

Report on RESEARCH



Innovative program *hits the mark* for faculty equity

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Cover

Members of ADVANCE, a collaborative quest begun in 2018 to transform UMass Amherst into a place where every faculty member, regardless of gender, race/ethnicity, or sexuality, feels respected and has equal professional opportunities.

Left to right: Laurel Smith-Doerr, Buju Dasgupta, James Allan, Donna Baron, Jennifer Normanly, Sergio F. Breña, Gabriela Weaver, Joya Misra.

The mission of the University of Massachusetts Amherst is to create positive impact on the commonwealth and the broader society we serve through education and advancing knowledge. As the flagship public university in Massachusetts, we cherish and add to the commonwealth's long tradition of intellectual and educational leadership.

Our institution is rooted in the idea that any qualified individual, regardless of wealth or social status, should have access to high quality higher education. We draw from and support diverse experiences and perspectives as an essential strength of this learning community and accept for ourselves and instill in our students an ongoing commitment to create a better, more just world.

FROM THE VICE CHANCELLOR



Dear Friends and Supporters,

I am pleased to provide this fiscal year 2020 Report on Research. It showcases the notable research and scholarly activity being conducted at UMass Amherst.

During these unprecedented times, our faculty, staff, students, and partners have stepped up to meet unprecedented challenges. We have come together to apply our knowledge and expertise to help provide solutions to the problems that confront us. Whether it is banding together to create COVID19 Response Teams ready to support the needs of the medical community, or providing insights into adapting to climate change, new clean energy approaches, equity issues, or catalyzing innovation, UMass Amherst continues its land grant mission of research and scholarship for the common good.

Your support, in its many forms, helps us to realize our vision of a better future for all. Thank you for your interest, and Go UMass!

For the latest information on research, visit umass.edu/researchnext.

A handwritten signature in black ink that reads "Mike Malone".

MICHAEL F. MALONE '79PHD
Vice Chancellor for Research and Engagement

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A GOOD IDEA GOES **VIRAL**

COVID-19 Response Teams answer health care workers' call

“We weren’t a delivery organization, yet we somehow had to get them out to all the regional hospitals, to front-line workers to ambulances to hospices to the Holyoke Soldier’s Home. They were all asking for help.”

PETER REINHART,
DIRECTOR, INSTITUTE FOR APPLIED LIFE SCIENCES

Peter Reinhart, PhD, was sitting alone in his fifth-floor office on a cold day in March. The \$150 million building that houses the UMass Amherst Institute for Applied Life Sciences (IALS) stood virtually empty. Its halls were void of traffic. Its equipment, silent. Just days before word had come from the Chancellor that the campus was closing. Students were leaving, staff were sent home to work, and labs and facilities were on skeleton crew. A life-threatening virus was on the loose and no one knew how to stop it.

“I was sitting in my office just after the campus had shut down and thinking, ‘what a waste.’ Here we are sitting in a beautiful new building with \$60 million dollars of new life science equipment, and we have some of the smartest people on the planet thinking about assay building and sample testing, sitting at home. It really irked me,” says Reinhart.

At the same time, news reports highlighting regional and national shortages of personal protective equipment (PPE), such as masks and

Dr. Peter Reinhart directs the UMass Amherst Institute for Applied Life Sciences.

face shields, were coming in. Testing centers couldn't get testing materials, such as swabs and the biological medium necessary to transport virus samples safely to labs. "It was such a disconnect to me, thinking we have all these resources on one side and this massive need on the other side. How could I connect these two?" says Reinhart.

He put out a call to the campus, asking if anyone would be interested in participating in some regional efforts to try to help with the shortages and the societal issues that were hitting the life sciences space. He couldn't believe what happened next.

"I got a few hundred responses within hours," says Reinhart. "It made me realize that people were very excited about helping this crisis that was hitting us both nationally and very locally. The phrase 'COVID-19 Response Teams' really just formed itself. We were dealing with a COVID-19 crisis, and we were trying to address some of the issues related to it—we were actually creating responses."

That initial call would result in the formation of more than a dozen Response Teams, each actively addressing COVID-19-related problems.

"I am proud and grateful for the work UMass Amherst faculty, staff, and students have done. They have worked tirelessly using the unique infrastructure and expertise in our research programs to meet the needs of the community during COVID-19."

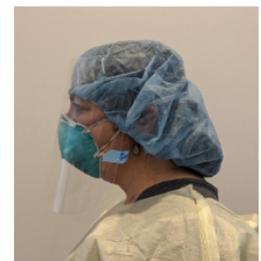
MICHAEL F. MALONE '79PHD,
VICE CHANCELLOR FOR RESEARCH
AND ENGAGEMENT



The Need for Face Shields

As faculty and staff started to tease apart the issues, it became clear that the lack of PPE for front-line workers was huge. "Nobody had enough face shields," Reinhart says. "All the front-line workers were complaining that they'd be seeing patients all day long and they didn't have enough PPE. They would have to clean it at the end of the day. They would have to put their name tags on it, reuse it day after day. We started to brainstorm around it, and pretty soon we had a team that was focusing on face shields."

Reinhart knew that in order to respond with something useful, and quickly, the team would have to reach outside the Institute for help—something he had learned working in industry. Team members began participating in regional conference calls and collaborating with health care professionals and other academics who could address face shield design from a broad perspective. The Response Team worked together with area clinicians to design prototypes, identify technical issues, and suggest improvements to the design of a low-cost shield for rapid production. It was clear through that process that in order to keep costs down, the shield had to be designed so that it could ship flat. With those design requirements in mind, UMass Amherst engineers Frank Sup and Meghan Huber created an origami-like face shield from a flat sheet of plastic material



UMass Amherst's easy-to-manufacture face shield was developed with help from area nurses and physicians.

that could accommodate the wearing of PPE underneath, such as an N95 respirator, and was simple enough to be assembled in fifteen seconds or less. The design uses laser cutting or industrial die cutting, which can produce tens of thousands of shields per day, per machine with minimal workforce to reduce the spread of worker infection. Partnering with K+K Thermoforming of Southbridge, Massachusetts, the team fabricated and distributed 100,000 face shields throughout the region.

“We weren’t a delivery organization, yet we somehow had to get them out to all the regional hospitals, to front-line workers, to ambulances, to hospices, to the Holyoke Soldier’s Home. They were all asking for help,” says Reinhart.

Ellen Smithline ’21PhD, a long-time emergency care nurse and School of Nursing doctoral student, was asked to vet the needs, and a University Health Services doctor was asked to help with requests. Week by week, they came up with a triage list of who on the front lines needed face shields the most. Campus volunteers jumped into their cars and delivered the shields; team members also provided curbside pickup, putting the number of boxes people had ordered on a table outside the IALS building.

“We went from nothing to having made 100,000 face shields and distributed them to about sixty local medical groups, including Cooley Dickinson Hospital and Baystate Medical Center, in a few weeks’ time,” says Reinhart.



The Dark Days of COVID

In the early days of the virus, planes were chartered to get face masks to Massachusetts from overseas. But did they work?

“We have a Response Team that started testing some of these face masks, and w they were basically useless. We t particulate transfer, and particle: easily penetrated them. We had out that you might be buying N95 you’re protected, but not all N95 are from a reputable maker, the they should, and some of these i do not work,” says Reinhart.

Richard Peltier ’97, professor of environmer health sciences in the School of Public Heal and Health Sciences, leads the face mask tea His lab conducts tests on mask re-use. “Not face masks can be safely sterilized and reuse says Peltier, though his research has shown that hydrogen peroxide sterilization for N95 respirators does work. Using state-of-the-ar pollution instruments to measure whether microscopic particles can pass through the mask after it is sterilized, his results showed no real difference in filtration between a new mask and a sterilized one. “As new sterilizat



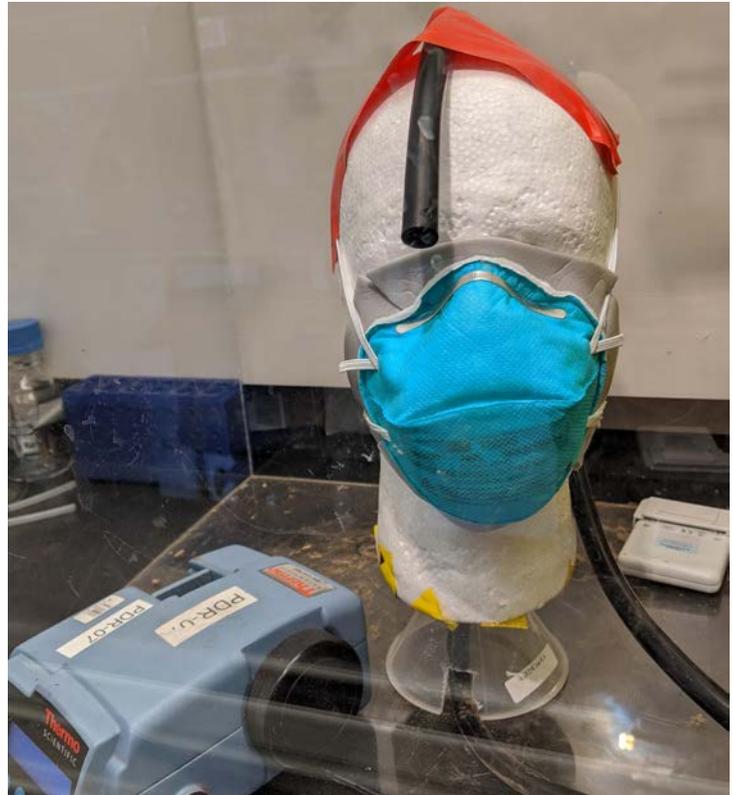
Professor Rick Peltier, '97

methods continue to be developed, my lab continues to do rigorous scientific testing to evaluate the efficacy of different mask sterilization methods,” says Peltier.

Another Response Team was quickly formed when Baystate Health’s resident physician, Mat Goebel, and respiratory specialist Kyle Walsh contacted the campus for help with ventilators. Regular ten-foot ventilator cables were on extreme backorder, and longer cables, which would provide added safety to staff by increasing distance and reducing the need for PPE, did not exist.

“If you have an intubated patient on a ventilator in a hospital, you don’t want to be very close to them because clearly they are highly infectious,” explains Reinhart. “But there was no way to take the ventilator control signals away from a patient bed to a safe distance where hospital staff could operate it.” “Seems straight forward, but it was a pretty tricky project,” says Reinhart. “We had to get immediate sign-off from the legal group in Japan that actually owned some of the patents so we could make some of these parts.”

After getting permission, UMass engineers were able to fabricate a fifty-foot cable that was compatible with Baystate’s ventilators. They contacted Amphenol Sine Systems, who agreed to design and fabricate the longer cables. Baystate is now ordering cables directly from the manufacturer.



Re-using PPE safely has been of key concern during the COVID-19 pandemic. Professor Rick Peltier’s lab tests the efficacy of face mask re-use as new sterilization methods are developed.



UMass Amherst engineers worked with Baystate Health Systems physicians and respiratory specialists to design a longer ventilator cable that provides healthcare workers with an increased level of protection.



UMass Students Get Active

Award-Winning Work

Nursing doctoral student and longtime emergency-care nurse Ellen Smithline '21PhD made Johnson & Johnson's list of "Ten Nurses Pioneering Innovative COVID-19 Solutions." Smithline not only contributed to the design of a fast-track face shield for health care workers in a multidisciplinary UMass Amherst project, but she has also helped set up and manage COVID-19 medical care tents in Springfield to screen homeless people and provide shelter to those who may be infected and need to be isolated.



Helping the Holyoke Soldier's Home

Two UMass Amherst ROTC cadets—psychology major Jake Gramstorff '21 (pictured at left) and kinesiology major Jacob Goulet '21—were called up to serve as National Guard medics at the Soldiers' Home in Holyoke, which has been hard hit by COVID-19. For weeks, both students have been providing direct care to veterans living in the home, among other duties. "Hearing the stories from these amazing men and women and their incredible lives of service inspires me every day," says Gramstorff. Goulet says providing care to veterans in their time of great need "has truly been both humbling and rewarding."

A Call from the Commonwealth

In the largest and earliest UMass Amherst volunteer initiative, some 215 graduate and undergraduate students in the School of Public Health and Health Sciences signed up to support dozens of local public health departments across the state as part of the Massachusetts Academic Public Health Volunteer Corps. That group, co-led by Aimee Gilbert Loinaz, Public Health and Health Sciences assistant director for internships and employer engagement, includes students from twelve Massachusetts schools and programs of public health.

Within weeks, sixty-six students had been assigned to carry out rapid-response tasks from their homes, including the first contact tracing and translation of critical COVID-19 materials into eleven languages. "Nearly 100 other students were hoping to be deployed throughout the summer," Gilbert Loinaz says. "We are a home-rule state, so every local public health department is different in what their needs are."





More than 30 volunteers worked around the clock at the Institute for Applied Life Sciences to produce and distribute 120,000 tests worth of viral transport medium (VTM).



Testing, Testing, Testing

Another COVID-related product that was in need in the early days was viral transport medium (VTM). As testing ramped up nationwide, this solution, used to keep COVID-19 samples safe during transport, was in short supply. Most of the medium needed for testing came from a company in Northern Italy, which shut down. Inevitably, the U.S. supply of testing materials dried up. Staff from Cooley Dickinson and Baystate Health again contacted Reinhart for help and a new Response Team swung into action, putting a VTM production line together.

“This is probably the largest group of volunteers we have working, around 30-35 people, working just about around the clock, shift by shift, to manually make this viral transport medium, liter by liter. The Broad Institute ran out, the State testing lab ran out. By the end, we had made about 120,000 tests worth of VTM and supplied all the regional hospitals, from Pittsfield out west to the east. We supplied all of these organizations with our UMass-made VTM, which kept testing going in those dark days in April and May when there was none to be had anywhere,” says Reinhart.

Again, the team had to organize distribution. “This is not something you think about as an academic group. Manufacturing, scaling, the appropriate labeling, making sure the tubes stay sealed during transport, the quality control to make sure there are no PCR (polymerase chain reaction) inhibitors in any batch of our solution, storing them in cold rooms. Erin Poulin, lab manager at [UMass Amherst Health Services], was instrumental in being the point of distribution for the local hospitals to either arrange pick-up or transport,” says Reinhart.

IALS researchers formed more than a dozen Response Teams to actively address COVID-19-related problems in local and regional healthcare systems.

Expressions of Gratitude

At the end of the day, all of this hard work does not go unnoticed by those who have benefited from the UMass Amherst COVID-19 Response Teams.

“We had people whose daughters and sons working in testing tents on the front lines writing letters saying, ‘Who knows? You may have saved my daughter’s life.’” Reinhart reads a letter from the Holyoke Soldier’s Home (which made national news for high numbers of COVID-19 deaths) filled with such gratitude that it brings tears to one’s eyes. “It makes you feel really good when that happens,” he says.

Reinhart acknowledges the selfless generosity of the many volunteers that came together to create these Response Teams. “Whether the teams were large or small, this was an all-volunteer effort with no compensation of any description, other than the feeling that you are contributing to solutions in a time of crisis. We had many times the number of volunteers that offered to help us than we could possibly find jobs for. The real heroes here are all the individual volunteers who got up on a Saturday morning to come into the lab and sit pipetting for seven hours when they could have been outside enjoying the weather or doing other things,” says Reinhart. “They chose to do this instead.”



Labeled Faces in the Wild

UMASS PROFESSOR CALLS FOR FEDERAL
OVERSIGHT OF FACE RECOGNITION SOFTWARE

It's been in the news: public concern over the growing use of face recognition software, its flaws and biases, and increased use by private companies and government agencies in ways that might be unfair, or even detrimental, to certain populations. UMass Amherst College of Information and Computer Sciences (CICS) Professor Erik Learned-Miller, a pioneer in the development of face recognition software, is calling for federal oversight of the technology in order to promote its fair use.

His recommendations are outlined in a recently-released white paper, titled "Facial Recognition Technologies in the Wild: A Call for a Federal Office," co-authored with Joy Buolamwini, Vicente Ordonez, and Jamie Morgenstern. Learned-Miller's motivation for regulation comes from a deep understanding of the problems associated with face recognition software and its use in ways that were not originally intended.

In many ways, Learned-Miller is the right person to suss out face recognition regulation. Along with UMass Amherst alumnus Gary Huang '12PhD and Facebook research scientist Tamara Berg, Learned-Miller was honored with the 2019 Mark Everingham Prize from the International Conference on Computer Vision. The three were recognized for their work on one of the most influential

face datasets in the world, Labeled Faces in the Wild (LFW), considered the gold standard by which facial recognition algorithms are measured. It's been used by companies such as Google and Facebook to test their facial recognition accuracy.

LFW moved the needle on face recognition accuracy for several reasons, says Learned-Miller, including the types of images used in face recognition datasets. "Most people were working with things like passport photos, where faces are very carefully aligned in the middle, looking in a particular direction with no expression. I jokingly call these 'faces in a vise.' We wanted to promote research on arbitrary face images and to establish better face recognition rules, so we created LFW," says Learned-Miller.

Though LFW was a big improvement over other datasets, it had its limitations. Racial and ethnic diversity of any data set is limited, as is the number of arbitrary images you can reasonably manage to collect and label.

"There is an illusion out there that if you had a magic database with enough images in it and enough different people, then we could use it to certify all the face recognition systems. That won't work. No matter how many people you put in a database, there will always be subgroups that will not be well represented; for example Pacific Islanders, Native Americans over 85, children with autism or Down's. Will you say your software just doesn't have to recognize those people? That is not acceptable," says Learned-Miller.

Stricter demands for data privacy are putting a kink in the ability to collect image data as well, says Learned-Miller. "General data protection regulations

(GDPR) laws, like those found in Europe, are getting very strict. If your personal information appears in any database, you can demand it be removed for any reason," he says.

Seeing no way around these problems, Learned-Miller started to think about the issue in a different way—one that was based on his early career as co-founder of a technology company that developed software and computer platforms for use by neurosurgeons in the operating room.

"Our company had to get those products approved by the FDA (Food and Drug Administration)," says Learned-Miller. "The approval process required thorough documentation and the creation of a scientifically valid way in which to test our devices for safety and efficacy, which the FDA either approved for marketing or rejected. That is the model. The more I thought about it, the more I thought, 'That's what we need.' We can't have a one-size-fits-all test for all possible uses."

For some applications, such as social media filters that are used just for fun, the consequences of faulty recognition are low. "But if you give police body cams and they are identifying people as they are arresting them, the consequences can be really severe. You are not going to demand the same kinds of tests for both of these uses," says Learned-Miller.

"The FDA model seemed like a natural fit. They have a whole center just for regulating medical devices and one for regulating pharmaceuticals. These offices operate somewhat differently, but they work on many of the same principles. The FDA has been working on this for 100 years and it is highly



Erik Learned-Miller

sophisticated. As much as people like to criticize the FDA, the model is effective and they do a great job," says Learned-Miller.

Learned-Miller's push to regulate face recognition is part of a larger effort by CICS to focus on computer science research for the common good, which envisions a world where computing enhances the well-being of its citizens. Research initiatives take into consideration concepts of equity, accountability, trust, and explainability (EQUATE).

"Now it is time to address many of the larger societal challenges that come with face recognition technology, including fairness, privacy, and intelligent guidelines for its use," says Learned-Miller. "Many of us at UMass and elsewhere are working hard to address these problems."

Read the white paper:
www.ajl.org/federal-office-call

Taking regional action on climate change

Northeast Climate Adaptation Science Center



The word “adaptation” in the Northeast Climate Adaptation Science Center’s (NE CASC) name gets right at the crux of its work. While other institutions focus on climate projections, such as how fast our oceans are rising, or how quickly our atmosphere is warming, UMass Amherst-based NE CASC investigates how we can use this information to protect wildlife and ecosystems from the looming impact of climate change. To date, NE CASC’s research has included such topics as how to conserve monarch butterflies in urban areas; predicting the impact of climate change on

maple syrup production; investigating how shifting climate is affecting mammals in the Northeast; assisting tribal nations with climate change adaptation; and studying how to keep cold-water fish cool. The center has completed scores of such critical projects, with many more underway.

“We have more demand for work that’s valuable to our region than we can provide,” says director of NE CASC, Richard Palmer.

Actionable Science

It's unusual to have such a focus on actionable science at the university level, says Palmer, who is also a UMass Amherst professor of civil and environmental engineering. "We are set up to work reciprocally with stakeholders to see what the impacts of climate change will be on our resources and to inform resource management," he explains. "Our faculty, staff, and federal partners are working directly with people who make decisions—park managers, coastal fisheries staff, foresters, directors of land trusts. We can then see the impact of the science they bring to these problems. It's very exciting."

It was a validation of the campus's expertise and research breadth when the U.S. Department of the Interior selected UMass Amherst as the NE CASC host in 2011. Since plants, animals, and waterways don't respect boundaries, the consortium is geared for large-scale decision making across state lines, spanning a region from Maine to Virginia and west to Missouri. In addition to UMass Amherst, the consortium members are the College of Menominee Nation; Columbia

"When it comes to climate change, we can't kick the can down the alley. Things need to be done right now."

JON WOODRUFF, NE CASC CO-PRINCIPAL INVESTIGATOR



Students and faculty collect data from Nahant beach, Massachusetts. The project is designed to investigate climate change impacts on erosion, mass wasting, and the supply of sediment to tidal wetlands in the Northeast.

University; Cornell University; Michigan State University; Woods Hole Research Center; the universities of Missouri, Vermont, and Wisconsin-Madison; and researchers affiliated with the U.S. Geological Survey. This team has published more than 200 peer-reviewed papers, delivered hundreds of presentations, and developed over twenty-five interactive tools used by wildlife ecologists, state agencies, Native American tribes, town planning boards, and local conservation groups.

In 2019, the Department of the Interior reviewed this strong track record and renewed support for the UMass Amherst-based center with a five-year, \$4.5 million commitment; that commitment was increased by another \$1 million in January 2020. Although politics have imperiled some climate change research funding, Palmer says, "We've had very strong congressional support and are hopeful that the increases in funding we've seen in the past will continue."

Jon Woodruff, associate professor in the UMass Amherst Department of Geosciences and NE CASC co-principal investigator, affirms that Congress recognizes the critical importance of the center's work. "Action has to start now in order to adapt to all the major climate-related changes that are coming to our region," he says.



A Regional Approach



Bethany Bradley

“Looking at climate change impacts regionally, rather than on a state or local basis, makes sense because of the commonalities among the Northeast’s ecosystems and wildlife,” says Bethany Bradley, NE CASC co-principal investigator and professor in the UMass Amherst Department of Environmental Conservation. Bradley points out that far-flung entities didn’t always have the opportunity to work together. For example, there wasn’t a regional strategy to combat invasive species before NE CASC developed the Regional Invasive Species and Climate Change (RISCC) Management Network. Last year, RISCC narrowed a list of more than 100 plants likely to spread in the Northeast due to the changing climate down to a ten-most-wanted list of plants that pose the greatest threat to native species, encouraging natural resource managers and others to strategically target nuisance neoinvasives, such as bur chervil and giant reed.

RISCC also published a gardeners’ guide to desirable native plants, including blazing star, blue flag iris, and butterfly weed. Eighty percent of typical nursery stock is not native, explains Bradley, who foresees that as educated gardeners request natives, they will become more widely available.

Woodruff, who studies coastal systems and rivers and the interplay of natural and

human-induced changes on these systems, adds that because culture, ecology, and geology vary greatly among regions, it makes sense to study the coasts regionally rather than nationally. Presently, his team is working on a NE CASC project focused on tidal marshes along the Hudson River. His research addresses such questions as: How much do we need to invest to keep these systems resilient? How can we apply what we learned from the costly restoration of the marshes of New York’s Jamaica Bay following flooding from Hurricane Sandy to this system? Through projects like this, Woodruff says, “We are providing useable, actionable science for stakeholders and practitioners.”

Bradley adds that NE CASC can respond to its stakeholders needs quickly—and often their needs are unpredictable. For example, she says, “In 2016, we were surprised by a major gypsy moth outbreak in the Northeast. We hired a postdoctoral student who was an expert in remote sensing, who produced maps of where the outbreak had occurred and its severity. Then researchers went out on the ground to see the effects of the outbreak: Were the trees surviving? What were the longer-term consequences? With changing precipitation patterns, gypsy moths will be an ongoing threat in our region, so it’s important to have this data.”



Jon Woodruff



The Art of Resilience

Using art to combat climate change and disasters

Climate change is informing the work of faculty from across campus. Pictured here is “High Tide” by Carolina Aragón, assistant professor of landscape architecture, in the World Bank atrium. It is an abstraction of a marsh landscape, using translucent disks placed at varying levels, marking levels of past and predicted floods, bringing attention to the shifting boundary between land and water. It’s part of “The Art of Resilience” exhibition featuring global artists using their art to advance resilience to disasters and climate change. “High Tide” was first installed in 2016 on the Rose Kennedy Greenway Conservancy in Boston. This 2019 version shows projected sea-level rise for Washington, D.C., for 2050 and 2060.



What’s Next

NE CASC supports the next generation of scientists who bring a pulse of new energy to the important work of adapting to climate change; the center trains up to twenty-five graduate students per year at UMass and other institutions. They have gone on to careers in departments of natural resources, federal fish and wildlife agencies, nongovernmental agencies, and in academia. “They have interdisciplinary training in the climate sciences and bring the culture of collaboration and stakeholder engagement they’ve experienced here with them to their careers,” says Addie Rose Holland ’10MS, deputy university director of NE CASC.



As Palmer prepares to retire as NE CASC’s director, he can reflect on the consortium’s success and take heart that these newly trained scientists, along with the consortium’s researchers and its principal investigators, are committed to NE CASC’s mission. Woodruff says, “When it comes to climate change, we can’t kick the can down the alley. Things need to be done right now, planning needs to take place, real decisions that are informed by science have to be made.”

As for Bradley, she strives to stay undaunted by thoughts of the losses that the earth and its people will sustain due to climate change. She says, “I look at it as a huge science experiment. We have enormous challenges ahead—we want to maintain diversity, keep our rare species, help them to adapt. Our goal is to focus on solutions.”

Tools and more information can be found at necsc.umass.edu.

PORTABLE AI DEVICE TURNS COUGHING SOUNDS INTO HEALTH DATA FOR FLU FORECASTING

UMass Amherst researchers Tauhidur Rahman and Forsad Al Hossain '24PhD have invented a portable surveillance device powered by machine learning called FluSense, which can detect coughing and crowd size in real time, then analyze the data to directly monitor flu-like illnesses and respiratory illness trends.

The FluSense creators say the new edge-computing platform, envisioned for use in hospitals, health care waiting rooms, and larger public spaces, may expand the arsenal of health surveillance tools used to forecast seasonal flu and other viral respiratory outbreaks, such as the COVID-19 pandemic or SARS. Results of their study were published in Proceedings of the Association for Computing Machinery on Interactive, Mobile, Wearable and Ubiquitous Technologies. mosaic.cs.umass.edu



UMASS EXPERT FINDS DISINFORMATION PRODUCTION HAS BECOME DIVERSIFIED AND 'DEMOCRATIZED'

A new report co-authored by Jonathan Corpus Ong, associate professor of global digital media in the Department of Communication, highlights key trends in election-related disinformation and integrity interventions from the study of three Southeast Asian nations.

The report, published by the NATO Strategic Communications Centre of Excellence, offers to shed new light on the various ways in which state actors themselves are actively involved in disinformation production.

UMASS GRANTED \$10 MILLION TO STUDY JAIL-BASED OPIOID ADDICTION TREATMENT

Elizabeth Evans, co-principal investigator and UMass Amherst assistant professor in the School of Public Health and Health Sciences, is among the scientists at a dozen institutions nationwide to form the Justice Community Opioid Innovation Network (JCOIN), an ambitious, \$155 million effort funded by the National Institutes of Health to improve opioid addiction treatment in criminal justice settings. Over the next five years, researchers will study the impact of evidence-based medications for opioid use disorder, behavioral interventions, digital therapeutics, and patient-centered treatments in fifteen states and Puerto Rico. They will focus on a range of justice settings, including jails, drug and problem-solving courts, policing and diversion, and probation and parole.

DANCE PROFESSOR DIRECTS NEA-FUNDED CLINICAL TRIAL

The National Endowment for the Arts (NEA) approved funding for a clinical trial led by Aston K. McCullough, assistant professor of dance science in the Department of Music and Dance.

The two-year trial will determine the effects of a group-based dance/movement program on physical and mental health in women who are survivors of domestic/intimate partner violence. The study seeks to confirm a dose-response relationship between exposures to group-based dance/movement, post-traumatic stress disorder (PTSD) symptoms, and changes in heart rate variability among survivors. The \$190,000 trial is funded by a \$95,000 NEA Research: Art Works award, with additional support from the Laurie M. Tisch Illumination Fund.

COMPUTER SCIENCE-MATH-ENGINEERING TEAM FORMS NEW NSF INSTITUTE

The National Science Foundation (NSF) recently awarded a collaborative team, led by Associate Professor Andrew McGregor (computer science), a three-year, \$1.5 million grant to further develop the foundations of data science in a project that created NSF's national TRIPODS Institute for Theoretical Foundations of Data Science. Based at UMass Amherst, the institute conducts rigorous analyses of existing data sciences approaches, together with the development of new ideas to ensure the optimal use of available computational and statistical resources, and to develop a principled and systematic approach to relevant problems rather than relying on a collection of ad hoc solutions.

NEW MECHANISM INVOLVED IN PROMOTING BREAST CANCER IDENTIFIED

A new approach to studying the effects of two common chemicals used in cosmetics and sunscreens found they can cause DNA damage in breast cells at surprisingly low concentrations, while the same dose did not harm cells without estrogen receptors.

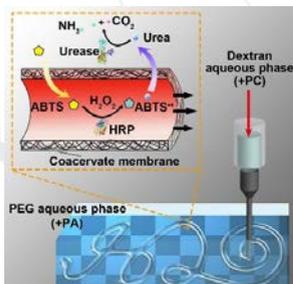
The research, published January 15, 2020, in *Environmental Health Perspectives*, identifies a new mechanism by which estrogens and xenoestrogens—environmental chemicals that act like estrogens—may promote breast cancer, says D. Joseph Jerry, UMass Amherst professor of veterinary and animal sciences. Jerry also serves as science director of the Pioneer Valley Life Sciences Institute and co-director of the Rays of Hope Center for Breast Cancer Research, in a partnership between UMass Amherst and Baystate Medical Center.

GETMANSKY SHERMAN CO-LEADS EFFORT TO COMBAT CATASTROPHES WITH BIG DATA

Mila Getmansky Sherman, a finance professor in the Isenberg School of Management, is co-leading a multi-disciplinary team from around the United States to use big data to identify risk factors across systems for catastrophic events such as major power outages and natural disasters. The team has received a \$2.42 million grant under the National Science Foundation's Harnessing the Data Revolution Big Idea program.

TECHNOLOGY BEING DEVELOPED TO DETECT FOODBORNE DISEASE

UMass Amherst food scientist Matthew Moore has received two grants from the USDA to apply new technology in an effort to more quickly detect and trace foodborne disease caused by noroviruses and bacteria. Under the USDA's Agriculture and Food Research Initiative, Moore and UMass Amherst associate professor of chemistry Min Chen received a \$490,000 grant to develop and evaluate a portable sensing device capable of both identifying and subtyping foodborne pathogens, including bacteria and viruses.



MATERIALS SCIENTISTS BUILD SYNTHETIC SYSTEM WITH COMPARTMENTS LIKE REAL CELLS

Polymer chemists and materials scientists have achieved some notable advances that mimic nature, but one of the most common and practical features of cells has so far been out of reach: intracellular compartmentalization. It refers to the way many different organelles, vesicles, and other “water-in-water” soft structures in the cell contain and isolate chemical reactions and processes.

A research team, led by UMass Amherst's Professor Thomas Russell '79PhD, reveals how they take advantage of differences in electrical charge to create an “all aqueous,” water-in-water construct that achieves compartmentalization in a synthetic system. Details appear in the August 22, 2019, issue of *Chem*.

NECKLACE-LIKE WIRELESS DEVICE TO IMPROVE UNDERSTANDING OF SCHIZOPHRENIA

Two high-tech health researchers at UMass Amherst have received a \$1.15 million grant from the National Institutes of Health (NIH) to develop a wireless device worn like a necklace that aims to transform the understanding and treatment of schizophrenia.

Sunghoon Ivan Lee and Jie Xiong, both assistant professors at the College of Information and Computer Sciences, took on the project after a psychiatrist at Massachusetts General Hospital approached Lee about inventing a way to measure the social interactions of people with schizophrenia. Lee and Xiong will carry out their research in the Center for Personalized Health Monitoring at UMass Amherst's Institute for Applied Life Sciences.

RESEARCHERS FIND EXPLANATIONS FOR GENDER PAY GAPS ACROSS GOVERNMENT SCIENCE AGENCIES

While government employment is commonly believed to be controlled by neutral, formal pay structures, new research from a team led by UMass Amherst sociologist Laurel Smith-Doerr has found that, in a number of science-based federal agencies, gaps and differential implementation in current standardization schemes create gendered outcomes. The research indicates that the resulting pay gaps between men and women at these agencies can also be associated with the cultural gender frames of the agencies' field of research. The complete report, “Gender Pay Gaps in U.S. Federal Science Agencies: An Organizational Approach,” is available online at the *American Journal of Sociology* website.

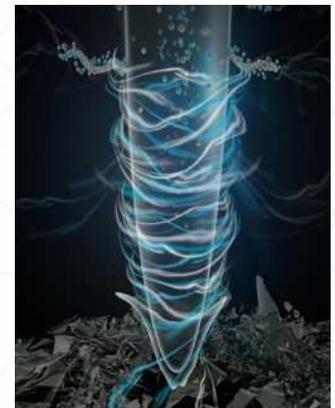


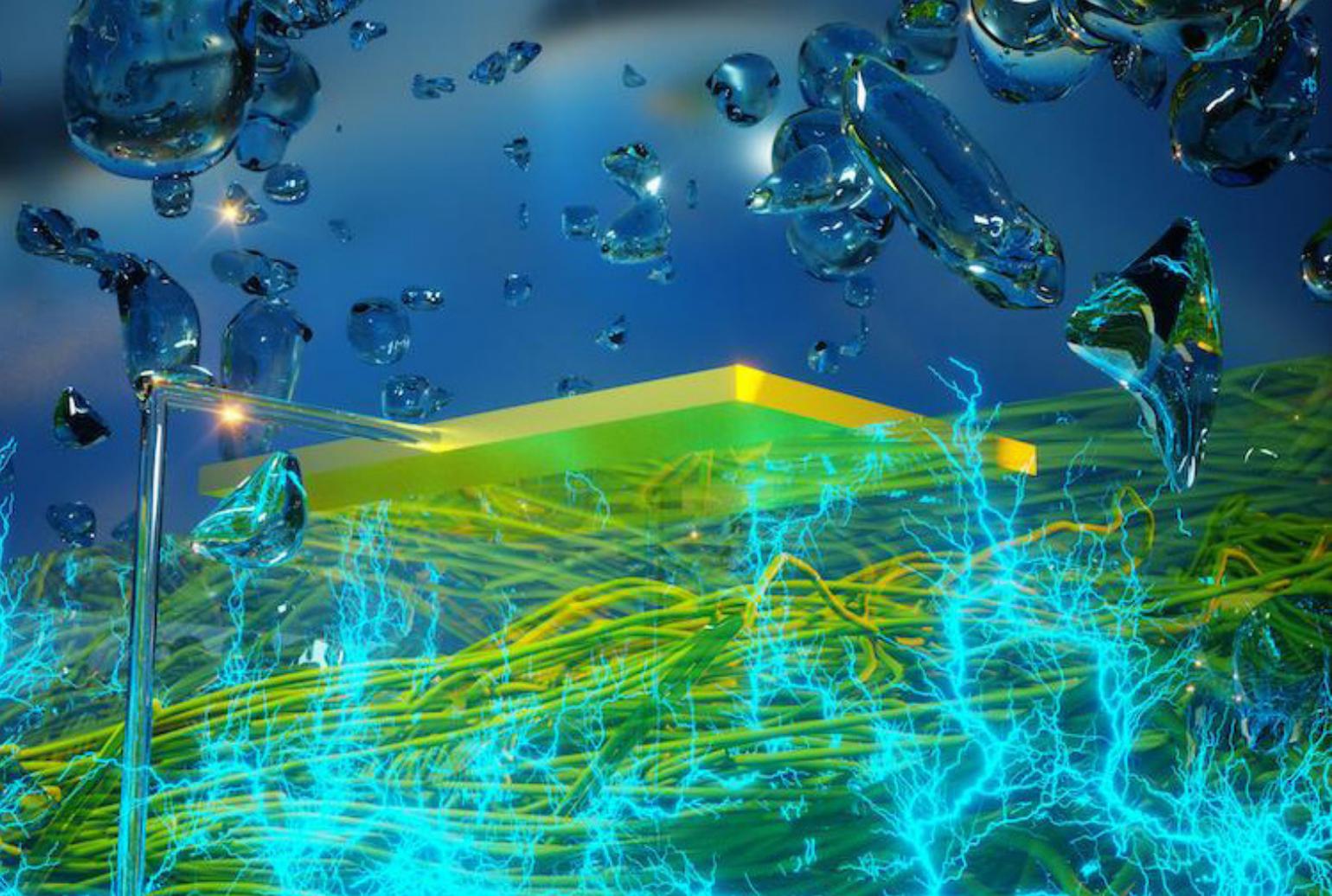
ENVIRONMENTAL DNA IN RIVERS OFFERS NEW TOOL FOR DETECTING WILDLIFE COMMUNITIES

Collaborating with researchers in England and Scotland, UMass Amherst ecologists Christopher Sutherland and Joseph Drake '22PhD report a new method of identifying an “entire community of mammals”—including elusive and endangered species that are otherwise difficult to monitor—by collecting environmental DNA (eDNA) from river water. The team set out to validate the eDNA method because it may offer a monitoring tool that could revolutionize conservation and ecology research. Details of their international collaborative work are in the March 10, 2020, issue of the *Journal of Applied Ecology*.

RESEARCH SHOWS NANOPLASTICS ACCUMULATING IN PLANT TISSUES

As concern grows among environmentalists and consumers about micro and nanoplastics in the oceans and in seafood, UMass Amherst environmental scientist Baoshan Xing says little is known about the behavior of nanoplastics in terrestrial environments, especially agricultural soils. Now, Xing and collaborators at Shandong University, China, provide direct evidence that nanoplastics can accumulate in plants, depending on their surface charge. Plant accumulation of nanoplastics can have both direct ecological effects and implications for agricultural sustainability and food safety. Details are in the June 22, 2020, article in *Nature Nanotechnology*.





Out of Thin Air



Derek Lovley

NEW TECHNOLOGY USES PROTEIN TO CREATE ELECTRICITY FROM MOISTURE IN THE AIR

Electrical engineer Jun Yao and microbiologist Derek Lovley have developed a device that uses a natural protein to create electricity from moisture in the air, a new technology they say could have significant implications for the future of renewable energy, climate change, and the future of medicine.

Yao and Lovley's "Air-gen," or air-powered generator, is a device with electrically conductive protein nanowires produced by the microbe, *Geobacter*. The Air-gen connects electrodes to the protein nanowires in such a way that electrical current is generated from the water vapor naturally present in the atmosphere. Their results have been reported in *Nature*.

“We are literally making electricity out of thin air,” says Yao. “The Air-gen generates clean energy 24/7.”

Lovley, who has advanced sustainable biology-based electronic materials over three decades, says the technology has significant advantages over other forms of renewable energy because it does not require sunlight or wind, and it even works indoors. “It’s the most amazing and exciting application of protein nanowires yet,” he adds.

The current generation of Air-gen devices are able to power small electronics; Lovley and Yao expect to bring the invention to commercial scale soon. Their plan includes developing a small Air-gen “patch” that can power electronic wearables, such as health and fitness monitors and smart watches, which would eliminate the requirement for traditional batteries. They also hope to develop Air-gens to apply to cell phones to eliminate periodic charging.

“The ultimate goal is to make large-scale systems,” says Yao. “For example, the technology might be incorporated into wall paint that could help power your home. Or we may develop stand-alone air-powered generators that supply electricity off the grid. Once we get to an industrial scale for wire production, I fully expect that we can make large systems that will make a major contribution to sustainable energy production.”

Watch the Video:
<https://www.youtube.com/watch?v=hKMJVDA50lw>



Jun Yao



John and Elizabeth Armstrong

Lovley, Yao Receive Armstrong Fund for Science

Jun Yao and Derek Lovley were chosen to receive the 2020 Armstrong Fund Award for their work on air-gen technology. The \$40,000 grant supports scaling up of the invention for practical applications. UMass Amherst benefactors John and Elizabeth Armstrong established their Fund for Science in 2006 to identify and support promising research directions that do not yet have enough data available for the principals to apply to standard funding channels.

Yao and Lovley are planning exploratory research to attract extramural grants from such sources as the U.S. Department of Energy (DOE), the Office of Naval Research (ONR), and the Defense Advanced Research Projects Agency (DARPA) and to establish intellectual property for startups and commercialization. “We are honored to receive the Armstrong Fund Award, both as a recognition of our discovery and the very critical support for us to further develop the technology for attracting extramural investment and commercialization potential,” says Yao.

“When we support women and faculty of color, we support women students and students of color. A more diverse faculty will also result in better research—we know that through research on science itself.” LAUREL SMITH-DOERR, PROFESSOR OF SOCIOLOGY

“Advancing faculty equity through collaboration is our focus at UMass,” adds Laurel Smith-Doerr, professor of sociology and this year’s principal investigator. “We have a theme for each year of ADVANCE. Last year was the year of faculty peer mentoring, this year will be inclusivity in the time of COVID-19, next year we’ll work on equitable research collaborations, and in our final year, we’ll focus on departmental governance.”

Tools for Success

The ADVANCE program has a number of arrows in its quiver to help target these goals, the first of which is the ADVANCE team itself. The team is led by principal investigators from computer sciences (James Allan), engineering (Sergio Breña), natural sciences (Buju Dasgupta, Jennifer Normanly, and Gabriela Weaver), and social sciences (Misra and Smith-Doerr), who have the experience, the data, and the drive to power change.

Second, ADVANCE is backed by the funds and broad reach of the National Science Foundation, which launched the initiative in 1999. Two years ago, UMass Amherst won a competitive \$3 million, five-year NSF ADVANCE Institutional Transformation grant that allowed the campus to consolidate and strengthen its efforts to promote faculty equity. With the grant, UMass set its sights on the initiative—hiring project staff, conducting research, and offering extensive programming and tools. The

newest tool will help faculty document how COVID-19 has affected their work to ensure they aren’t disadvantaged by childcare responsibilities and other pandemic impacts. “Inequality can get ratcheted up in times of crisis,” points out Smith-Doerr.

Another ADVANCE advantage is its network of powerful campus allies: “We have the buy-in of Provost John McCarthy and Chancellor Kumble Subbaswamy, who support inclusion, diversity, and equity,” says Misra. “We also have a number of super-supportive deans, and a wonderful partner in the faculty union.”

Signs of Change

Some changes are already policy, including new rules regarding peer mentoring, which research shows is critical to faculty retention. The university now requires departments to have mentoring plans for newly-hired faculty, annual faculty rewards for mentoring have been established, and faculty mentoring is part of annual faculty reports. “Mentoring is now something that is rewarded on campus, something that gets counted when we are evaluated,” says Misra. “That was an enormous win.”

ADVANCE deploys an annual cadre of faculty fellows who foster cultural change within their departments. Elizabeth Sharrow, associate professor of public policy and history, was one of last year’s fellows. She sees her role as bringing equity issues to the forefront. “We signal to colleagues that there is a lot of work being done around campus—not just regarding gender, but regarding race and intersectionality— and there’s a network of us who are figuring out ways to do it,” she says. One of Sharrow’s priorities is encouraging research collaborations. “In the natural sciences and social sciences, collaboration is increasingly important to our research. Who gets to be part of the research team and who gets left out? That matters a lot and is a metaphor for how well departments function in other non-research-related work.”

Professor Michele Cooke, an ADVANCE fellow in the department of geosciences and a faculty member since 1999, says that starting conversations around equity at UMass Amherst has become easier. “In the past, issues related to faculty gender and equity didn’t always gain traction,” she says. “Now that we have the data on these issues, and we have ADVANCE at our back, faculty can be more comfortable raising these issues; it gives power to our voices.”



Left to right: Laurel Smith-Doerr, Buju Dasgupta, James Allan, Donna Baron, Jennifer Normanly, Sergio F. Breña, Gabriela Weaver, Joya Misra.

Smith-Doerr notes that greater faculty equity will benefit UMass Amherst as a whole. “Faculty are the foundation of higher education,” she says. “When we support women and faculty of color, we support women students and students of color. A more diverse faculty will also result in better research—we know that through research on science itself.”

In 2023, at the conclusion of the NSF grant, the ADVANCE team will examine the data to assess how well UMass Amherst has succeeded in reducing gender, race/ethnicity, and other disparities among faculty, and they will work to extend and expand their efforts throughout campus. And they will push on. As Smith-Doerr notes, “Equity and inclusion is not something that you can take your eye off of. It’s a continual effort. It’s unending work.”

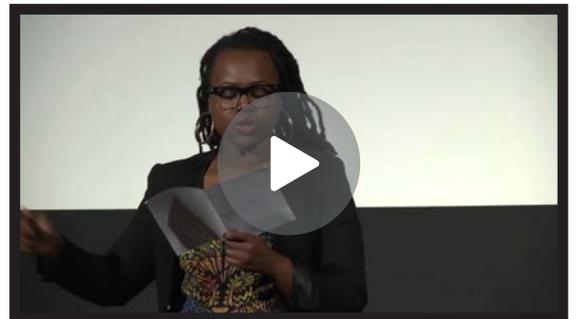
umass.edu/advance



Building a Just Society

Growing up as a first-generation American in a working-class neighborhood in Brooklyn, Jamila Lyiscott learned how to navigate the contrasts between her family's Caribbean background and an educational system that demanded assimilation. "I was an A-student only because I knew how to do school," recalls Lyiscott, now an assistant professor of social justice education in the UMass Amherst College of Education, a senior research fellow at Columbia University's Teacher's College, and a nationally renowned spoken word artist.

EDUCATOR CHALLENGES
INSTITUTIONS TO RETHINK
ATTITUDES ROOTED IN OPPRESSION



Watch the TED Talk: bit.ly/30RyWK4

As she became involved in her community, though, Lyiscott noticed a disconnect that she found increasingly disturbing. “The brilliance that exists throughout the African Diaspora wasn’t centered in school,” she says. “Instead, it was in these out-of-school spaces I could see the ways that brilliance was valued.”

This disconnect brought her to a turning point at age 19, when Lyiscott was speaking on an academic panel and a woman told her how articulate she was. “I knew that if she’d heard me speaking the way I spoke at home or with friends, she wouldn’t have said that,” says Lyiscott. “What was it at this intersection between language and race that allowed this woman to make an assessment of my value?”

Questions like this became the basis for Lyiscott’s viral TED talk, “3 Ways to Speak English,” which has been viewed more than 4.6 million times and led to appearances on national and international media outlets, including Spike Lee’s “2 Fists Up,” NPR, and Huffington Post, as well as a commission by TED for a poem, titled “2053.” Among other honors, she was recently recognized by the American Educational Research Association—the world’s top education research organization—with their Outstanding Public Communication of Education Research and Scholar-Activist and Community Advocacy awards.

Through it all, Lyiscott has devoted her career to challenging the accepted notions of a pedagogy rooted in colonialism, with its emphasis on “civilizing” those from outside the traditional framework.

“Young people are grounded in experiences that people outside their communities can’t understand,”

she says. “They’re the experts on what needs to happen in their world. Yet they’re bombarded with messages that they have to engage in assimilation.” By confronting this top-down education model, Lyiscott encourages young people to recognize their own experiences as valid, starting with naming what they’re feeling. “When they start getting those tools, they light up and become motivated. They begin to understand, ‘Oh, so that’s why I feel so uncomfortable. Why can’t I just be what I am?’”

Questioning who gets to produce knowledge is at the core of her teaching and speaking engagements, as well as at Cyphers for Justice, a program she founded at Columbia University that uses hip hop, digital literacy, spoken word, and social research methods to apprentice New York City high school students, incarcerated youth, and teachers as critical researchers.

It’s also central to her new book, *Black Appetite. White Food. Issues of Race, Voice, and Justice Within and Beyond the Classroom*, which is already in its second printing after selling out in just ten days. The text serves as a practical guide for teachers seeking to increase their awareness and foster action around racial injustice and inequity. But in Lyiscott’s hands, the content goes beyond academic language as it moves through poetry and personal narrative to disrupt readers’ preconceived notions, resonating on a gut level.

“It never goes well when you try to disrupt the institutions,” she laughs. Although many of her ideas have met with resistance, Lyiscott has worked to find spaces in which she can build allies who will help nourish her work. “It’s called fugitivity: moving from freedom to freedom. There are powerful people and places who are willing to be part of this work, but I have to find those spaces of freedom.”

Luckily, UMass Amherst is a place open to such concepts, as evidenced by Lyiscott’s latest project, a new Center of Racial Justice and Youth Engaged Research that she is launching with assistant professor of education Keisha Green. “We’ll be collaborating around how to have local, national, and international conversations about the ways social and racial justice needs to be central to education across disciplines,” says Lyiscott. That means going beyond having Black History Month programs, she says, to challenging institutions to rethink embedded standards of intellectualism.

“We need to move from cultural hierarchy to cultural pluralism,” she states, a belief that’s finding form in Lyiscott and Green’s Fulbright-funded project that will take a group of educators to Ghana next summer to explore the ways ingrained methods of learning and teaching shape their curriculum. Lyiscott calls it “one of the first big steps to start situating my work globally.” She’s also beginning a Coyle Fellowship with the University of Notre Dame’s Center for Literacy Education.

“I’m proud of the way that I have drawn on the culture and history that my parents embedded in me,” says Lyiscott. “I’ve been able to remain true to the integrity of that journey, and when I’m authentic, other people feel like they have permission to be authentic.”

CALZETTI ELECTED TO THE NATIONAL ACADEMY OF SCIENCES



Daniela Calzetti, professor and head of astronomy at UMass Amherst, has been elected to the U.S. National Academy of Sciences (NAS) panel “in recognition of distinguished and continuing achievements in original research.” A specialist in how galaxies evolve, Calzetti is known worldwide for “Calzetti’s Law,” a tool she developed in the mid-1990s that, among other things, allows astronomers to estimate how much information they are missing due to dust obscuring probes of very distant galaxies.

The honor is “a widely recognized mark of excellence in science and one of the highest honors a scientist can receive,” according to NAS. Calzetti is one of 120 United States and twenty-six international new members who will receive individual citations for their specific research contributions at a formal induction ceremony at the 2021 NAS annual meeting.

KUROSE NAMED TO NATIONAL ACADEMY OF ENGINEERING



Distinguished Professor James Kurose of the College of Information and Computer Sciences has been elected to the National Academy of Engineering for “contributions to the design and analysis of network protocols for multimedia communication.”

Election to the academy is among the highest professional distinctions accorded to an engineer, the organization points out. Academy membership honors those who have made outstanding contributions to “engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature” and to “the pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education.”

BRIGHAM-GRETTE HONORED WITH HUMBOLDT RESEARCH AWARD



Geosciences professor Julie Brigham-Grette has been honored by Germany’s Alexander von Humboldt Foundation with its coveted Humboldt Research Award. She is being recognized for her career-long achievements developing paleoclimate records. The award is granted in recognition of a researcher’s entire

achievements to date to academics whose fundamental discoveries, new theories, or insights have had a significant impact on their own discipline and who are expected to continue producing cutting-edge achievements in the future.

WANG RECEIVES DOE EARLY CAREER AWARD



The U.S. Department of Energy has chosen assistant professor of physics Chen Wang to be an Early Career Award recipient. The award provides university-based researchers with at least \$150,000 per year in research support for five years.

Chen’s project involves enhancing quantum bit (qubit) performance by harnessing friction—usually an unwelcome source of error in quantum devices—to make qubits perform with fewer errors. The work is most relevant for quantum computing, with potential applications in cryptography, communications and simulations.

NAGURNEY RECEIVES 2020 HAROLD LARNDER PRIZE



Anna Nagurney, the John F. Smith Memorial Professor at the Isenberg School and director of the Virtual Center for Supernetworks, is the recipient of the 2020 Harold Larnder Prize, which is awarded annually to an individual who has achieved international distinction in operational research. Nagurney is the award’s thirty-fifth recipient and only the second female to be so recognized.

AASCU NAMES KRAUTHAMER TO 2020 MILLENNIUM LEADERSHIP INITIATIVE



Barbara Krauthamer, dean of the College of Humanities and Fine Arts, joins a new class of thirty-one senior-level higher education professionals in the 2020 Millennium Leadership Initiative (MLI), a premier leadership development program of the American Association of State Colleges and Universities (AASCU).

MLI provides individuals traditionally underrepresented in the highest ranks of postsecondary education with the opportunity to develop skills, gain a philosophical overview, and build the network and knowledge needed to advance to the presidency.

DIMITRAKOPOULOS NAMED FELLOW OF THE NATIONAL ACADEMY OF INVENTORS



Christos Dimitrakopoulos, professor of chemical engineering, has been named a Fellow of the National Academy of Inventors. He is one of 168 prolific academic innovators from across the world who have been elected to the 2019 class of Fellows.



Du

Andrews

Bertramo

Lee

Perry

FIVE COLLEGE OF ENGINEERING FACULTY WIN NSF CAREER GRANTS

Five faculty members in the College of Engineering have been awarded National Science Foundation's (NSF) Faculty Early Career Development (CAREER) grants. Four of the recipients of the five-year grants, Lauren B. Andrews, Peter J. Beltramo, Jungwoo Lee, and Sarah L. Perry, are assistant professors in chemical engineering, while Xian Du is an assistant professor in mechanical and industrial engineering. These rising stars conduct research in emerging areas, such as therapeutics and vaccine development, tissue engineering, biomanufacturing, biosensors, and flexible electronics.

SIEGELMANN AWARDED DARPA MERITORIOUS PUBLIC SERVICE MEDAL



College of Information and Computer Sciences professor Hava T. Siegelmann has received the rarely awarded Meritorious Public Service Medal from the Defense Advanced Research Projects Agency (DARPA) of the United States Department of Defense. It is the third-highest honor the Department of the Army can bestow on a private citizen.

Her citation reads, "She created and managed some of DARPA's largest and most advanced AI programs, including L2M—developing next-generation advanced AI systems capable of learning in real time and applying learning to environments and circumstances not specifically trained for." Siegelmann was recognized for an "exceptionally productive" term at DARPA, which included developing a system that administers insulin plus dextrose to maintain glucose at safe levels for patients in critical care and those with diabetes; sensors to identify dangerous chemicals from a safe distance; collaborative, secure learning systems that allow group collaboration without revealing sensitive data; and methods to identify attacks by reverse engineering to secure the system and find the attacker.

FOUNTAIN NAMED TO LIST OF MOST INFLUENTIAL PEOPLE IN DIGITAL GOVERNMENT



Distinguished Professor Jane Fountain of the School of Public Policy, the Department of Political Science, and director of the National Center for Digital Government, has been named to a list of the "100 Most Influential People in Digital Government" for the second year in a row.

The list, compiled by Apolitical, a peer-to-peer learning platform for governments, recognizes people making the biggest impact in digital government around the world.

CHEUNG RECEIVES COVETED PLANT BIOLOGY EXCELLENCE AWARD



Alice Cheung, professor of biochemistry and molecular biology, has received the American Society of Plant Biologists 2020 Lawrence Bogorad Award for Excellence in Plant Biology Research. The award is made every other year to "a plant scientist whose work both illuminates the present and suggests paths to enlighten the future."

WHITE HOUSE SELECTS SAHA FOR EARLY CAREER AWARD



Algorithm and data management expert Barna Saha, associate professor in the College of Information and Computer Sciences, was chosen by the White House to receive the Presidential Early Career Award for Scientists and Engineers—the highest U.S. award given to rising stars of science and technology who work at the frontiers of new research and ideas. The award recognizes

outstanding scientists and engineers who show exceptional promise in their early career for leadership in science and technology.

NAHMOD RECEIVES COVETED SIMONS FOUNDATION GRANT



Mathematics professor Andrea R. Nahmod has been named a principal investigator for an \$8 million Simons Foundation Collaboration in Mathematical and Physical Sciences that will involve leading mathematics and physics researchers in the United States and Europe in a systematic, coordinated study of wave turbulence. It is the most prestigious and coveted of the collaboration grants given by the Simons Foundation.



"I"(-Corps) is for Innovation

UMASS HAS A POWERFUL NEW TOOL FOR STEM TECH DEVELOPMENT

UMass Amherst has a history of science innovation. During the First World War, when food was scarce, campus horticulturists taught students and homemakers the technology of food preservation. Fast-forward a century, and revolutionary ideas are flowing from campus labs: from genetically engineered trees that can capture more carbon dioxide, to the harnessing of a novel bacteria that generates electricity out of thin air (see page #).

These revolutionary ideas are just a sample of technologies born from academic research. Yet the process of spinning technologies out of labs and developing them into products and services that people want and need is not an easy one.

The National Science Foundation (NSF) I-Corps site program is designed to help. I-Corps awards funding to select universities such as UMass Amherst to engage STEM faculty and students in team-based early-stage technology commercialization experiential training. Sites provide advice, training, and modest funding to enable teams to explore real-world needs and to prepare for the National I-Corps Teams program.

"This is technology innovation training specifically for STEM researchers," says Ken Carter, principal investigator of the I-Corps site program and UMass Amherst professor of polymer science and engineering. Carter says having a site adds an important STEM-focused element to the campus's innovation ecosystem. His motivation to make UMass Amherst an I-Corps site stems from his own experience in a 2016 National I-Corps Teams program, which he says was "eye-opening" and instrumental in helping to bring his team's anti-fogging technology, FogKicker, to market.

The campus received its site award in October 2018 and quickly created customized training that is unique to the needs of the UMass Amherst community. The program has already served more than 180 faculty, students, and staff, says Karen Utgoff, UMass Amherst I-Corps site director. With Carter and co-principal investigators Professor Buju Dasgupta (psychological and brain sciences) and Burnley Jaklevic, PhD (director of UMass Amherst Technology Transfer Office), they created a program that supports individuals and teams as they start to test the waters of innovation.

Warm-Up, Jump-Start, Rev-Up

The three-part program starts with a ninety-minute Innovators Warm-Up, which provides a brief introduction to university-based innovation, technology commercialization, and the Lean Startup methodology.

Part two is the Innovator's Jump-Start, which provides hands-on experience with the I-Corps approach and the scientific method applied to technology commercialization. The training is focused on customer discovery and getting participants out of their comfort zones to interview ten potential customers. The interview process is a critical piece of the I-Corps training, says Utgoff. "It helps entrepreneurs to understand customer needs. Teams are able to test their assumptions and pivot based on lessons learned. Once complete, participants are prepared to go on to the National I-Corps program."

The third part of the program, the Innovator's Rev-Up, is self-paced and offers mini-grants. Participants work directly with Utgoff to do twenty more interviews and to deepen their understanding of customer needs.

COVID Challenges

Once COVID-19 hit, the I-Corps team had to re-think the Jump-Start training. "Before COVID, the emphasis was on face-to-face interviews. You had to be in the room with the person," says Utgoff. With safety protocols changing so quickly, the time was right to try things virtually. Utgoff, who was an adjunct instructor for the first all-virtual national program, worked with the local team to create an entirely virtual program. "We learned that video interviews work well, but we had to adjust our training to incorporate them," she says. Building on these initial experiences, Carter secured supplemental funding from the NSF to pursue e-distribution of the I-Corps training models. The team will put the supplemental funding to work to build tools to make the program stronger and more impactful, no matter what the future holds in terms of social distancing.

Reflecting Diversity and Inclusion

Another special aspect of the UMass Amherst program is its commitment to diversity and inclusion. The team embraced the university's diversity and inclusion mission to build training designed to address both aspects through emphasis on overcoming blind spots, with respect to interview dynamics and identification of potential customers.

"We are training people to be conscious of overlooked markets so that they are thinking about those markets from the get-go. We are raising awareness of blind spots that both interviewers and interviewees have, including about ethnicity and gender, which can be really important when you are talking about how people see the entrepreneur," says Utgoff.

Co-principal investigator Buju Dasgupta, a professor in the Department of Psychological and Brain Sciences and founding director of the campus's Institute of Diversity Sciences, is the chief architect of this part of the curriculum. Dasgupta's own research focuses on implicit bias, making her a natural fit for I-Corps diversity and equity training.

"A really important part of our I-Corps program is to attract greater diversity of students and faculty into innovation and entrepreneurial training," says Dasgupta. The image of an entrepreneur as male and typically White or Asian may keep women and people of color away from innovation training because they don't see themselves fit that mold, she adds.

By conducting research in collaboration with economics associate professor Ina Ganguli, Dasgupta and the team are learning that many more women are attracted to I-Corps training when it is described as a launch pad to develop innovative ideas motivated by social good instead of being motivated by purely commercial interests. "Consistent with other research, this suggests that women's career-related decisions are often driven by social impact. Having an opportunity to satisfy that motivation brings more people into innovation and entrepreneurship," says Dasgupta.

When asked about lessons learned as the program wraps up its second year, Utgoff says, "We want to build programs that prepare people for the national I-Corps competition, but we also want to have a program that is really accessible to STEM researchers, social science researchers, anyone who has an idea for commercializing research. The STEM researchers are our sweet spot, but we are also mindful that there's a lot of great STEM research going on beyond the traditional STEM departments We want to hear from them. We want to help them because even if our program isn't a good fit, it's highly likely we can direct them to another program that is.

www.umass.edu/icorps

55

invention disclosures received

25

new patent applications filed

3

new start-ups formed

27

patents issued

10

license and option agreements executed

\$620,710

total revenue received

Technology Transfer

The *Technology Transfer Office* moves technologies beyond the lab bench to become commercially viable products, processes, and services. It licenses campus technology to corporate partners and supports the development of new businesses derived from UMass Amherst technology.

Start-Up Companies

TUMULT LABS UNLEASHES THE POWER OF DATA WHILE GUARANTEEING PRIVACY

Tumult Labs, Inc., co-founded by UMass Amherst's Professor Gerome Miklau, Professor Ashwin Machanavajhala of Duke University, and Professor Michael Hay of Colgate University, is building cutting-edge privacy technology that allows data to be used effectively while respecting and maintaining the privacy of the contributing individuals. Tumult's solutions accomplish this through satisfying differential privacy. In differential privacy, specially-designed algorithms add noise to data in such a way that the sensitive information of individuals within the dataset is protected. This occurs while maintaining enough accuracy in the modified dataset so that decision makers can still rely on it to make data-driven decisions.



Gerome Miklau

This year, the TTO exclusively licensed to Tumult some of its core software technologies. Tumult is currently assisting multiple U.S. government agencies in safely releasing privacy-sensitive data.

Research Activity

Proposals Submitted: **1,237**

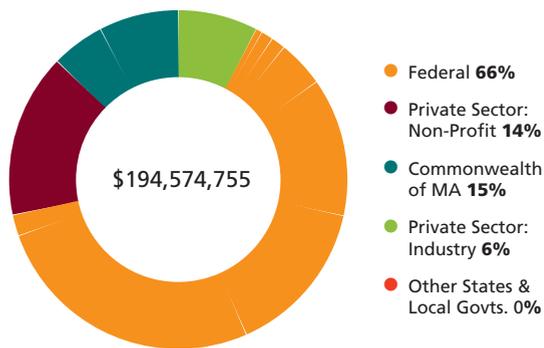
Proposal Dollars: **\$733.9 million**

Awards: **1,020**

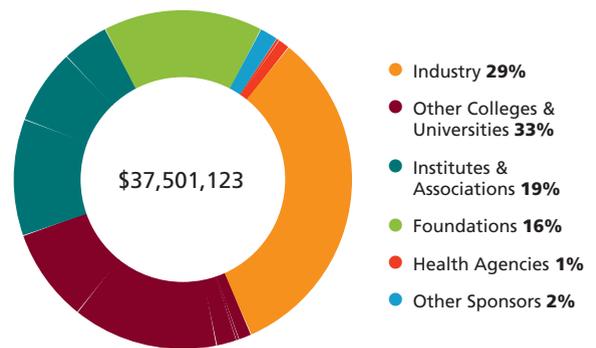
Award Dollars: **\$194.6 million**

Annual Research Expenditures: **\$223.18 million** (FY 2019 most current data)

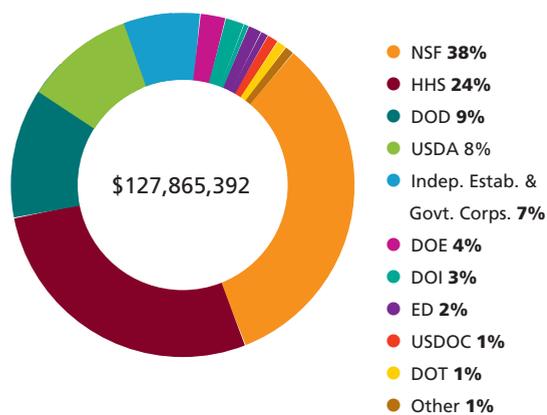
DISTRIBUTION OF AWARDS BY SPONSOR CATEGORY FY 2020



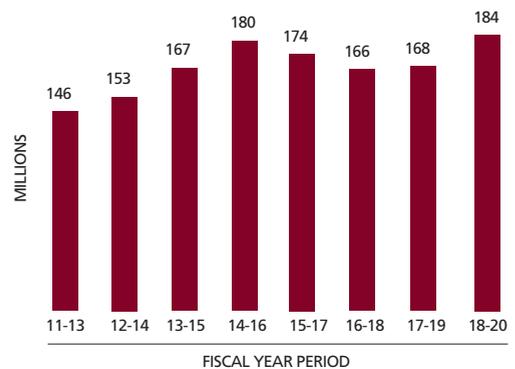
DISTRIBUTION OF AWARD DOLLARS FROM THE PRIVATE SECTOR FY 2020



DISTRIBUTION OF AWARD DOLLARS FROM FEDERAL AGENCIES FY 2020



AWARD DOLLARS THREE YEAR ROLLING AVERAGE OF AWARDS FY 2011-2020



Press News

GREENHOUSE STUDIOS PARTNERSHIP

UMass Press and UConn's Greenhouse Studios received a two-year, \$500,000 grant from the Andrew W. Mellon Foundation to support the researching and testing of peer review, publishing, and preservation workflows for digital scholarship. During the grant period, which extends from the fall of 2019 through 2021, they are investigating how digital humanities centers and their university press partners can best guide digital scholarship to publication.

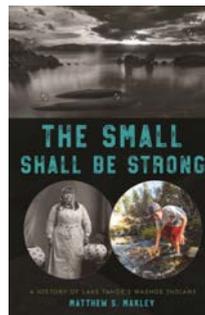
UMASS PRESS UPGRADES

In the summer of 2020, UMass Press began a range of technological and operational upgrades designed to improve the customer experience. On July 1, the Press transitioned to the University of Chicago Press's Chicago Distribution Center for order fulfillment and U.S. distribution. Additionally, they are now represented by the University of British Columbia Press in the Canadian market. A new website, www.umasspress.com, designed by Supadü, was unveiled in concert with these other upgrades.

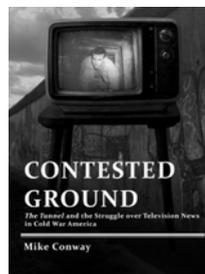
FY 2020 Numbers



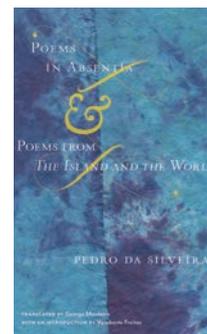
Accolades



Matthew Makley's *The Small Shall Be Strong: A History of Lake Tahoe's Washoe Indians* was selected as a "CHOICE Outstanding Academic Title" for 2019.



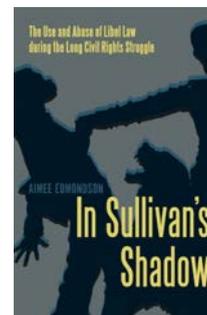
Contested Ground: The Tunnel and the Struggle over Television News in Cold War America by **Mike Conway** was the recipient of the 2020 Broadcast Historian Award from the Library of American Broadcasting Foundation. Additionally, the book was selected as a finalist for the 2020 James Tankard Book Award.



Tagus Press's *Poems in Absentia & Poems from The Island and the World*, translated by **George Monteiro**, was longlisted for the 2019 PEN Award for Poetry in Translation.



Anthony Connors' *Went to the Devil: A Yankee Whaler in the Slave Trade* was awarded the John Lyman Book Award from the North American Society for Oceanic History in the category of "Naval and Maritime Biography and Autobiography."



Aimee Edmondson's *In Sullivan's Shadow: The Use and Abuse of Libel Law during the Long Civil Rights Struggle* was named the runner up for the AEJMC's History Division Book Award. Additionally, the book was a finalist for the Frank Luther Mott/Kappa Tau Alpha Research Award.



Faculty Bookshelf

Peter A. Freeman, **W. Richards Adrion**, and William Aspray, *Computing and the National Science Foundation, 1950–2016: Building a Foundation for Modern Computing* (Morgan & Claypool, 2019).

Michael Ash and Francisco Louçã, *Sombras, el desorden financiero en la era de la globalización* (Sylone Editorial, 2019).

Sonya Atalay, Kisha Supernant, Jane Eva Baxter, and Natasha Lyons, *Archaeologies of the Heart* (Springer, 2020).

M.V. Lee Badgett, *The Economic Case for LGBT Equality: Why Fair and Equal Treatment Benefits Us All*, (Beacon Press, 2020).

Jessica Barr, *Intimate Reading: Textual Encounters in Medieval Women's Visions and Vitae* (University of Michigan Press, 2020).

Aviva Ben-Ur, *Jewish Autonomy in a Slave Society: Suriname in the Atlantic World* (University of Pennsylvania Press, "The Early Modern Americas" series, 2020).

Joseph Black, (Vol. Ed.), *Private Libraries in Renaissance England: A Collection and Catalogue of Tudor and Early Stuart Book-Lists. Volume 10*. (Arizona Center for Medieval and Renaissance Studies, 2020).

Samuel Bowles, Margaret Stevens, Eileen Tipoe, and The CORE Team, *Economy, Society, and Public Policy* (Oxford University Press, 2019).

Samuel Bowles and Simon Halliday, *Microeconomics: Competition, Conflict, and Coordination* (Oxford University Press, 2020).

James K. Boyce, *Economics for People and the Planet: Inequality in the Era of Climate Change* (Anthem Press, 2019).

James K. Boyce, *The Case for Carbon Dividends* (Polity Press, 2019).

Laura Briggs, *Taking Children: A History of American Terror* (University of California Press, 2020).

Allison Butler, *Educating Media Literacy: The Need for Critical Media Literacy in Teacher Education* (Brill, 2019).

Teppo Hujala, Anne Toppinen, **Brett J. Butler**, *Services in Family Forestry. Vol. 24. World Forest Books.* (Springer, 2019).

Donal Carbaugh, Brion Van Over, Ute Winter, Elizabeth Molina-Markham, and Sunny Lie, *Communication in Vehicles: Cultural Variability in Speech Systems* (De Gruyter, 2020).

Virginia M. Cross, *While Rome Burned: Fire, Leadership, and Urban Disaster in the Roman Cultural Imagination* (University of Michigan Press, 2020).

Paul M. Collins, Jr. and Matthew Eshbaugh-Soha, *The President and the Supreme Court: Going Public on Judicial Decisions from Washington to Trump* (Cambridge University Press, 2019).

Louis G. Castonguay, **Michael J. Constantino**, and Larry E. Beutler, (Eds.), *Principles of Change: How Psychotherapists Implement Research in Practice.* (Oxford University Press, 2019).

James Crotty, *Keynes Against Capitalism: His Economic Case for Liberal Socialism* (Routledge, 2019).

John Santrock, **Kirby Deater-Deckard**, and Jennifer Lansford, *Child Development: An Introduction, 15th edition*, (McGraw-Hill Education, 2020).

Constantin Volosencu, **Xian Du** and Ali Saghafinia, *Control Theory in Engineering* (IntechOpen, London, 2020).

Cedric de Leon, *Crisis!: When Political Parties Lose the Consent to Rule* (Stanford University Press, 2019).

Gerald Epstein, *The Political Economy of Central Banking: Contested Control and the Power of Finance* (Edward Elgar Publishing, 2019).

Gerald Epstein, *What's Wrong With Modern Money Theory: A Policy Critique* (Palgrave, 2019).

Robert S. Feldman, (Ed.), *Learning Science: Theory, Research, and Practice* (McGraw-Hill, 2020).

Jill Franks ('88MA), *Every Stranger a God: Hiking the English Moors* (White River Press, 2019).

Jill Franks ('88MA), *Woody Allen and Charlie Chaplin: Little Men, Big Auteurs* (McFarland, 2019).

Gerald Friedman, *Microeconomics as a Social Science* (Kendell Hunt, 2019).

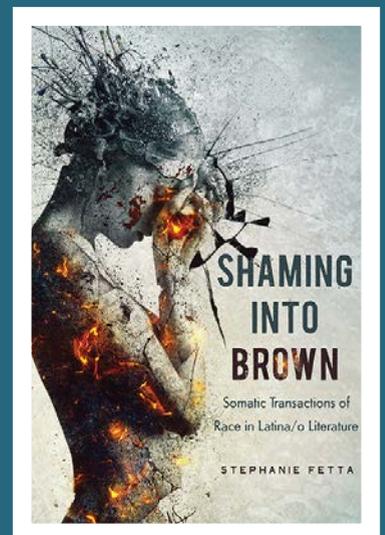
Gerald Friedman, *The Case for Medicare for All* (Polity Press, 2020).

Gretchen Holbrook Gerzina, (Ed.) *Frances Hodgson Burnett: The Secret Garden, A Little Princess, Little Lord Fauntleroy* (Library of America, 2019).



Fetta's Book *Shaming into Brown* Honored

Shaming into Brown: Somatic Transactions of Race in Latina/o Literature by Associate Professor of Latin@/x Literature and Culture Stephanie Fetta has received the 2019 MLA Prize in United States Latina and Latino, and Chicana and Chicano Literary and Cultural Studies. In the book, Fetta asserts that our bodies are fundamental to how we live and how we make meaning. *Shaming into Brown* focuses on exposing the underpinnings of racialized shame and does so through analyzing "scenes of racialization" in prominent works by authors such as Junot Díaz, Sandra Cisneros, and Oscar Zeta Acosta.



Krista Harper and Valeria Siniscalchi, (Eds.) *Food Values in Europe* (Bloomsbury, 2019).

John Hennessy and Ostap Kin, (translators), *A New Orthography: Poems by Serhiy Zhadan*, Volume V in the Lost Horse Press Contemporary Ukrainian Poetry Series (University of Washington Press, 2020).

Christine I. Ho, *Drawing From Life: Sketching and Socialist Realism in the People's Republic of China* (University of California Press, 2020).

Donald R. Chambers, Mark J. P. Anson, Keith H. Black, **Hossein B. Kazemi**, CAIA Association, *Alternative Investments: CAIA Level I, 4th Edition* (March, 2020).

Maria Ivanova, *Cinema of Collaboration: DEFA Coproductions and International Exchange in Cold War Europe* (Berghahn Books, 2019).

Micaela Martegani, **Jeff Kasper**, and Emma Drew. *More Art in the Public Eye* (Duke University Press, 2020).

Jasmine Kerrissey, **Eve Weinbaum**, **Clare Hammonds** ('07MS), **Tom Juravich** ('84PhD), **Dan Clawson**, *Labor in the Time of Trump* (Cornell University Press, 2020).

David Kotz, Fred Weir, *Russia's Path from Gorbachev to Putin: The Demise of the Soviet System and the New Russia*, Malayalam language edition: Kerala Sasthra Sahithya Parishad (Kerala Science Literary Association, 2019).

Karen Kurczynski, *The Cobra Movement in Postwar Europe: Reanimating Art* (Routledge, 2020).

Jim Kurose and Keith Ross, *Computer Networking: A Top-Down Approach (8th edition)* (Pearson, 2021).

Christopher Neck, **Charles Manz**, and Jeffery Houghton, *Self-Leadership: The Definitive Guide to Personal Excellence, 2nd Ed.* (Sage, 2020).

Matthew Jakupcak, Amy Wagner, and **Christopher R. Martell**, *The PTSD Behavioral Activation Workbook: Activities to Help You Rebuild Your Life from Post-Traumatic Stress Disorder* (New Harbinger, 2019).

Airín D. Martínez and Scott D. Rhodes, (Eds.) *New and Emerging Issues in Latinx Health* (Springer, 2019).

Marla R. Miller, *Entangled Lives: Labor, Livelihood, and Landscapes of Change in Rural Massachusetts* (Johns Hopkins University Press, 2019).

David Mix Barrington, *A Mathematical Foundation for Computer Science: Revised Preliminary Edition* (Kendall Hunt Publishing Company, 2019).

Anthony J. Nyberg and **Thomas P. Moliterno**, (Eds.), *Handbook of Research on Strategic Human Capital Resources* (Edward Elgar Publishing, December, 2019).

Douglas Rice, *Lighting the Way: Federal Courts, Civil Rights, and Public Policy* (University of Virginia Press, 2020).

Marianna Ritchey, *Composing Capital: Classical Music in the Neoliberal Era* (University of Chicago Press, 2019).

Alasdair Roberts, *Strategies for Governing: Reinventing Public Administration for a Dangerous Century* (Cornell University Press, 2019).

Lynda Schwartz ('86BBA), *Understanding the Forensic Technology Landscape: A Reference Guide for Practitioners* (American Institute of Certified Public Accountants, 2000).

Shawn Shimpach, *The Routledge Companion to Global Television* (Routledge, 2019).

Mary Ann Shifflet, Cecilia Martinez, Jane Oppenlander, **Shirley Shmerling** ('94PhD), *Improving Health Care Quality: Case Studies with JMP®* (Wiley, June 2020).

James Smethurst, *Brick City Vanguard: Amiri Baraka, Black Music, Black Modernity* (University of Massachusetts Press, 2020).

Wolfgang Banzhaf, **Lee Spector** and Leigh Sheneman, (Eds.), *Genetic Programming Theory and Practice XVI* (Springer, 2019).

Muzzo Uysal and Orhan Icoz, *Turizm Ansiklopedisi - Türkiye: Turizmin ve Ağır Llama Endüstrisinin Temel Kavramlar* (Detay Yayıncılık, 2019).

Margaret Birney Vickery, *Landscape and Infrastructure: Reimagining the Pastoral Paradigm for the Twenty-First Century* (Bloomsbury Press, 2019).

Anna Johansson, **Stellan Vinthagen**, *Conceptualizing 'Everyday Resistance': A Transdisciplinary Approach* (Routledge, 2019).

Isabella Weber, *How China Escaped Shock Therapy: The Economic Reform Debate* (Routledge, 2020).

Susan Jahoda and Caroline Woolard, *Making and Being: Embodiment, Collaboration, and Circulation in the Visual Arts* (Pioneer Works Press, 2019).

Kevin A. Young, Tarun Banerjee, and Michael Schwartz, *Levers of Power: How the 1% Rules and What the 99% Can Do about It* (Verso, 2020).

If you didn't know what a supply chain was a month ago, you do now. We are feeling them palpably, through strikes of essential workers, surgical mask shortages, and bleak shelves in the paper-products aisle. Anna Nagurney, John F. Smith Memorial Professor of Operations Management at the UMass Amherst Isenberg School of Management, has spent her career studying supply chains and the impacts of disruptions. Nagurney has written widely in the popular press on how specific supply chains—including the unique blood supply chain—are impacted by the coronavirus.

