REPORT ON RESEARCH

University of Massachusetts Amherst
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.
are excited to issue this report highlighting some of our recent advances in research and scholarship, both of which are critical to our mission and to our vision of what constitutes a Top 20 institution.

A key goal in our strategy is to establish UMass Amherst as a partner of choice in advancing and applying knowledge and innovation for the betterment of society. Some of these partnerships are on campus and bridge academic disciplines, such as in our new Institute of Diversity Sciences (see page 14) or the interdisciplinary UManage Center (page 20). Others are off campus and made in conjunction with institutions, communities, government, and industry such as the Multidisciplinary University Research Initiative on photomechanical materials (page 17). This report focuses on just a few of these partnerships, along with the outstanding students and faculty that make them possible.

You can find more about our strategy at bit.ly/umastrategicplan and updated information about research at umass.edu/researchnext.

Thank you for your interest and support, and Go UMass!

Michael F. Malone '79PhD
Vice Chancellor for Research and Engagement,
Ronnie and Eugene Isenberg Distinguished Professor of Engineering

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Sankaran “Thai” Thayumanavan has big plans for the $1.8 million National Science Foundation grant the campus has received to create a multi-university Center for Autonomous Chemistry. He and his colleagues, including fellow UMass Amherst chemist Vince Rotello, seek to design artificial self-activating systems that mimic how biological systems respond automatically to subtle changes in their environment. Thayumanavan calls the process “automatic control as nature does it.”

He cites as an example the many components of the immune system that remain quiet and dormant until an irritant or pathogen is detected. “Once that happens,” says Thayumanavan, “it’s activated. It’s automatic, organically driven; that’s what we refer to as autonomous. The response requires no other intervention.” Thayumanavan knows of no current artificial systems with that capability and adds, “It would be really valuable if we could develop something like it. We want to figure out the ways in which nature uses molecular interactions to create autonomous function.”

Autonomous chemistry has a broad range of applications. Thayumanavan says that personalized medicine has a high profile at the moment and that the need for this type of innovation is widely and readily understood.

“If, for example,” says Thayumanavan, “we had a system that could sense an individual’s response to a drug they’ve been prescribed, that would be very beneficial. We know that some people hyperreact to medication, some respond just fine, and some don’t respond at all. If we had a quick test, an autonomous biomarker without the need for heavy diagnostic testing, it would enhance medicine for many, many people.”

In order to develop “designer materials with autonomous capabilities,” Center researchers will “do the chemistry” to figure out the structural underpinnings of such a system. Thayumanavan and his team members expect that when they try to mimic any complex biological system using a one-step-at-a-time approach, each step will hold the exciting possibility of leading to innovations or new capabilities.

UMass Amherst’s partners in the endeavor include researchers from MIT, the University of Michigan, and the University of Illinois at Urbana-Champaign. Phase 1 funding comes as part of NSF’s Center for Chemical Innovation program.

Researchers in the Center for Autonomous Chemistry investigate the structural underpinnings necessary to build designer materials with autonomous capabilities. Inset: Professor Thai Thayumanavan.
View from the Top

The Department of Linguistics continues its reign as a top-seed academic program

UMass Amherst’s Department of Linguistics has held top spots for years in the rankings established by the National Research Council (third place in 2010) and QS World (second place in 2018). Quite a feat, and one that department chair Joe Pater calls unique. “The QS World rankings are reputation-based,” he says. “The NRC is metric-based. UMass Amherst is the only department in the top three in both.”

Why the acclaim? “We have a strong academic core, we’re forward-thinking, and our culture of excellence has existed from the start,” says Pater.

The department was one of the first founded within generative linguistics, a new way of thinking about language structure developed by Noam Chomsky, considered by many as the father of modern linguistics. The department can be summed up in one word: intense. Pater calls his people “intensely committed to doing top-level research, teaching, and service.” Their drive for excellence and their deep sense of who they are as a department have helped them establish a solid reputation, generating a number of pioneers in the field and an ability to recruit top faculty and students.

This intensity and commitment extend beyond the department. A commitment to joint enterprises and a strong interdisciplinary nature drive innovation, which in turn creates new fields built on traditional strengths. “This is one of our biggest distinguishing factors,” says Pater. “We have collaborations in cognitive psychology, computer science, philosophy, communication disorders, and underrepresented or understudied languages. This helps keep it new and exciting.”
Computational linguistics is the department’s latest research realm. Pater and colleague Gaja Jarosz founded the Society for Computation in Linguistics, which held its inaugural meeting in Salt Lake City in January 2018. “Existing societies focus on trying to create useful applications through computing,” says Pater. “We use computation to focus on understanding how human language develops.”

This new direction has already had a positive impact on students. Professor Rajesh Bhatt is leading the development of a computational linguistics major with the College of Information and Computer Sciences, the first “CS + x” offering. “We want our undergraduates to get jobs and to have that relate to their core expertise in linguistics,” says Pater. “Some programs try to force a computational component, but for us it’s been organic.”

umass.edu/linguistics
Antimicrobial Ingredient in Toothpaste, Soaps, Linked to Inflammation, Altered Gut Microbiota

A research team led by UMass Amherst food scientist Guodong Zhang reports that the antimicrobial ingredient triclosan, found in hand soaps and toothpastes among other products, could have adverse effects on colonic inflammation and colon cancer by altering gut microbiota, the microbes found in our intestines. The study, reported in *Science Translational Medicine*, suggests that short-time treatment with low-dose triclosan caused low-grade colonic inflammation and exaggerated the development of colitis and colitis-associated colon cancer in mice.

New Frontiers for Materials Design

Chemical engineer Sarah L. Perry is using chemistry to help design materials similar to how nature uses amino acids to create proteins. The manufacturing challenge has been how to change materials in order to modify the texture or the thickness in consumer products such as cosmetics or food. Perry has found a way to use electrostatic force to make these provisions naturally, without the need to change materials. Her research opens up new frontiers for materials design. Her findings are published in the journal *Nature Communications*.

Novel Cancer Immunotherapy Shows Promise

Much cancer immunotherapy research has focused on harnessing the immune system’s T cells to fight tumors, “but we knew that other types of immune cells could be important in fighting cancer too,” says biomedical engineer Ashish Kulkarni. He and colleagues at Brigham and Women’s Hospital and elsewhere are reprogramming specific macrophages to eat tumor cells. They report that in preclinical models they can amplify macrophage immune responses against cancer using a self-assembling supramolecule. Details appear in *Nature Biomedical Engineering*.

Code to 36-Year-Old Computation Problem Cracked

UMass Amherst computer scientist Barna Saha and colleagues have offered a theoretical solution to a problem in RNA folding predictions, widely used in biology for understanding genome sequences. Knowing more about RNA structure may reveal clues to its role in the origin and evolution of life on earth. Over the past 36 years, the running time for the algorithm had not improved until Saha and colleagues developed a new faster algorithm. Saha’s article appears in a special issue of the *Journal of Computing*, published by the Society for Industrial and Applied Mathematics.
Exposure to Fracking Chemicals Affects Mammalian Breast Tissue

With more than 17 million Americans now living within one mile of an oil or gas well, research on the effects of chemicals used in unconventional oil and gas (UOG) extraction such as hydraulic fracturing (fracking) is increasingly important. Environmental health scientist Laura Vandenberg and her team have released the first study to show that mouse mammary gland tissues are sensitive to a mixture of 23 commonly used UOG chemicals, with dose-specific effects on tissue morphology, cell proliferation, and induction of intraductal hyperplasia, an overgrowth of cells, considered a marker for future breast cancer risk. Details appear in the journal Endocrinology.

New Blood Test Quickly Detects Liver Damage

UMass Amherst chemist Vincent Rotello and an international team of colleagues have developed a blood test that can detect liver damage before symptoms appear. Their find could lead to a significant advance in the early detection of liver disease, a leading cause of premature mortality in the United States and the U.K. Liver disease often goes unnoticed until its late stages, when the damage it causes is irreversible. The team’s method can detect liver irregularities from a blood sample in 30–45 minutes. Details appear in Advanced Materials.

Biochemists Develop Molecular Probe to Measure Accessible Cholesterol in Cells

UMass researchers have developed a new molecular probe for measuring the amount of accessible cholesterol in cells. The cholesterol research community once focused only on the total amount of cholesterol present in the membrane. The research, done by graduate students Ben Johnson and Mariana Breña and faculty adviser Alejandro Heuck, suggests that the accessibility of cholesterol plays an important role in how cholesterol levels are regulated in the cell. That finding will be useful in the study of cholesterol transport and cholesterol-related diseases. The team’s paper appears in Springer Nature journal Scientific Reports.

Molecular Switch for On-Demand Release of Molecular Cargo

For the first time, it is now known how the movement of a single chemical bond can compromise a membrane made up of more than 500 such bonds. Chemist Sankaran “Thai” Thayumanavan and colleagues at UMass Amherst have developed a system that uses light as a switch to create a reversible, on-demand molecular control mechanism. Their work was supported by a Department of Defense Multi-University Research Initiative award and published in Nature Chemistry.
Improving Human Health

Biomedical engineering blends disciplines for medical innovation

“A biologist, a doctor, and an engineer walk into a room . . .” could be an opening line for UMass Amherst’s Biomedical Engineering program. Launched in 2017, it blends engineering, medicine, and biology with the end goal of growing a talent pool to solve human health problems through interdisciplinary thinking and innovation.

“Our campus has strength in biomedical engineering,” says Tilman Wolf, senior vice provost for academic affairs. “Now we’re putting structure around it.”

A first cohort of undergraduate students has completed its inaugural year in the program and the authorization of a graduate component and new faculty hires has begun. Space for the new discipline is being prepared in the campus’s Life Sciences Laboratories, home to the Institute for Applied Life Sciences (IALS). “Expect to see more advances—more interactions between researchers connecting in ways they haven’t before,” says Wolf.

Alex Smith, a mechanical engineering PhD candidate, envisions how the program will enhance his education. “Biomedical engineering,” he says, “offers an opportunity to improve human health, to help real people. Designing devices requires good engineering but the device will interact with a body, with human biology. How will the biology respond to the mechanical device? How will patients interact with it? The biomedical component is critical to identifying problems in health care that can be solved with engineering.”

Smith does just such discipline blending to find workable solutions. He and UMass colleagues Derek Lovley, Kelly Nevin, and Jun Yao have launched e-Biologics, a biomedical engineering start-up that took top prize in UMass Amherst’s 2018 Innovation Challenge. Focused on providing early detection of chronic diseases, e-Biologics is developing a small, inexpensive skin sensor patch, worn like an adhesive bandage, that noninvasively monitors biomarkers in a person’s sweat. If it senses the onset of a medical condition such as a diabetic complication, the patch can send an alert to a phone.

The campus’s investment in IALS, a significant portion coming from the Massachusetts Life Science Center (MLSC) to build out and equip centralized core facilities, is a big draw for companies like e-Biologics. Smith especially appreciates the connections IALS offers between people in industry and others on campus doing related work.

“Working with IALS is helping to create a culture around a common goal to talk about our ideas,” says Smith. “We’re developing tools that help people, tools that are used for a good cause.”

bme.umass.edu
“Biomedical engineering offers an opportunity to improve human health, to help real people.... The biomedical component is critical to identifying problems in health care that can be solved with engineering.” — Alex Smith
Health Equity

UMass Amherst Report on Research 2018

Healing from Within

Poverty, discrimination, and lack of social support take a toll on well-being that’s hard to measure and even harder to alleviate. That is especially true for low-income African American men, a population that suffers disproportionately from chronic disease and poor health. To combat this disparity, the UMass Amherst Center for Community Health Equity Research (CCHER) is teaming with the Springfield, Mass.–based MOCHA (Men of Color Health Awareness) program to help develop stress-reduction strategies to promote better health outcomes.

MOCHA began as a grassroots program for black men to share experiences of stress stemming from gender-role pressure and associated issues such as violence, depression, incarceration, and substance abuse. Through a multiyear, NIH-funded study, CCHER researcher and UMass Amherst public health professor Louis Graham is working alongside MOCHA’s director and with colleagues in the departments of health promotion and policy and psychological and brain sciences and UMass Medical School to test an expanded program that introduces digital storytelling, field activities, and community activism. In addition to completing interviews and surveys, participants are measured for stress-related biomarkers such as blood pressure, BMI, and levels of the hormone cortisol, providing much-needed longitudinal data on stress disparities and intervention effectiveness.

What makes the study unique is that its content is driven primarily by the community itself: residents designed interview questions and weighed in on research methods, and the men built a bank of coping strategies based on their own stories. “This program wasn’t developed by researchers,” says Graham. “It was started by a group of community members who were concerned about men’s health.” Graham believes this is key to long-term success for participants and to the program’s future as a potential model for communities nationwide.

“We live in a time when, for good reason, many communities around the country have lost faith in institutions. People no longer accept the notion that highly educated elites know what’s best for them—and they shouldn’t,” says Graham.

“Designing research that truly reflects what’s happening within the community and developing solutions to address disparities can only happen by working alongside the communities that will take up those solutions,” he adds. “You may not believe some nameless, faceless person, but you will believe your own work.”

umass.edu/sphhs/ccher
“We live in a time when, for good reason, many communities around the country have lost faith in institutions.” — Louis Graham
Students accompany Congressman Jim McGovern (D-MA) during a tour of the Stockbridge School of Agriculture’s Agricultural Learning Center. Behind them is the former campus horse barn. Built in 1894 and last used to house the UMass Amherst Police Department’s mounted patrol, the barn has been rebuilt and relocated and is now part of the center, just north of campus. Newly reopened, the barn supports student agricultural activities and houses industry-standard equipment for washing and packing the approximately 75,000 pounds of vegetables produced by the campus’s student farmers each year.
Understanding Human Behavior

Human diversity is complex. It originates from factors such as biology, psychology, economics, and history that influence every facet of human experience—from health and work to education and environment—in ways that may confer advantages or disadvantages on people's lives. Research on the science of human diversity is just as complex, residing in different departments, schools, and colleges and across disciplines. Bringing the players together from across campus and encouraging interdisciplinary efforts is the intent of the UMass Amherst Institute of Diversity Sciences.

“Our goal is to break down disciplinary silos and foster a new kind of intellectual environment where people come together who study similar topics in human diversity but from very different angles,” says Nilanjana (Buju) Dasgupta, the institute's director. “We want to cultivate integrative, multidisciplinary, innovative directions for future scholarship and teaching. Multidisciplinary approaches are critical in solving problems—often complex and seemingly intractable ones—associated with group disparities out there in the world.”
New institute provides fresh approach to the science of diversity

A primary role of the institute is to play matchmaker, bringing together researchers and practitioners whose expertise and interests are mutually complementary. “Often,” says Dasgupta, “the faculty we bring together have never met one another because they work in different parts of campus or perhaps even at another campus in the Five College consortium. What they have in common is an interest in solving the same complex problem and a need for collaborators with complementary expertise.”

Consider, for example, disparities associated with health or learning. Solving these complex problems requires multidisciplinary experts and practitioners to band together. Once researchers are connected, the institute provides incentives to make the match work. A first round of seed funding, awarded last spring to six different teams, encourages new multidisciplinary collaborations that can later be leveraged to seek larger grants.

“The long game,” Dasgupta explains, “is to advance each project to the next stage of seeking competitive external funding, provide mentored research experience for the next generation of students interested in the science of human diversity, and promote research that has social impact.”

The institute’s mission is close to Dasgupta’s heart. Her own research focuses on unconscious or implicit bias with emphasis on the ways in which changes in social contexts correspondingly change implicit attitudes, beliefs, and behavior.

“As individual scientists, each of us tries to make a small dent in the problem from our own disciplinary angle,” says Dasgupta. “Just imagine how much more effective we’ll be when we pool our expertise and attack the problem from multiple angles in coordination.”

umass.edu/diversitysciences
Chan Zuckerberg Initiative Awards $5.5M to Accelerate Science and Medicine

Researchers in the UMass Amherst Center for Data Science have received an initial $5.5 million grant from the Chan Zuckerberg Initiative to create a navigable map of scientific knowledge using artificial intelligence. Professor Andrew McCallum, distinguished scientist and Center for Data Science director, leads the Computable Knowledge project, designed to help scientists track important discoveries, uncover patterns, and deliver insights in an up-to-date collection of published scientific texts, including more than 60 million articles.

$1.5M Grant to Address HIV Prevention

UMass Amherst engineer Chaitra Gopalappa is helping to refine the national strategy for reducing HIV infection by developing new analytic models and methods thanks to a $1.5 million grant from the National Institutes of Health. Gopalappa has had experience working closely with the Centers for Disease Control and Prevention and the World Health Organization on noncommunicable diseases such as cancers and communicable diseases such as HIV. Her research will include analyses of a new methodology for simulating sexual and needle-sharing contact networks to reduce the incidence of HIV infections.

Mueller Awarded ACLS Research Fellowship

Melissa Mueller, classics, has been named a 2018 Frederick Burkhardt Residential Fellow by the American Council of Learned Societies. Burkhardt Fellowships carry a $95,000 stipend and a $7,500 research budget and allow awardees to take yearlong residencies at institutions whose resources and scholarly communities are well suited to facilitate their research. Mueller, a specialist in archaic and classical Greek poetry, will be in residence for the 2019–20 academic year at the National Humanities Center in North Carolina.

$525K to Study Earthquake Zone Fundamentals

Thanks to a $525,800 grant from the National Science Foundation, geoscientist Haiying Gao will be able to compare and model five subduction zones across the globe where large earthquakes have occurred. This is the first time research is being done for characterizing fundamental differences and similarities in earthquakes. She will compare characteristics of subduction zones in Alaska, New Zealand, South America, Central America, and the Caribbean and will model earthquake propagation. The improved models could help predict how much ground motion or displacement will occur with a massive earthquake.

Tropp’s Experimental Psychology Research Honored

Social psychologist Linda Tropp received the 2018 Scientific Impact Award from the Society of Experimental Social Psychology. The award recognizes “the author of a specific article or chapter offering a theoretical, empirical, and/or methodological contribution that has proven highly influential over the last 25 years.” Tropp is honored for her theory that under certain conditions contact between two or more social groups can promote tolerance. Her findings show that intergroup contact typically reduces intergroup prejudice.
Campus Takes Lead Role in Photomechanical Materials Initiative

UMass polymer scientist Ryan Hayward has taken the lead role on a project to rethink how light-responsive materials are designed and fabricated. With new applications such as smart building materials that harness solar energy and remotely controlled microrobots being developed, the researchers hope to ultimately develop working, light-driven devices.

Thanks to a $7.5 million grant from the Office of Naval Research Multidisciplinary University Research Initiative, Hayward and colleagues will design molecules and material architectures that efficiently convert photon energy into mechanical work.

Francis Awarded NEA Postdoctoral Fellowship

Dania Francis, assistant professor of economics and Afro-American studies, has been selected to receive a National Academy of Education / Spencer Postdoctoral Fellowship, an award created to encourage outstanding scholars at the postdoctoral level to pursue critical education-research projects. Francis will use her $70,000 award to conduct research to help understand minority and women’s underrepresentation in advanced math courses in high school by investigating whether school counselors exhibit racial or gender bias in making course assignments. This research is being done in collaboration with faculty members Angela de Oliveira in resource economics and Carey Dimmitt in the College of Education.

Richardson Receives CAREER Award for Study of Parkinson’s Symptoms

Kelly Richardson, assistant professor of communication disorders, received a $461,000 early-career research award from NIH’s National Institute on Deafness and Communication Disorders to study two approaches to treating speech and voice symptoms associated with Parkinson’s disease. Until now, the primary speech treatment for people with Parkinson’s has focused on having patients learn to monitor their own speech and adjust their speaking volume when they perceive it as too soft. In a new approach, Richardson and Jessica Huber, a professor of speech, language, and hearing sciences at Purdue University, are using SpeechVive, a small in-ear device designed by Huber that takes advantage of a reflex to talk louder in the presence of background noise. Richardson and Huber hope to establish which voice-rehabilitation programs best match patients’ needs and maximize therapy outcomes.

Mwangi Honored for International Education Work

Chrystal A. George Mwangi, educational policy, research, and administration, has received the 2018 Innovative Research in International Education Award from NAFSA, an association of international educators. The award “celebrates and recognizes new and innovative research with potential or demonstrated impact in the field of international education.” Mwangi received the award in recognition of her 2017 article “Partner Positioning: Examining International Higher Education Partnerships through a Mutuality Lens.” It explores “60 international higher education partnerships through the lens of mutuality” and examines “how partners negotiate and navigate power.”
The Mahoney brothers all received their degrees in chemistry from UMass Amherst. They went on to become leaders in their own industries and have served as high-level alumni advisers to the campus. Their family legacy of giving and involvement is seen throughout the campus. The Mahoney Life Sciences Prize, like all that this family does for its alma mater, inspires and recognizes greatness.
Prize-Winning Science

Chemist Jeanne Hardy untangles the mysteries of Alzheimer’s disease

The challenges wrought by Alzheimer’s disease are increasing with the graying of society in the developed world. Although no suitable treatments for Alzheimer’s disease exist, recent discoveries by UMass Amherst Professor of Chemistry Jeanne Hardy may significantly advance the ability to treat this devastating disease.

For her work, Hardy was selected as the inaugural recipient of the university’s Mahoney Life Sciences Prize, which recognizes scientists from the College of Natural Sciences whose work significantly advances connections between research and industry. The $10,000 prize will be awarded annually to one faculty member who is the principal author of a peer-reviewed paper about original research.

The award was established by Robert ’70, Richard ’55, ’83Hon, and William Mahoney ’55, who all received their degrees in chemistry from UMass Amherst and went on to become leaders in their own industries and serve as high-level alumni advisers to the campus.

“Professor Hardy’s research rose to the top of three highly competitive rounds of review. Her work exemplifies the outstanding translational research for which our faculty are well known,” says Tricia Serio, dean of the College of Natural Sciences.

“We had two purposes in establishing the Mahoney Life Sciences Prize,” said Richard Mahoney, former president and CEO of Monsanto. “To let science-based companies see the extraordinary R&D being done in their field by UMass scientists and to show the UMass scientists that the corporate life sciences community places a high value on research that they can use to solve problems or provide future growth opportunities.”

Hardy has been working for more than a decade to understand an important protein involved in Alzheimer’s disease, called caspase-6. People with Alzheimer’s disease have tangles associated with the neurons of their brains and evidence points to the caspase-6 protein as being responsible for creating those tangles. In her most recent research, Hardy used a new approach to reveal “distinct conformational dynamics in critical regions of the caspase-6 structure” that had not been observable by any other techniques. As a result, she said, these new findings shed more light on caspase-6’s mechanisms, and the changes they describe “may inspire approaches for manipulating caspase-6 in the context of neurodegeneration.”

Insights from this study have allowed the Hardy Lab to develop new chemicals, targeting caspase-6 without affecting other caspases. This development represents a pivotal step forward toward treating Alzheimer’s disease with caspase-6 inhibitors.
Empowering Technologies

With chronic illness on the rise and medical personnel in demand, helping people manage symptoms at home has become critical to patients’ ability to take charge of their own health. One key challenge: self-monitoring technologies are only effective if patients can and will use them.

The UManage Center at UMass Amherst’s College of Nursing has launched a series of pilot programs that team nurses with engineers, chemists, psychologists, and computer scientists to develop self-monitoring solutions that empower patients to actively manage their symptoms. The program’s initial focus is on symptoms related to fatigue and impaired sleep in the chronically ill. One of only seven NIH-funded Exploratory Centers in the nation, UManage is exceptionally well suited to interdisciplinary work, according to director Cynthia Jacelon. “UMass’s intensively collaborative nature is the perfect environment to create a center like this,” she says.

Using the resources of the Center for Personalized Health Monitoring at UMass Amherst’s Institute for Applied Life Sciences, the nurse-led teams take a holistic approach that pairs cutting-edge technology with the realities of patients’ lives.

For patients at risk of fluid overload and lung congestion, Beth Henneman, nursing, is leading a team developing clothing with sensors that could serve as an early warning system to prevent hospitalizations. Its fabric must be comfortable to wear and its data easy to read. In addition, says Jenna Marquard, professor of engineering and director of the center’s Human Factors Core, “The systems must improve users’ cognition, so they know why and how to change their behaviors.”

Jacelon agrees. “Patients benefit by being empowered to act on their own behalf,” she says. “It’s so much more than just following doctor’s orders. The nurse knows what the person with the health problem needs, the engineer knows how to create equipment, the computer scientist knows how to get the data out, and the psychologist knows how to interpret that data. They all bring their unique expertise to solve the problem.”

umass.edu/nursing/UManage-Center

Researchers at UMass Amherst are developing clothing with sensors that could serve as an early warning system to prevent hospitalizations.

Rachel Walker

Walker Named AAAS-Lemelson Invention Ambassador

Rachel Walker, assistant professor of nursing, is the first nurse selected as a Lemelson Invention Ambassador by the American Association for the Advancement of Science. Invention Ambassadors highlight the importance of invention and inventors in improving the quality of life globally.

Walker is a nurse inventor who works collaboratively with patient advocates and community leaders, clinicians, industry partners, and scholars from a wide variety of disciplines to develop technology, care models, and other innovations that support cancer-symptom self-management and survivors’ abilities to engage in the roles and activities most important to them and their families.
Technology Transfer

FY2018 TECH TRANSFER BY THE NUMBERS

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.

Ernest Pharmaceuticals Delivers Molecules to Kill Cancer

The bacteria *salmonella*, notorious for causing food poisoning, has an uncanny property: it prefers to infect cancer tumors. Ernest Pharmaceuticals LLC, founded by Professor Neil Forbes and postdoctoral fellow Nele Van Dessel, is using a nontoxic genetic mutation of *salmonella* to deliver anti-cancer molecules into cancer cells to kill them. Because *salmonella* doesn't naturally enter cells in a way that the anti-cancer molecules are released, Forbes and Van Dessel had to invent a way to alter *salmonella* genes so that the bacteria not only gets into the cells but, once inside, bursts to deliver its anti-cancer cargo. Ernest plans to use this invention to develop a highly potent anti-cancer therapy.

SCT Technologies Improves Artificial Insemination Success

UMass Amherst professors Pablo Visconti and Anna Maria Salicioni, experts in fertility and sperm biology, have made the surprising discovery that ordinary sperm, if placed for a time in a special culture liquid, stop swimming. However, when later placed in an ordinary culture liquid they become hyper-motile, swimming like crazy. Further research has shown that sperm treated in this way are far more likely to fertilize an egg and produce offspring, in some cases improving the success of artificial insemination by 30 percent or more. Visconti and Salicioni have formed SCT Technologies LLC to develop methods and products to improve the artificial insemination of mice, cows, horses, and humans.
Sponsored Activity

Research Activity

Proposals Submitted: 1,323
Proposal Dollars: $610.6 million
Awards: 1,083
Award Dollars: $161.8 million
Annual Research Expenditures*: $210.4 million (FY 2017 most current data)

Distribution of Award Dollars Accepted from Federal Agencies FY2018

- Federal: 63%
- NIH: 36%
- Health Agencies: 1%
- Institutes & Associations: 11%
- Other Colleges & Universities*: 31%
- Industry: 46%
- Other: 2%

Distribution of Award Dollars Accepted from Private Sector FY2018

- Nonprofit: 14%
- Industry: 46%
- Foundations: 9%
- Other Colleges & Universities*: 31%
- DoD: 10%
- Health Agencies: 1%
- Other: 1%

*A significant portion of these awards are prime Federal Funds

Distribution of Award Dollars by Sponsor Category FY2018

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- NIH: 36%
- Health Agencies: 1%
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- Other Colleges & Universities*: 31%
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Federal

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- Other Federal Agencies: 5%
- Health Agencies: 1%
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- Other Colleges & Universities*: 31%
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Private Sector

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- Other Colleges & Universities*: 31%
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- Health Agencies: 1%
- Other: 1%

Distribution of Award Dollars Three-Year Rolling Averages

- NIH: 36%
- Other Federal Agencies: 5%
- Health Agencies: 1%
- Institutes & Associations: 11%
- Other Colleges & Universities*: 31%
- Industry: 46%
- Other: 2%

Federal

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UMass Press

Partnerships and Series

Tagus Press The University of Massachusetts Press has a new partnership with Tagus Press, the publishing arm of UMass Dartmouth’s Center for Portuguese Studies and Culture. The press will distribute and market Tagus’s scholarly and trade series as well as their textbook series and peer-reviewed journal, Portuguese Literary & Cultural Studies.

Bright Leaf Success Bright Leaf, the press’s new regional trade imprint, has garnered a good deal of attention since its fall 2017 launch. One of its first titles, Bricklayer Bill: The Untold Story of the Workingman’s Boston Marathon, was featured in The New York Times, The Boston Globe, The Irish Echo, Fox News, and Smithsonian.com, as well as on NPR’s Only a Game; other Bright Leaf books have been featured in The Chronicle of Higher Education, Publishers Weekly, and The Boston Globe.

Accolades

Michael Soto’s Measuring the Harlem Renaissance was selected as a Choice Outstanding Academic Title for 2017.

James Wadsworth was the recipient of the Weymouth Historical Commission’s Chet Kevitt Award for The World of Credit in Colonial Massachusetts.

Paul Rubinson won Bridgewater State University’s 2018 Class of 1950 Distinguished Faculty Research Award for his book Redefining Science: Scientists, the National Security State, and Nuclear Weapons in Cold War America.

Mary Bagg and Robert Bagg’s Let Us Watch Richard Wilbur was selected as a Times Literary Supplement “Book of the Year” for 2017. It also received honorable mention from the New England Book Festival in the general nonfiction category and a wave of coverage from such outlets as The Weekly Standard, First Things, The New York Times Book Review, and Commonweal.


Peter Benes’s For a Short Time Only was honored with the Theatre Library Association’s 2017 George Freedley Memorial Book Award for exemplary work in the field of live theatre or performance. It was also selected as a Choice Outstanding Academic Title.

Juniper Prize Twenty-eighteen is the inaugural year for the Juniper Prize for Creative Nonfiction, presented in association with UMass Amherst’s MFA for Poets and Writers program. It seeks fresh, innovative projects in memoir, essay, or biography.

Scholarly Series The press launched three new scholarly series this year, including African American Intellectual History, edited by Christopher Cameron; Childhoods: Interdisciplinary Perspectives on Children and Youth, coedited by Karen Sánchez-Eppler, Rachel Conrad, Laura L. Lovett, and Alice Hearst; and Veterans, coedited by Brian Matthew Jordan and J. Ross Dancy.

Bright Leaf Success

Bright Leaf, the press’s new regional trade imprint, has garnered a good deal of attention since its fall 2017 launch. One of its first titles, Bricklayer Bill: The Untold Story of the Workingman’s Boston Marathon, was featured in The New York Times, The Boston Globe, The Irish Echo, Fox News, and Smithsonian.com, as well as on NPR’s Only a Game; other Bright Leaf books have been featured in The Chronicle of Higher Education, Publishers Weekly, and The Boston Globe.

53,000
Over
Titles published
Units sold
20%
Faculty Bookshelf


Elena Suet-Ying Chiu, Bannermen Tales (Zidishu): Manchu Storytelling and Cultural Hybridity in the Qing Dynasty (Harvard University Asia Center, 2018).

Adam Dahl, Empire of the People: Settler Colonialism and the Foundations of Modern Democratic Thought (University Press of Kansas, 2018).


Ela Gezen, Brecht, Turkish Theater, and Turkish-German Literature: Reception, Adaptation, and Innovation after 1960 (Camden House, 2018).


Frank Hugus (translator and ed.), The Improvisatore (annotated translation of Hans Christian Andersen’s debut novel; University of Minnesota Press, 2018).


Elena Suet-Ying Chiu, Bannermen Tales (Zidishu): Manchu Storytelling and Cultural Hybridity in the Qing Dynasty (Harvard University Asia Center, 2018).

Adam Dahl, Empire of the People: Settler Colonialism and the Foundations of Modern Democratic Thought (University Press of Kansas, 2018).


Andrea Malaguti, *Straniere a se stesse: identità femminili e stilistica visuale nel cinema di Michelangelo Antonioni negli anni cinquanta* (Galaad Giulianova, Italy, 2018).


Christine McCormick and David Scherer, *Child and Adolescent Development for Educators* (Guilford, 2018).


Visit www.umass.edu/research-report/faculty-bookshelf for a complete listing of FY18 publications.
A $2 million state investment is making advanced research facilities at the University of Massachusetts available to start-up businesses and local companies through a subsidy program aimed at promoting economic growth and innovation. Championed by Massachusetts House Speaker Robert DeLeo (second from left) and administered by MassDevelopment, the Innovation Voucher Program will help local companies gain an edge in business development.

With the state incentive, start-ups can develop prototypes and test new devices at a lower cost. Established companies, especially manufacturers, can create prototypes to bid on contracts without having to make large investments beforehand.

“When [companies] take advantage of the labs and equipment on the UMass campuses, they’ll be working with trained personnel, faculty, and students, the next generation of innovators. Not only does it give businesses a competitive edge, it benefits students—challenging them to think creatively, explore technologies, and connect with companies looking for new employees,” said DeLeo.