MAKE POSSIBLE

THE CAMPAIGN FOR CARNEGIE MELLON UNIVERSITY

THE MELLON COLLEGE OF SCIENCE
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“Carnegie Mellon will create the future of science by bringing together automation, big data and technology with the foundational sciences. No other university is positioned to do this.”

REBECCA W. DOERGE
Glen de Vries Dean of the Mellon College of Science

Science is ready for a revolution. The pace of discovery is accelerating, and the problems that face the world are growing more complex. Meeting those challenges begins with individuals who are both forward-looking scientists and innovative collaborators.

Combining our long tradition of strength in the foundational sciences with partnerships that harness the university’s excellence in data science, automation and technology, the Mellon College of Science is leading the charge into a bold future. Our expansive vision for the future of science is now being realized with a new, cutting-edge science building; the world’s first academic cloud lab; and research that can change our understanding of our world and the universe beyond. Here, we will disrupt tradition, work across disciplines, accelerate scientific discovery and address modern problems in new ways.

Your philanthropic support of MCS through Make Possible: The Campaign for Carnegie Mellon University will enable us to:

• Create an environment for foundational science and interdisciplinary research.
• Pioneer new scientific fields.
• Educate and equip future scientists.

The people of CMU’s Mellon College of Science have a passion for discovery and a hunger to do transformational science for the good of the world.

TOGETHER, WE WILL MAKE IT POSSIBLE.
By collaborating with partners from across campus and using machine learning, engineering and data analytics, our scientists will accelerate both the process and the impact of scientific research. The Mellon College of Science is creating an environment where human ingenuity meets cutting-edge technology to solve the world’s toughest challenges.
CREATE AN ENVIRONMENT FOR FOUNDATIONAL SCIENCE AND INTERDISCIPLINARY RESEARCH

With automation on our side, we can devote more energy to asking “What if?”

At the Mellon College of Science, we’re radically changing how science is done, to make the journey from idea to conclusion faster and more direct — and to accelerate the potential of science to solve critical problems.

It all starts with reimagining the lab.

The current research process requires tremendous time and resources, and it can be prone to human error. An idea leads to an experiment. The experiment is conducted, often involving manual tasks that are repeated over and over. Data is recorded and analyzed. Discovery often comes only after dead ends are explored, failures are overcome and significant effort is invested.

Carnegie Mellon is going to be the first university to host its own cloud lab: a shared, central facility where experiments are largely conducted by robots. Scientists design experiments, from their classroom or office — wherever they may be. Technicians set up the experiments and the cloud lab executes them efficiently. The data generated is sent to cloud-based servers, where scientists can access it from any place, at any time.

Bruce Armitage, professor of chemistry and co-director of the Center for Nucleic Acids Science and Technology, and graduate student Dmytro Kolodieznyi have already experienced firsthand the benefits of such next-generation technology on their research.

Armitage — whose lab focuses on the design and synthesis of molecules to bind DNA and RNA — says that, using traditional methods, he might synthesize up to three compounds a week. “With robotic technology and automation, we could increase that a hundredfold,” he says. “It greatly increases our chances of finding a compound that’s really successful in the applications that we’re pursuing.”

“Today, science is about partnership: combining foundational physics, chemistry, math and biology with computation, automation, artificial intelligence and robotics, making scientific research more transparent and more reproducible. And this approach makes scientific innovation faster. At CMU, we are uniquely positioned to create this future.”

GLEN DE VRIES (MCS 1994)
CMU Trustee, Campaign Chair and Alumnus

“If you need to reproduce something, you just ask the robots again,” Kolodieznyi says. “With human performance, in the same experiment, you’re not always getting the same results.”

By automating the process of research, scientists can focus more of their time on asking questions and designing experiments, moving science closer to solving problems like efficiently delivering drugs to cells or treating genetic and infectious diseases. Working with a cloud lab, researchers and students could do dozens of experiments in the same amount of time it takes for a single experiment using traditional methods.

With your support, the Mellon College of Science will revolutionize how science is done and prepare students for the labs and research of the future. In this way, we can give them career advantages and ensure that their impact on the world will be limitless.
YOU CAN UNLEASH INNOVATION.

Establish maker spaces in the Mellon Institute and Doherty Hall that will provide students and faculty access to advanced simulation and fabrication tools, so that they can create custom scientific instruments and design novel experiments while integrating engineering and computer science into their work.

DEPARTMENT AND EQUIPMENT FUNDS

Enable our departments to secure the latest technology and address other areas of critical need, giving students and researchers the resources to explore new questions.

Help make it possible by providing critical support to our college’s faculty and students through:

MAKE SPACES

By bringing great minds together and giving them state-of-the-art resources, equipment and facilities, the Mellon College of Science will drive life-changing research forward.

With your support, we will:

Foster expansive collaboration and innovation to solve complex problems.

When CMU’s strengths in technology, computation and artificial intelligence meet the Mellon College of Science’s expertise in foundational science and research, no problem is too large. We’re developing powerful cross-disciplinary teams to focus on emerging areas that are ripe for world-changing breakthroughs.

Construct a new home for science.

CMU’s vision for the future of science will be realized in a $210 million, cutting-edge facility that will serve as the new home of the Mellon College of Science. Every classroom, teaching lab and collaboration space will be designed to inspire cross-disciplinary work and tear down boundaries. Made possible by a $75 million lead grant from the Richard King Mellon Foundation, this building will house the nation’s first academic cloud laboratory, which will feature highly automated, remote-controlled robotic instruments for experimentation and data collection. Planned to open in 2022, this groundbreaking $40 million facility will fuel discovery and democratize science by expanding access to advanced equipment, resources and collaboration. Work that previously took years will now take weeks or days, creating fertile ground for extraordinary scientific breakthroughs.

Advance and expand our use of automation.

New technologies and AI are generating massive amounts of data and reshaping the scientific process. This shift requires a new kind of lab for a new kind of scientist. MCS will house the nation’s first academic cloud laboratory, which will feature highly automated, remote-controlled robotic instruments for experimentation and data collection. Planned to open in 2022, this groundbreaking $40 million facility will fuel discovery and democratize science by expanding access to advanced equipment, resources and collaboration. Work that previously took years will now take weeks or days, creating fertile ground for extraordinary scientific breakthroughs.
When we invest in outstanding faculty, we spark innovation for generations.

By giving acclaimed researchers and educators a community that challenges them and nurtures their talent and creativity, we help make the impossible possible. It’s because of our gifted faculty that discovery has a home at the Mellon College of Science.

Enhancing our status and worldwide reputation will secure CMU’s leadership in applied analysis — and hence the nation’s — and will enable a transformative leap to respond to contemporary challenges in data science that permeate our daily lives.”

IRENE FONSECA
Kavčič-Moura University Professor of Mathematics
Director, Center for Nonlinear Analysis
to study the molecules and mechanisms that govern how healthy cells form, in order to better understand how cancer tears them apart. Her multidisciplinary team, which includes students, also uses the insects to explore the body’s complex bacterial ecosystem and how the symbiotic relationship between human and microbe contributes to our health.

McCartney has already gained significant insights into both areas of her research, including connecting alcohol sensitivity with the absence of a particular type of gut bacteria—which could help us better understand triggers for alcoholism.

At the Mellon College of Science, researchers like McCartney join with colleagues to solve real-world problems with far-reaching consequences through multidisciplinary research and activities. Built on a foundation of automated science, computation and artificial intelligence, these teams bring together foundational science researchers, computer scientists, engineers and statisticians from across Carnegie Mellon to work on global-scale problems in collaborative teams.

The results of these collaborations could be profound, leading to innovations like mind-controlled robotic limbs, next-generation batteries and gene-editing techniques based on peptide nucleic acids.

With your support, the Mellon College of Science will enlist more talented, inquisitive faculty like McCartney to bring their considerable skills to solve some of the world’s most pressing challenges, one “eureka” at a time.
YOU CAN HELP US BUILD A COLLABORATIVE COMMUNITY OF EDUCATORS AND RESEARCHERS.

Help make it possible by providing critical support to our college’s faculty and students through:

ENDOWED PROFESSORSHIPS
Fund faculty to empower their research and teaching, and help us to recruit and retain the best professors and scholars.

POSTDOCTORAL AND DOCTORAL FELLOWSHIPS
Bolster the efforts of up-and-coming researchers by funding studies and projects that will serve as the basis for their future careers.

ENTREPRENEURS-IN-RESIDENCE
Spur innovation at MCS with experts who can help students and faculty realize their ideas and turn breakthroughs into businesses.

BREAKTHROUGH FUNDS
Support promising ideas with critical early-stage funding, encouraging researchers to push boundaries and take risks that could lead to leaps forward in their fields.

When we attract and retain the brightest minds, we set the course for the future of foundational science.

When we attract and retain the brightest minds, we set the course for the future of foundational science.

By actively seeking out the best researchers and most inspiring educators, we reinvent the scientific enterprise for the 21st century — and beyond.

With your support, we will:

Strengthen and deepen our research.

By devoting resources to attract dynamic talent to our college, we will make the Mellon College of Science an international destination for top researchers. These faculty will form deep disciplinary teams that will drive crucial inquiry and enrich each department.

Increase seed funding for bigger ideas.

The first step to scientific breakthroughs is early-stage, cross-disciplinary research that addresses fundamental scientific questions. With resources ready to support these projects, we will create new avenues to groundbreaking discovery — and help faculty members bridge the gap between great ideas and projects ready for major government or foundation funding.

Boldly recruit and retain new faculty.

To build teams of unparalleled expertise, we must provide laboratory start-up funding and other resources that meet the professional needs of top-tier scientists. This will allow us to create a haven for experts looking to make an impact in their disciplines and on the world.

Assistant Professor of Physics Riccardo Penco studies problems in physical systems that can be as small as a beaker and as large as the universe, finding connections between seemingly different phenomena like dark matter, tides and superfluids. Theoretical physicists at MCS are poised to draw on these connections to reframe how we view and use the laws of nature.

Pioneer new scientific fields

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By encouraging students to understand both the process and the consequences of scientific discovery, we help them to fully grasp the implications of their work — and we make sure they’re ready to take the lead in the lab, in their communities and in the world.
The accelerated pace of change in the 21st century touches every aspect of life. This leads to the question: What do today’s students need to be tomorrow’s scientific leaders?

At the Mellon College of Science, the answer starts with our Core Education program, which is designed to help students develop along four dimensions: as scholars, professionals, persons and citizens. Students enter MCS with a genuine excitement about science, and this program builds on that enthusiasm by providing tools that open their minds to new possibilities.

Instituted in 2015, the curriculum complements the strength of the college’s academic departments, adding personal and career skills development, and emphasizing hands-on research — from undergraduate students’ very first year.

The heart of the Core Education is a series of seminars and colloquia that occur at critical points in our students’ education. First- and sophomore-year seminars focus on developing foundational knowledge, skills and perspectives to support their development as scientists and professionals. A junior-year seminar concentrates on societal impact and scientific communication skills.

Throughout their years at MCS, additional requirements connect students to the arts, wellness resources and service opportunities. That means that during their time at the college, they receive deep training in a chosen discipline and the fundamentals of research, as well as opportunities to:

• Become a critical member of a research team.
• Build a strong community of like-minded peers through shared experiences.
• Lead student groups like the MCS Student Advisory Council or Women in Science.
• Gain experience through internships or volunteer service.
• Attend arts and cultural presentations that expand their perspectives and explore diverse cultures.
• Tutor high school or middle school students working on science fair projects.
• Develop skills in interviewing, resume writing, business etiquette and networking.
• Travel around the world, using science to help others.

With your support, the Core Education program’s opportunities for student growth and exploration will be endless, preparing students to lead the next era of discovery for the benefit of humankind.
Today's students are entering an increasingly complex and interconnected world. Supported in their professional and personal growth, they will leave our college ready to be the scientists and citizens our world needs.

**WE EQUIP OUR STUDENTS TO BE GOOD PEOPLE and GREAT SCIENTISTS.**

With your support, we will:

**Give undergrads even greater research opportunities.**
Undergraduate research is a defining aspect of the Mellon College of Science experience. By giving students more time at the bench, they'll have more opportunities to discover areas of focus, present at conferences, gain experience for their careers and have their work published.

**Develop well-rounded scientists.**
By creating and funding learning experiences inside and outside the classroom, we can offer students a clearer path to becoming dedicated scholars, accomplished professionals, engaged citizens and respected individuals.

**Invest in advising and skills development for students.**
Doing good science is only a fraction of what it takes to be a good scientist. Our scholars must also develop skills in proposal writing, oral presentation and other areas, so that they can explain their work to any audience.

**YOU CAN MAKE THE UNDERGRADUATE LEARNING EXPERIENCE A TIME OF BOLD DISCOVERY.**

Help make it possible by providing critical support to our college's students through:

**UNDERGRADUATE RESEARCH AND ENRICHMENT FUNDS**
Enhance and diversify the classroom experience and enable undergraduate students to pursue their own lines of creative inquiry.

**SCHOLARSHIPS**
Secure an MCS education for tomorrow's talented scientists, regardless of their financial circumstances, and help build a student body that reflects the world they will influence.

**PROGRAM SUPPORT**
Strengthen our diversity initiatives, student advising programs, and student training and development resources, which impact the MCS experience for all of our scholars and ensure their success in the classroom, in the laboratory and beyond.
JOIN US. TOGETHER, we will make this UNPRECEDENTED FUTURE for THE MELLON COLLEGE of SCIENCE POSSIBLE.

WHAT REVOLUTIONIZES SCIENCE AND LEADS TO WORLD-CHANGING BREAKTHROUGHS is what we MAKE POSSIBLE.

“The Mellon College of Science will lead the charge into a bold new future of scientific discovery. Through its revolutionary interdisciplinary research and its dynamic approach to education, the college’s students and faculty are poised to break ground and change the world.”

FARNAM JAHANIAN President
Henry L. Hillman President’s Chair