



# 2024 RESEARCH REPORT

**Global Impact • Local Relevance**

**Maine's R1 University at Work**

# UMAINE RESEARCH AT A GLANCE

## FISCAL YEAR 2024

**\$249.3M**

Research and Development Expenditures

**766**

New Research Awards

**\$225.3M**

Research and Development Funding



# MAINE'S R1 UNIVERSITY

## GLOBAL IMPACT • LOCAL RELEVANCE

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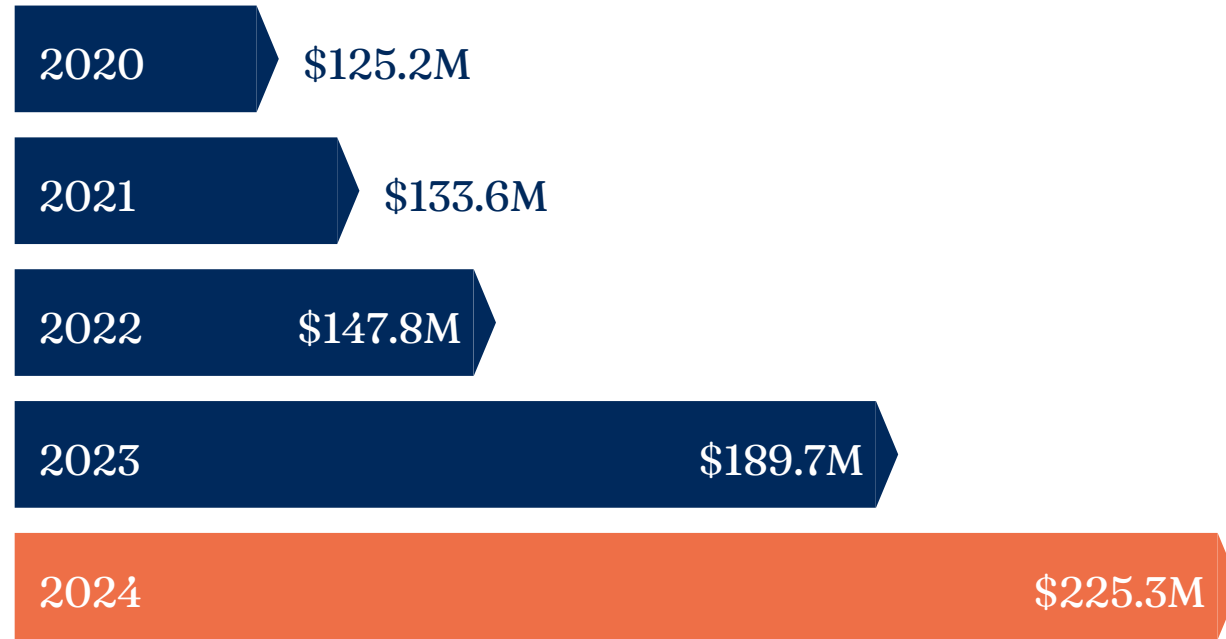
**Joan Ferrini-Mundy**  
President, University of Maine and  
University of Maine at Machias  
Vice Chancellor for Research and  
Innovation, University of Maine System

**Kody Varahramyan**  
Vice President for Research and  
Dean of the Graduate School,  
University of Maine

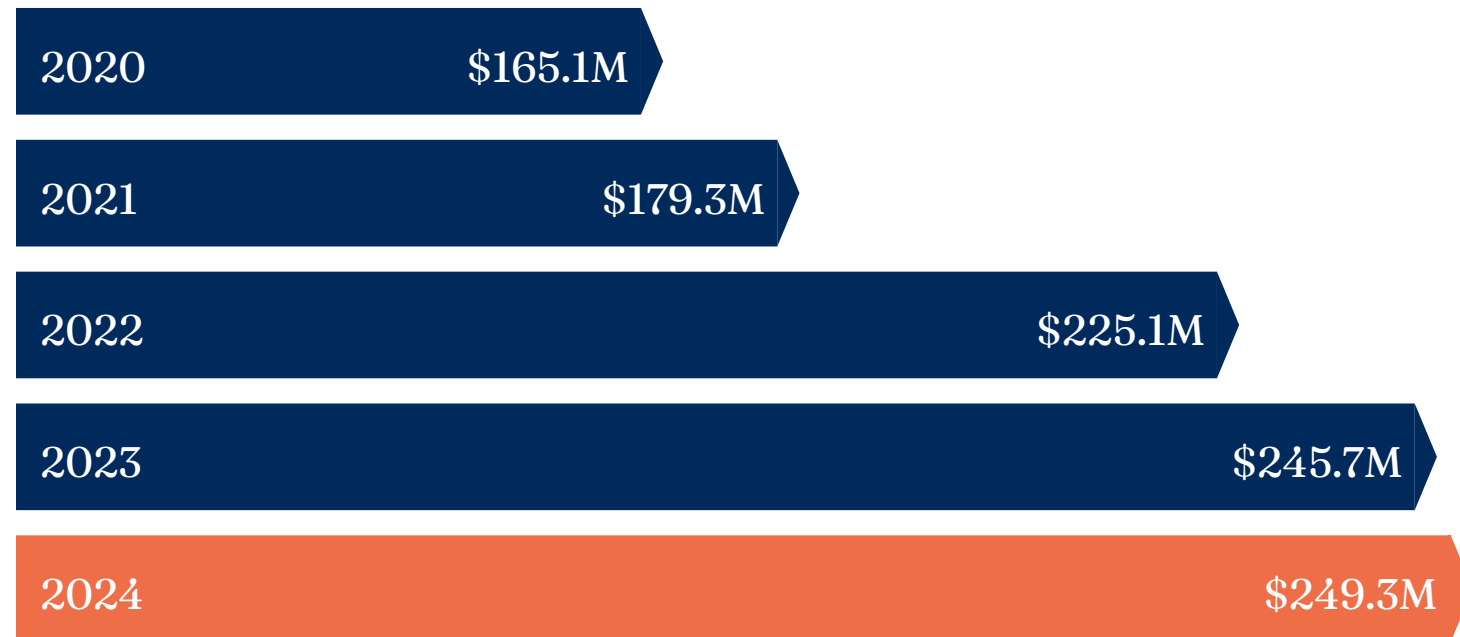
# RESEARCH AND DEVELOPMENT ASCENDS

The University of Maine reported **\$225.3M in research volume in FY2024, a 19% increase** compared to the previous fiscal year.

## TOTAL RESEARCH AWARDS FY2020-24



## TOTAL RESEARCH EXPENDITURES FY2020-24



# UMAINE RESEARCH DATA POINTS

**354**

funded industry  
R&D partnerships

**766**

new research  
awards

**90%**

of all university  
research in Maine

**30%**

rise in doctoral  
enrollment over the  
past five years

**2,563**

undergraduate  
students participated  
in research learning

**92%**

of all Ph.Ds  
conferred in Maine  
as reported on the 2023 NSF  
Survey of Earned Doctorates

## RANKINGS

**Top 15%**

for research expenditures  
according to the National Science  
Foundation's Higher Education  
Research and Development 2023  
ranking.

**R1**

UMaine holds the Carnegie  
Classification of Institutions of  
Higher Education's top research  
status, a distinction held by only  
3.7% of universities nationwide.

# 2024 MILESTONES FOR UMAINE

## Maine Impact Week drew thousands of participants to 15 events.

The annual showcase celebrates of UMaine's contributions to the scientific, creative and economic advancement of the state.

UMaine capitalized on excitement for the **total solar eclipse** to empower community scientists of all ages to investigate the cosmos, earning nods from media and policy leaders including Governor Janet Mills.

The UMaine **Student Symposium for Research and Creative Activity** drew **350+ student exhibitors** and more than 1,000 visitors eager to see posters, exhibits and lightning talks presented by UMaine students.

For the fifth consecutive year, **UMaine secured and expended research funding at record highs**, obtaining \$225.2M and generating \$249.3M in expenditures for research and development.

Microbiologist Robert **Wheeler** spoke as an expert at a **Congressional briefing** about how the University of Maine System used wastewater tests to keep classes and labs open during the COVID-19 pandemic.

The Portland Gateway led creation of the UMaine/USM/Maine Law course **Complex Problem-Solving for Future Leaders**. It unites research, law, policy and business methods to promote interdisciplinary thinking.

UMaine broke ground on the Green Engineering and Materials (GEM) building. **GEM will immerse students and businesses in a test bed for innovation** of manufacturing while using bio-based materials.

## TOP HONORS



President **Biden** named **Joan Ferrini-Mundy to the National Science Board**, the governing body of the \$9B National Science Foundation. The President of UMaine and UMaine Machias advises Congress and the President on science and engineering policies and programs.



UMaine Machias Dean and Campus Director **Megan Walsh** was elected to the **American Antiquarian Society**, a 212-year-old national research library and community of learners dedicated to discovering and sharing a deeper understanding of the American past



Daniel H. **Sandweiss** was elected to **The National Academy of Sciences** for discovering some of the oldest sites in South America and unraveling the evolution of El Niño events and their ramifications over the past 11,400 years.



Mauricio **Pereira Da Cunha** was named an **IEEE Fellow**—one of the highest distinctions awarded by the largest technical professional society worldwide—for his contributions to the commercialization of harsh-environment microwave acoustics materials, sensors and systems.

A **record-breaking 605 students** enrolled in doctoral programs during the fall semester, a 30% rise from five years ago. Applications to doctoral programs are also up 200% over the same time period.

The **National Science Foundation** ranked **UMaine at an all-time high**. Among the 914 universities, UMaine ranked 140 in the 2023 HERD Survey, and 112 among those without medical schools.

UMaine Professor Elizabeth **Allan** served as a **subject matter expert to the members of Congress** and their staff as they crafted the bipartisan Stop Campus Hazing Act, which became law in December.

The National Science Foundation awarded \$15M to a coalition of top New England universities. Through this regional I-Corps, UMaine will help **accelerate the conversion of research into impact for society**.

# BUILT FOR INNOVATION

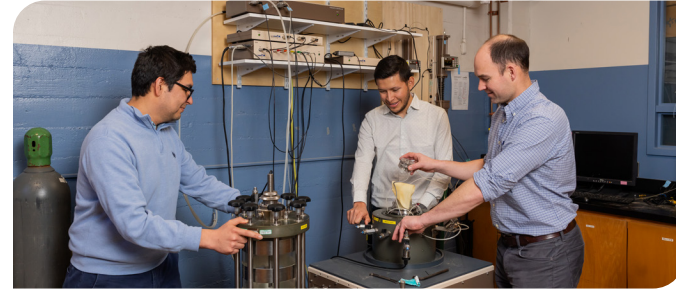
UMaine leads the world in transforming advanced manufacturing, developing renewable composites and energy solutions, and engineering cost-effective, rapidly-deployed infrastructure.



As a world leader in additive manufacturing, UMaine drives innovation to address plastic pollution, affordable housing and aging infrastructure at an unprecedented scale. This April, the **Advanced Structures and Composites Center (ASCC) unveiled Factory of the Future 1.0, a 3D printer four times larger than the previous world record**, which was also developed at UMaine. This feat of technology is poised to pioneer eco-friendly, cost-effective manufacturing for national security, housing, bridge construction, ocean and wind energy technologies and maritime vessel fabrication.



VoltturnUS + floating offshore wind technology is poised to transform how deep-water wind energy is harnessed. The project, which secured \$12.5M from the U.S. Department of Energy this year, will **create more efficient and cost-effective turbines**. With the Gulf of Maine's vast wind energy resources, this innovation positions Maine as a leader in clean energy.



UMaine researchers are developing a **new way to reduce earthquake damage by stabilizing waterlogged soils that can liquefy during tremors**. Using natural processes to create tiny gas bubbles in the soil, the method helps absorb pressure and prevent foundations from shifting. This innovative solution could protect critical infrastructure in earthquake-prone areas and make communities more resilient.



UMaine doctoral students advance research that makes energy more affordable. One chemistry student sought to use a **cheaper water-splitting catalyst for hydrogen fuel production**, paving the way for cleaner energy innovations that could reduce reliance on fossil fuels. A Ph.D. student in the ecology and environmental science program, who is also a member of the Passamaquoddy Tribe at Pleasant Point works to **empower tribal citizens to adopt renewable energy, weatherization and energy-efficient technologies** across Maine's Wabanaki Nations. Her work highlights the vital role of community-driven solutions in ensuring equitable access to sustainable energy.



## Green Engineering and Materials (GEM) Factory of the Future

UMaine broke ground on GEM, a **50,000-square-foot building that will immerse students and businesses in a test bed for innovation in manufacturing while using bio-based materials**.

The project will enable **new work with industry to manufacture affordable housing, marine vessels and renewable energy and civil infrastructure** components, all while **using sustainably sourced wood byproducts and other bio-based materials**. GEM will offer interactive learning spaces for students at all levels, from visiting K-12 students to doctoral candidates. Students from across the University of Maine System will be able to experience GEM's classrooms, laboratories and manufacturing bays as they research how to develop homes, boats and other products from design to delivery.

The \$82 million project is supported by several sources. This includes federal funding from the U.S. Department of Defense and the National Institute of Standards and Technology, including Congressionally Directed Spending requested by U.S. Sens. Susan Collins, vice chair of the Senate Appropriations Committee, and Angus King, as well as from the Northern Border Regional Commission's Catalyst Program. State funding was also secured by the University of Maine System through Gov. Janet Mills' Maine Jobs & Recovery Plan supported by the Maine Legislature and through ongoing appropriations provided for capital improvement. Philanthropic investment from the Harold Alfond Foundation through UMS TRANSFORMS. UMaine also contributed to the project.

GEM will operate as a partnership between UMaine's **Advanced Structures and Composites Center**, the **Maine College of Engineering and Computing** and UMaine's **College of Liberal Arts and Sciences**, with opportunities for other programs and industries on campus and remotely.



PAUL MELROSE

## The UMaine Boost: Compotech

Compotech develops **better systems to protect soldiers**. The Brewer-based company originates from ideas that co-founder and UMaine engineering alum Paul Melrose first developed while working at the **Advanced Structures and Composites Center**. Melrose took a ballistic protection system created during his time at the center and turned it into a profitable business. Melrose continues to leverage UMaine ingenuity for his growing company and hires UMaine graduates every year.

Scan to



watch

# SCIENTIFIC STEWARDS

From Antarctica to Everest and Mount Katahdin to the microscope, UMaine researchers relentlessly pursue a better understanding of our world and how to care for it.

## Facing Forever Chemicals

Economist Caroline Noblet has been a leader in research exploring how best to talk to the public about PFAS, or forever chemicals, in a way that helps them make more informed choices. PFAS, short for per- and polyfluoroalkyl substances, are pervasive around the globe and tied to a growing litany of health concerns. Noblet and her colleagues affiliated with the **Senator George J. Mitchell Center for Sustainability Solutions** are among those on the vanguard of learning where PFAS are, how they move through environments and us, and what to do about it as part of the university-wide **PFAS+ Initiative**.



CAROLINE NOBLET

## Unearthing Eons of Climate Data

- ◇ Researchers with the **Climate Change Institute** (CCI) led more than 50 expeditions in Maine and around the globe to study climate change in the past and present, and forecast the future.
- ◇ CCI's Climate Reanalyzer provides climate and weather data visualization tools for the public and researchers. The website sees about 4,000 visits daily, rising to 80,000 during extreme weather events. 10Green, another CCI website, has data visualization and information about air quality and its impact on health.
- ◇ A study co-led by UMaine revealed that global pollution has shifted the chemical processes affecting marine phytoplankton activity, a critical component of the ocean's ecosystem.

## Advances in Acadia

- ◇ The National Park Service has partnered with Wabanaki communities and UMaine faculty and Ph.D. students to protect Indigenous archaeological sites in Acadia National Park from climate change. The project blends Indigenous and western knowledge to preserve artifacts, including millennia-old shell heaps, threatened by rising seas and erosion. The initiative also emphasizes education to safeguard cultural heritage.
- ◇ The shores of Acadia National Park, Bar Harbor and the Schoodic Peninsula skirt the sparkling waters of Frenchman Bay. This year, UMaine researchers discovered that, while the bay's water and surrounding estuaries appear pristine, they are blanketed by roughly 400 billion microplastic fibers.
- ◇ UMaine researchers teamed up with Acadia National Park to develop a risk scorecard to help predict and manage harmful algal blooms in Maine's lakes. Drawing on decades of environmental data from three lakes on Mount Desert Island, the study identified nutrient-rich, shallow lakes as more vulnerable to these toxic blooms, which can threaten drinking water and recreation.

## Cultivating Opportunities

- ◇ UMaine researchers enhance food security and stewardship of working landscapes alongside farmers, conservation groups, food processors and distributors, and policymakers.
- ◇ On wild blueberry barrens, scientists are developing drone-based tools to help farmers pinpoint water and nutrient stress, and are testing methods using biochar, a renewable wood product, to hedge against drought.
- ◇ The Caribou Russet, a potato variety developed by UMaine in partnership with the Maine Potato Board, is now the top spud sown in the state. Maine is one of only three states in nationwide where potato production increased between 2000-22.
- ◇ The Maine Food Loss and Waste Generation Study, the first of its kind, analyzed food loss and waste across the state. It offers solutions to address food insecurity, economic losses and environmental harm from food waste.
- ◇ UMaine researchers are cooking up prototypes made from squid fins, a byproduct of current processing methods, to reduce food waste and open new markets. The project will develop frozen ready-to-eat preparations for home and restaurant use from concept to consumer testing.

## Mapping Migrations

- ◇ UMaine researchers lead an international collaboration to track the migration of the American woodcock. The cooperative has mapped nearly 700 woodcock migrations across North America, providing insights into the gamebird's behavior and helping wildlife managers target conservation strategies.
- ◇ Maine Big Night, a nonprofit founded by a UMaine Ph.D. candidate, calls on Mainers to brave the dark and muck to find frogs and salamanders on the move, and where they are most vulnerable to infrastructure like roads. Since 2018, the community science project has recorded more than 21,000 amphibians at 349 locations from Kittery to Fort Kent.

# BLUE INGENUITY

With the longest coastline in the continental U.S., Maine's shores are awash with opportunities to explore ideas that foster resilient coastal communities, food security and vibrant coastal and marine environments.

## Waterfront Workforce

- ◇ The University of Maine System awarded a Research Reinvestment Fund grant to UMaine's regional campus, the **University of Maine at Machias**, and its marine lab, the **Downeast Institute**, to support undergraduate research in marine science and aquaculture. The grant funds stipends for students advancing research relevant to the wild and cultivated shellfish harvest. These hands-on research opportunities foster interdisciplinary work aimed at ensuring the sustainability of Maine's seafood industry.
- ◇ A new program in the School of Marine Sciences, **Science Education Addressing the Blue Economy and Rural Success, or SEA BEaRS**, aims to give the next generation of marine scientists and industry leaders a boost. The \$2.5M grant from the National Science Foundation targets rural access to education and will support up to 25 Pell Grant-eligible students over the next five years who are pursuing degrees in marine sciences.

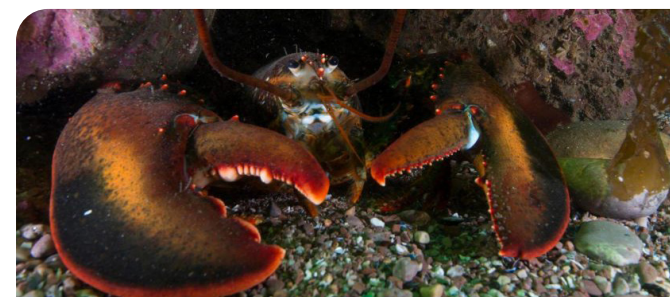
## Climate Smart Solutions

- ◇ A series of fierce storms battered Maine's waterfront communities in January 2024, causing record surges and flooding. **UMaine MARINE** convened 34 experts in response to strategize how the University of Maine System can support coastal resilience. It also partnered with **Maine Sea Grant** to host conversations on storm resilience.
- ◇ The **Advanced Structures and Composites Center** is developing rapidly deployable breakwaters to support shoreline activities or provide protection before devastating weather events.
- ◇ **Maine Sea Grant** – UMaine's boots-on-the-docks – initiated work with communities, state agencies and others along with engineering faculty to provide expertise on coastal hazards. The UMaine-led work connects communities with science and engineering tools to help them pursue climate resilience solutions and is supported by the Inflation Reduction Act through the Governor's Office of Policy Innovation and the Future.

## UMaine MARINE

The Marine Aligned Research, Innovation and Nationally-recognized Education (**UMaine MARINE**) Initiative builds on world-class coastal and marine programs, research and facilities to foster synergy among departments, research centers, academic programs and external groups to position the University of Maine System as a global leader in coastal and marine research, education and economic development while enhancing the well-being of Maine's coastal communities and beyond.

# FINDINGS



UMaine research provides critical data for the stewards of the state's top fishery. A 25-year study published this year revealed that American lobsters along Maine's coast have relocated to new habitats, while the population simultaneously shrunk in abundance and grew older. These findings offer **critical insights into the health of Maine's lobster population** and have implications for sustainable management of the state's fishery, which was valued at \$464M in 2023.



A study led by UMaine researchers found that the United States can meet all its seafood needs through domestic production. Despite being one of the world's top seafood producers, the nation imports 80-90% of its consumed seafood while exporting much of what it harvests. The study's findings include **strategies to cultivate seafood self-reliance, offering opportunities to improve food security, sustainability and public health.**



A study shed light on how to **improve the survival rate of Atlantic sea scallops, one of Maine's most valuable fisheries.** Researchers discovered that the lunar cycle and tidal shifts impact the bacterial communities in scallop tanks, influencing the survival rate of larvae which is currently as low as one percent. Their findings suggest that hatcheries could improve scallop production by adjusting seawater collection practices and enhancing filtration systems to support healthier microbial environments.



Researchers with the Maine-eDNA Project are **tracking biodiversity changes in Maine's kelp forests**, revealing how species are adapting to human-caused climate change. Their use of environmental DNA and visual data highlights the power of eDNA to detect hidden biodiversity and its potential for guiding conservation efforts as Gulf of Maine ecosystems face ongoing shifts.

# FOSTERING FOREST SCIENCE

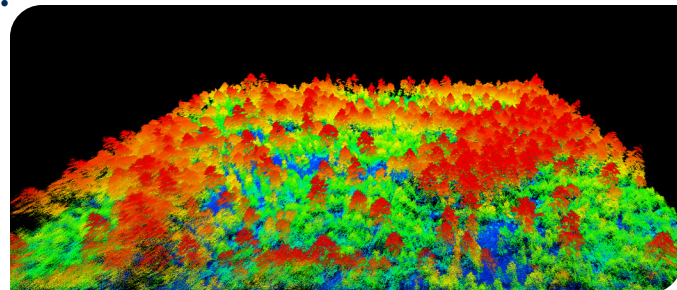
Rooted in the most forested state in the nation, UMaine is a bastion of innovation from forest land to lumber.



Through years of **collaborative research with the Wabanaki Nations**, UMaine experts developed innovative strategies to **manage and adapt to emerald ash borer, an invasive insect threatening Maine's ash tree population**. Despite the insect's inevitable spread, researchers remain hopeful, focusing on long-term solutions like seed collection, forest management and community engagement to protect Maine's ash trees for future generations.



The **i-Tree Pest Predictor** revolutionized how people combat invasive species threatening forests across North America. The online tool, which is hosted by the U.S. Forest Service, analyzes insect traits, host tree characteristics and evolutionary history to forecast which non-native insects are most likely to become devastating pests. Its development was led by Angela Mech, assistant professor of entomology, with collaborators across the United States. By enabling scientists and foresters to proactively target high-risk invaders, the tool can help save ecosystems, protect public health and prevent billions in economic losses.



Courtesy of the Wheatland Geospatial Lab

UMaine research provides **evidence-based land management strategies and assessment tools** for Maine's forest industry, agencies, nonprofits and small woodland owners.

- ◇ A study mapped the health of white pine stands across Maine using remote sensing technology, offering a new tool for forest stand management.
- ◇ A brief published in the Maine Policy Review outlined how forest owners and managers grapple with forest health challenges like the emerging spruce budworm outbreak.
- ◇ A study reported that 70% of the bird species on Maine's commercial forestlands increased over the past 30 years, bucking nationwide trends.
- ◇ The National Science Foundation-backed INSPIRES project set new standards for data-driven environmental research worldwide. Novel approaches included a multistate network of low-cost sensors and applied artificial intelligence.



Thousands of aerial photographs dating back to 1946 will create a **comprehensive, digitized map of changes to New England's forests over time**. The project aims to help researchers and land managers better understand forest dynamics and land use history. Once complete, this public archive of photos donated to Fogler Library's Special Collections by James W. Sewall Company (Sewall) will preserve a unique visual record of the region's forests.

## Tree-Powered Jets

UMaine is leading efforts to **transform underutilized forest biomass into jet fuel and fish feed**, offering new economic opportunities for rural Maine communities. A new project backed by the U.S. Department of Agriculture aims to reduce the cost of aviation fuel and provide more sustainable alternatives to traditional fish feed while enhancing forest health and creating new revenue streams.

## Maine-FOREST

A new **Center for Research on Sustainable Forests**-led partnership with nonprofits and other universities will strengthen Maine's forest-based economy and promote resilience in rural communities. Funded by a \$7M grant from the **National Science Foundation's Established Program to Stimulate Competitive Research (EPSCoR) program**, **Maine-FOREST** will focus on innovations like artificial intelligence, sustainable products and community-driven solutions. The project aims to **support workforce development, create new educational pathways and advance climate-smart technologies in Maine's forest sector**.

## Sustainable Packaging

A \$1.6M donation from Packaging Corporation of America bolstered UMaine's innovation in sustainable packaging by establishing the Sustainable Packaging Initiative. It supports the development of **renewable, forest-based packaging solutions and expands research opportunities for students**. This investment, part of a broader initiative to strengthen Maine's forest economy, builds on the state's leadership in renewable materials research.

## The UMaine Boost: TimberHP

North America's first wood fiber insulation plant using the waste stream from the lumber industry taps into product testing from UMaine's Advanced Structures and Composites Center. Joshua Henry, a former UMaine chemistry professor, and Matthew O'Malia founded TimberHP and revitalized a shuttered Madison, Maine paper mill to develop **revolutionary sustainable building materials inspired by biomass research at UMaine**.



JOSH HENRY

Scan to



watch

# STEM EDUCATION FOR ALL

As a learner-centered R1 university we are driven to create research-inspired learning opportunities for everyone.



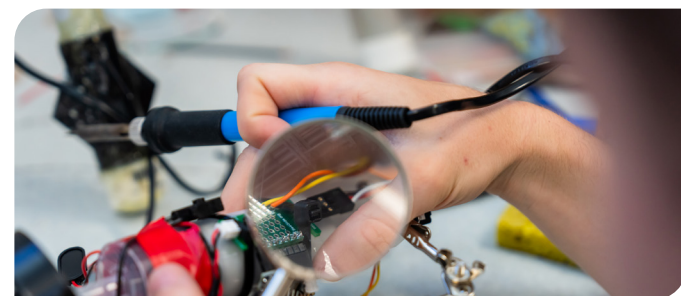
Maine's first research satellite launched into the stratosphere. MESAT1 uses its astronomical view to gather climate data about Earth for **experiments designed by middle and high school students**. The satellite's design, build and testing was led by UMaine students and faculty and supported by grants from NASA and Maine Space Grant Consortium



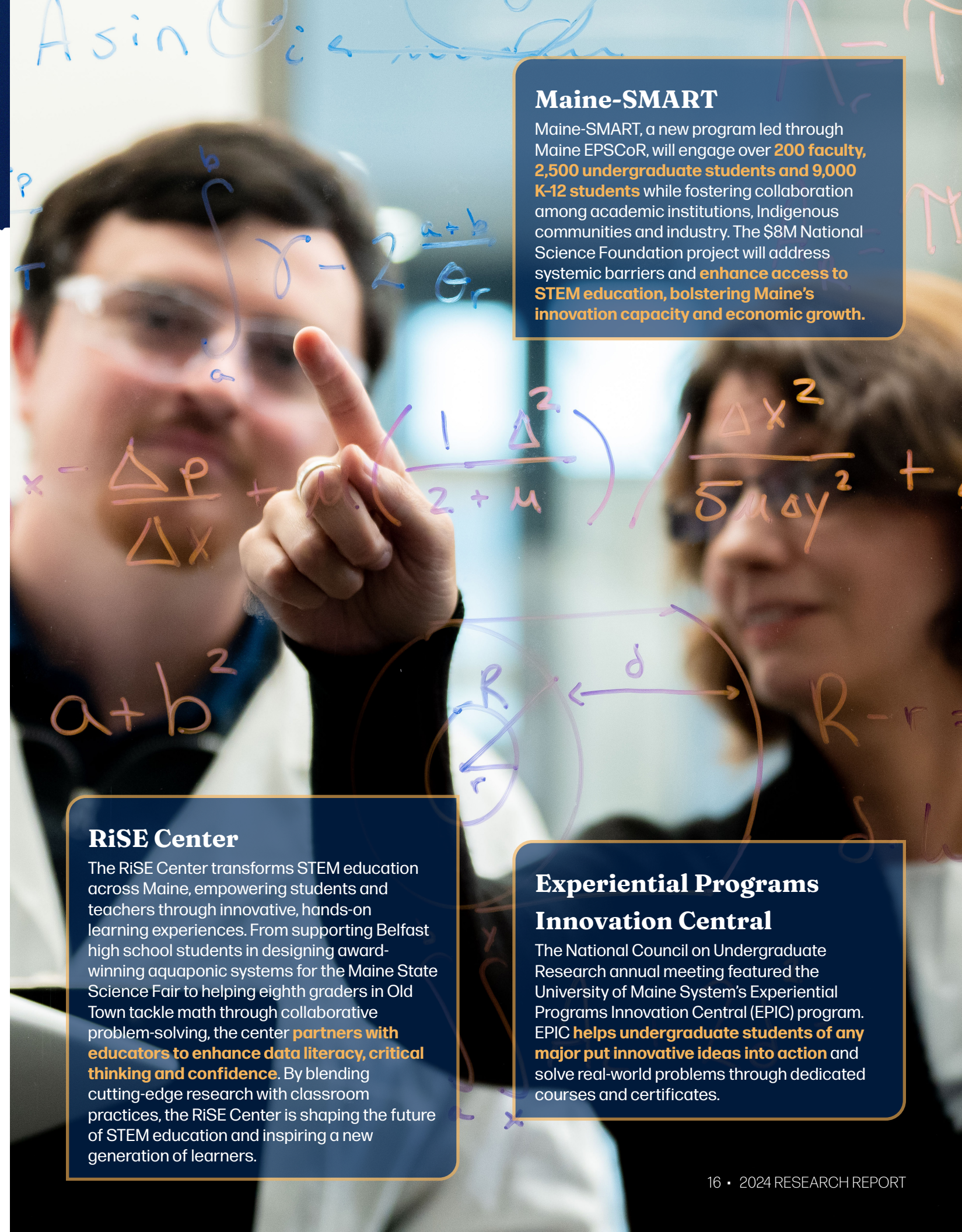
UMaine launched a new initiative to **address the shortage of qualified STEM teachers in rural schools**. The project, funded by a National Science Foundation award, aims to recruit, educate and support future and current STEM educators in underserved districts. By developing innovative pathways to teacher licensure and working closely with rural communities, UMaine hopes to strengthen local economies and inspire the next generation of scientists, engineers and mathematicians.



Nearly **400 middle and high school students from inland Maine communities connected to the coast through Maine Sea Grant's** Bringing the Sea to Inland and Rural Communities program. The new initiative fosters environmental literacy, career awareness and a deeper connection to Maine's coastal ecosystems by taking students aboard vessels and to working waterfronts.



The National Science Foundation awarded \$1.2M to UMaine to **create a curriculum to teach high school students about semiconductors**. Combining artificial intelligence, interactive game modules and hands-on learning, the program aims to **inspire students to pursue careers in STEM**. This initiative signifies a crucial step in UMaine's efforts to advance STEM education and addresses the growing need for innovative STEM education programs that prepare students for the challenges of the 21st century.



## Maine-SMART

Maine-SMART, a new program led through Maine EPSCoR, will engage over **200 faculty, 2,500 undergraduate students and 9,000 K-12 students** while fostering collaboration among academic institutions, Indigenous communities and industry. The \$8M National Science Foundation project will address systemic barriers and **enhance access to STEM education, bolstering Maine's innovation capacity and economic growth.**

## RiSE Center

The RiSE Center transforms STEM education across Maine, empowering students and teachers through innovative, hands-on learning experiences. From supporting Belfast high school students in designing award-winning aquaponic systems for the Maine State Science Fair to helping eighth graders in Old Town tackle math through collaborative problem-solving, the center **partners with educators to enhance data literacy, critical thinking and confidence**. By blending cutting-edge research with classroom practices, the RiSE Center is shaping the future of STEM education and inspiring a new generation of learners.

## Experiential Programs Innovation Central

The National Council on Undergraduate Research annual meeting featured the University of Maine System's Experiential Programs Innovation Central (EPIC) program. EPIC **helps undergraduate students of any major put innovative ideas into action** and solve real-world problems through dedicated courses and certificates.

# SEEDING CREATIVE EXPRESSIONS

UMaine is committed to fostering expressions and innovations through the arts and humanities, enriching communities on campus, across Maine and beyond.

## UMaine Arts Initiative

- ◇ An Intermedia Program digital exhibition space in UMaine's Collins Center for the Arts led by the center's Director Daniel Williams, as well as Susan Smith and Gretchen Faulkner.
- ◇ "Soil: A Book of Hours," an intermedia exhibit developed by Susan Smith, associate research professor and graduate coordinator of UMaine's Intermedia Programs.
- ◇ An exhibition infrastructure project led by Gretchen Faulkner, director of UMaine's Hudson Museum, for presenting UMaine Research to campus and the wider community.
- ◇ Jazz concerts and outreach in Orono and Machias led by Daniel Williams.
- ◇ Secondary Choral OutReach Experience (S.C.O.R.E.) led by Rebecca DeWan, Libra Assistant Professor of Choral/General Music Education at UMaine, provided a low-barrier high school choral festival designed to support music programs across Maine

# INSPIRED WORKS



Morgan Talty's debut novel, "Fire Exit," was a finalist for the 2024 Center for Fiction First Novel Prize and the 2024 Maya Angelou Book Award, and was considered for the 2024 Andrew Carnegie Medal for Excellence in Fiction. In the book, the Assistant Professor of English in Creative Writing and Native American and Contemporary Literature and citizen of the Penobscot Indian Nation explores the relationships between family, legacy and the secrets that shape these connections. The book is also longlisted for the 2025 Joyce Carol Oates Prize and the 2025 Aspen Words Literary Prize. Talty's debut short story collection, "Night of the Living Rez," is a critically acclaimed national bestseller.



PFAS, or per- and polyfluoroalkyl substances, are found around the globe. Researchers are racing to learn the extent of contamination, and what this means for human health. The issue is still emerging in the public consciousness as well.

To highlight the pervasive impact of "forever chemicals," Susan Smith, an artist and associate research professor who leads UMaine's Intermedia graduate programs, is transforming PFAS-laden materials into vivid works of art. By fusing creativity with science, Smith inspires conversations about soil health, pollution and the vital role art plays in interpreting complex environmental challenges.

## Innovative Media Research & Commercialization Center

The IMRC Center at UMaine unites science and technology with the arts to help students collaborate through creative projects. IMRC's resources offer students skilled staff to guide them as they use the center's research and prototyping labs, makerspaces, audiovisual production facilities and performance spaces.

This year, a life-sized knight sculpture crafted at the Center for History Live North East toured K-12 classrooms across Maine to make life in medieval times more tangible to the students. The five-and-a-half-foot-tall statue was shaped using 3D scanning and layered Computer Numerical Control machining, coupled with traditional sculpture methods.

## McGillicuddy Humanities Center

The Clement and Linda McGillicuddy Humanities Center supports excellence in teaching, research and public engagement in the humanities to deepen understanding of the human condition. In spring 2024, the Center welcomed four new undergraduate humanities research fellows. Their projects explored:

- ◇ How the relationships children form with their parents change in young adulthood.
- ◇ Past and current practices of college radio.
- ◇ How second-generation Iranian Americans experience their perceived belonging in a cross-cultural context of multiple identities.
- ◇ How racism shaped the women's suffrage movement in Maine and Louisiana from 1900-1925.

## Island Soundscape Project

The Island Soundscape Project is an arts research collaborative whose work intersects art, ecology and education. The project captures the sonic environment, or soundscapes, of Maine's coast in order to understand and preserve the identity of Maine's coastal communities.

The Island Soundscape Project, which previously received support through the **UMaine Arts Initiative** brings together faculty from UMaine and its regional campus, UMaine Machias as well as alumni of UMaine's Master of Fine Arts program. In addition to the core team, the project incorporates the work of numerous student researchers and collaborators.

"In a world where people are constantly being pinged, sounds going off, lots of distractions, I think what really appeals to me is how natural sounds and natural landscapes can be healing and can provide all of these health benefits, not just physical benefits [but] emotional benefits, to the visitors who are experiencing it," said project member Karen Beeftink, **UMaine Machias** associate professor of recreation and tourism management.



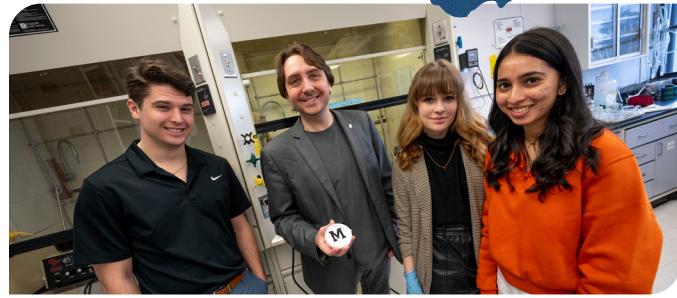
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# REVOLUTIONIZING CARE

At the state's only R1 university, UMaine leverages its position to buoy biomedical science technology to improve health and wellness.



Evan K. Wujcik, UMaine assistant professor of chemical engineering, is **revolutionizing wearable technology with self-healing, stretchable sensors**. These advanced sensors can stretch up to 30 times their original size and repair themselves, reducing waste and offering more flexibility for the wearer. With the backing of a prestigious National Science Foundation CAREER award, the project is poised to address key challenges in current sensor systems while **making them more comfortable and easier to fix**.



A study co-authored by Nick Giudice, professor of spatial computing, **paved the way for designing robotic systems that enhance mobility and accessibility for blind and low-vision individuals**. The paper outlined the user-driven guidelines for developing robotic guide dogs to assist people with visual impairments for the first time ever. By closely examining the handler-dog relationship, the research highlights how robotic companions can complement traditional guide dogs, offering a viable alternative when animal guides are not feasible.



UMaine is **advancing biomedical research through a pioneering partnership with the University of Southern Maine (USM)**. Led by UMaine's **Institute of Medicine**, the initiative pairs USM faculty with UMaine researchers to tackle critical issues like mosquito-borne diseases, innovative materials for medical devices and cancer detection. Through cross-campus collaboration and professional development, this program strengthens Maine's research enterprise while addressing health challenges with global impact and local relevance.



The **Institute of Medicine** and the **Department of Psychology** forged new partnerships with the U.S. Department of Veterans Affairs to **create research opportunities focused on supporting the physical and mental wellness of veterans**. The partnerships include two faculty positions jointly appointed to UMaine and the Veterans Affairs Health System, as well as research appointments for Veterans Affairs faculty at UMaine to accelerate research that aims to improve the health of former service members and the broader community.

# CONNECTED FOR IMPACT

## Institute of Medicine

The **Institute of Medicine** enhances the health and well-being of the citizens of Maine and beyond through research, education and strategic partnerships. The institute convened a crucial platform for advancing biomedical innovation and collaboration through the **Maine Research Symposium on Biomedical Science and Engineering**. In its second year, the symposium brought together top clinicians, researchers and educators to tackle pressing challenges in biomedical science. Sessions at the event spanned oncology, AI in medicine, rural health and workforce development.

## Center for Biomedical Research Excellence

UMaine's **Center for Biomedical Research Excellence (COBRE)** **elevates early-career biomedical scientists**. COBRE awarded its first round of seed funding this year to three faculty at UMaine and Colby College to support pilot projects focused on how cells respond to stimuli. The research, which spans muscular disorders, aging and infectious diseases, aims to provide insights into potential treatments. The program is one of several initiatives from the center, which UMaine established after receiving an \$11.3M award from the National Institutes of Health.

## Community Inclusion and Disability Studies

The **Center for Community Inclusion and Disability Studies (CCIDS)** promotes self-determination, independence, productivity and integration and inclusion in all facets of community life for people with developmental disabilities and their families. Alan Cobo-Lewis, associate professor of psychology and director of CCIDS as well as the Center for Excellence in Developmental Disabilities, was invited to a Communities in Action forum at the White House complex in March. There, alongside locally elected officials and community leaders from New England, he discussed how to create and expand opportunities for working families with senior officials from the Biden-Harris Administration.

## Center on Aging

The **Center on Aging** promotes and facilitates aging-focused education, research and evaluation and community service to maximize the quality of life of older adults and their families. The center strengthens research to promote the well-being of older adults and enhance their access to services through partnerships like the one advanced this year with Maine's Cabinet on Aging, a part of the Governor's Office of Policy Innovation and the Future. Researchers at the center also launched the Consortium for Aging Policy Research & Analysis and secured substantial funding from AmeriCorps Seniors for a multi-year workforce study. The center also works to position UMaine as an age-friendly university.

# RISING MEDICAL RESEARCHERS

Meet a few of the doctoral students advancing **healthcare innovation**.



## Lola Holcomb, Biomedical Science

Lola Holcomb, a Ph.D. candidate in the Graduate School of Biomedical Science and Engineering, is investigating the potential of broccoli sprouts to reduce inflammation and improve health, particularly for individuals with inflammatory diseases like Crohn's. Using bioinformatics and mouse models, Holcomb, who is advised by associate professor of Animal and Veterinary Sciences Sue Ishaq, explores how diet can influence the gut microbiome and offers accessible alternatives to prescription drugs for managing health conditions. Through works like Holcomb's, researchers are able to look at how to promote better health outcomes while also better understanding our bodies and lives.



## Curtis Wojcik, Clinical Psychology

Doctoral candidate Curtis Wojcik is studying a key symptom of depression, anhedonia, to improve understanding and treatment of mental health disorders. The symptom is characterized by a loss of pleasure and disinterest in typically rewarding experiences. His research, supported by a National Science Foundation Graduate Research Fellowship, aims to make mental healthcare more accessible and targeted particularly for people in underserved areas like rural Maine. Wojcik is advised by Rebecca MacAulay, associate professor of psychology and graduate coordinator.



## Amanda Ignacz, Biomedical Science

UMaine muscular disease research received a boost this year when the National Institutes of Health awarded the prestigious Ruth L. Kirschstein Predoctoral Individual National Research Service Award to Amanda Ignacz, a Ph.D. candidate in the Graduate School of Biomedical Science and Engineering's biomedical science program. Ignacz's work in the lab of Clarissa Henry, director of UMaine's Center for Biomedical Research Excellence, focuses on how rare muscle diseases progress and how to develop better treatments. By studying a specific genetic disorder using zebrafish, Ignacz aims to find ways to improve the lives of people affected by these conditions.

# ARTIFICIAL INTELLIGENCE

As artificial intelligence captured headlines and reshaped workflows around the globe, UMaine researchers were at the forefront **engineering AI for the greater good**.

## AI Initiative

The **AI Initiative** develops partnerships to advance transformative AI-based solutions that enhance the social and economic well-being of the citizens of Maine and beyond. In addition to the **Maine AI Conference**, the Initiative also hosted four workshops that drew 273 attendees from around the globe. UMaine researchers also **secured ten awards worth more than \$6.4M to support artificial intelligence or machine learning research** this year.

## Maine AI Conference

The **sold-out inaugural Maine AI Conference** convened by the **AI Initiative** in Portland brought together leaders from industry, academia and government to explore the transformative potential of artificial intelligence in the state. The event, which was organized in collaboration with UMaine's **Portland Gateway** and the University of Southern Maine, featured panel discussions, interactive sessions and **insights from key players like Lockheed Martin, IDEXX and IEEE-USA, the world's largest technical professional society**. The conference fostered AI innovation and adoption across Maine, paving the way for future technological advancements.

## Streamlining Learning Accommodations

University of Maine experts are leading national conversations on best practices for integrating artificial intelligence into schools. While much of the public discussion has focused on AI's risks, UMaine **researchers are exploring its potential to support teachers and students, particularly in special education**. Their efforts include publishing research, offering webinars and guiding educators in using AI ethically and effectively to enhance learning while preserving the essential role of human teachers.

## Safer Turbine Installations

UMaine researchers are **using AI to enhance the safety and precision of offshore wind turbine installations**. By predicting tower top motions in real-time, this National Science Foundation funded project aims to reduce risks for workers, minimize construction delays and support the growth of renewable energy.

**Office of the Vice President for Research  
and Dean of the Graduate School**  
[umaine.edu/research](http://umaine.edu/research)



**Global Impact  
Local Relevance**

*Maine's R1 Research University at Work*

**About the cover image:** MESAT1, Maine's first research satellite, ascended into orbit on July 4, 2024. The cost-effective research nanosatellite was designed, built and tested by UMaine students and faculty through the **UMaine Space Initiative** in collaboration with a trio of K-12 schools, the University of Southern Maine, the Radio Amateur Satellite Corporation and the Wells National Estuarine Research Reserve. MESAT1 uses its astronomical view to gather climate data about Earth for experiments designed and led by Maine middle and high school students. Grants from NASA and Maine Space Grant Consortium supported the project. Image courtesy of Firefly Aerospace / Trevor Mahlmann.

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