewpoint – that they are less than human.

The enslaved Africans sometimes found opportunities to overtake their captors. More commonly, they resisted by simply finding ways to maintain life. "Survival itself is an act of resistance," Green says.

So is remembering. And telling the story of your memories and of your ancestors' trauma.

Her book explores the works of artists wrestling with that remembering, from Alex Haley's "Roots" to Jesmyn Ward's "Salvage the Bones," from Bessie Smith's "Back Water Blues" to the TV series "Treme."

"No one had to be there to know about there," she observes about the Middle Passage. As storytellers, the slaves' descendants now hold power.

"Singing the blues was most certainly a form of resistance, just as spirituals were, because sometimes those spirituals brought the singer back to a historical and ancestral space," she says. Those musical forms led to rock, to soul, to hip-hop. The resistance continues.

Green was teaching in Arizona when Hurricane Katrina flooded much of New Orleans. An uncle nearly drowned in the flood. She watched on TV as tens of thousands sought higher ground. Many huddled in the Superdome, others in their attics, some punching their way to their roofs if they were lucky. Her book traces connections between the Middle Passage, the 1927 Mississippi River Flood, and Hurricane Katrina.

"I cannot think about – and many of us cannot think about – the flooding and see photos of Black people and not go back to the Middle Passage."

By Mike Harris

Learn more at go.uncg.edu/green

Green is co-editor of the Voices from the African Diaspora Studies series from Mercer University Press. She wrote "Reimagining the Middle Passage" with support from Vanderbilt University's Callie House Center for the Study

of Global Black Culture and Politics. At UNCG, she has taught two courses on the Black Lives Matter movement. She uses historical studies, music, and popular culture as access points into deep material.



THE POWER OF PUNK

The spark for Dr. David Kauzlarich's next book came as he observed the Occupy movement in St. Louis in 2008.

"It seemed like almost every other person had an acoustic guitar, and almost every other night there'd be bands out there if the cops didn't break it up," he says. "It was as much a part of the message, it seemed, as when people had the bullhorn."

The combination of music and protest against misdeeds of the powerful blended two of his primary interests – scholarly and personal.

Kauzlarich came to UNC Greensboro in 2017 to head the Department of Sociology. His academic career has focused on criminal justice and criminology, and he has coauthored a number of books, including "Crimes of the Powerful" and "Towards a Victimology of State Crime." He concentrates his work on crimes such as human rights violations, illegal wars, and anti-democratic practices against journalists. Kauzlarich was drawn to the Occupy movement for that reason.

"I started looking at resistance to perceived state and corporate wrongdoing, ethical issues, disproportionate coddling of corporations – the '08 housing scandal, Bank of America, and all that," he says. "The literature in criminology really didn't have a lot to say about how people resist that through social movements."

His book in progress is called "Theorizing Resistance: Music, Politics, and the Crimes of the Powerful." The focus is punk rock and how, Kauzlarich says, music can spotlight and spur resistance to crimes at a state level. He is the first criminologist to examine connections between music and resistance to high-level crimes, he says, though detractors may question whether music can produce political change.

His background helped him launch the research for the book. Kauzlarich has written songs and played in punk bands himself, including the St. Louis band Resoldered. He began the process by interviewing musical peers he shared stages with over the years, then widened his circle. He has interviewed about two dozen musicians from the United States, Canada, and Great Britain.

"Without music that's counter-hegemonic, or questioning power and authority, we're left in a vacuous situation, regurgitating these silly pop-culture things," he says. "That's why I think these bands are so important, because they show there are other ways to write songs, and there are other ways to think more deeply."

Kauzlarich came to UNCG following two decades at Southern Illinois University in Edwardsville, where he served six years as a department chair and received the school's Outstanding Teacher-Scholar Award. Heading the Department of Sociology at UNCG is his proudest academic accomplishment to date, he says.

"As I've grown older, what I really care about is making something meaningful for the largest amount of people possible."

That philosophy may help people outside the academic world appreciate "Theorizing Resistance" and its illumination of the ways music and politics can converge.

"Music can be more than just entertainment," he says.

By Eddie Huffman • Learn more at soc.uncg.edu/people/david-kauzlarich



RESIST "Music can foster and represent political and ideological challenges to structural conditions in society," says Kauzlarich.



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CURIOUS CHEMISTRY

Dr. Nadja Cech explores the natural world in search of new molecules to fight disease. The key to her scientific success? A vibrant community of scholars. The co-director of UNC Greensboro's Medicinal Chemistry Collaborative conducts her research alongside students from rural North Carolina to Bangladesh, and faculty from a multitude of disciplines. Together, they are on a journey to improve human health.



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