NU-ACCESS Combines Art, Scientific Exploration

Marc Walton, materials science and engineering, uses science to explain what curators cannot.

“Very few of the world's cultural heritage institutions have the ability to support an analytical laboratory. The Andrew W. Mellon Foundation has made it possible for institutions that don't have a lab to come to us,” says Walton, senior scientist at the Northwestern University/Art Institute of Chicago Center for Scientific Studies (NU-ACCESS).

“Our goal is to provide a national research infrastructure, a place where collections from various institutions can be investigated.”

NU-ACCESS was launched two years ago to advance the role of science within art history, curatorial scholarship, archaeology, and conservation. The center grew out of a decade-old relationship between Northwestern and the Art Institute and is comprised of two co-directors, one senior scientist, a director of operations, and two postdoctoral fellows.

The longstanding partnership has helped determine — among other discoveries — the source foundry of many of the Art Institute’s Picasso sculptures, why the luminous yellow in Seurat’s “A Sunday on La Grande Jatte — 1884” darkened, and how Matisse developed colors and forms in his masterpiece “Bathers by a River.”

“The heterogeneity of art frequently forces researchers to push the envelope in terms of instrumentation and their analytical ability to...
characterize materials,” says Francesca Casadio, NU-ACCESS co-director and the museum’s A. W. Mellon Senior Conservation Scientist.

NU-ACCESS selects internal and external projects twice a year.

“We’re not interested in just receiving samples, we want ideas,” Walton says. “If an institution has a great research idea without the ability to execute it, we’ll help them from start to finish.”

Current external projects include the exploration of a glass mosque lamp housed at the Brooklyn Museum, a systematic technical study of 15 Roman Egyptian paintings from the Phoebe A. Hearst Museum of Anthropology in Berkeley, California, and a partnership with the Solomon R. Guggenheim Museum in New York to conduct an in-depth study of the materials and techniques used by artist Laszlo Moholy-Nagy.

“All of these projects are distinct. The Guggenheim project, for example, represents a critical technical assessment of the works of an important Bauhaus artist,” Walton says. The Bauhaus was an early 20th century art school in Germany recognized for its approach to design. “We are at the ground floor, helping curators and conservators determine what the exact materials of the art works are and how Moholy-Nagy put them together.”

The center recently completed its first external project, having uncovered information on the origin and production of 23 bronze sculptures from the Smart Museum’s collection at the University of Chicago. The project became part of the museum’s 40th anniversary exhibition, which included a gallery talk by NU-ACCESS postdoctoral fellow Monica Ganio.

“The idea is to give them broad experience to enable the pursuit of a career in cultural heritage or wherever else creative problem-solving and the ability to work in cross-functional teams are required.”

Among affiliated faculty members working with NU-ACCESS are Richard Van Duyne, chemistry, and Oliver Cossairt, electrical engineering and computer science.

The Van Duyne group is attempting to develop a method to separate, detect, and identify individual components of dye mixtures from infinitesimally small samples. Meanwhile, Cossairt is working to shed light — quite literally — on some of the unknown techniques used by one of history’s most influential artists.

“We are working with Professor Cossairt to take digital photographs of a series of Paul Gauguin’s monotypes and prints lit from various directions — a process known as photometric stereo. In doing this, we can create an interactive composite that reveals each print’s textural characteristics,” says Walton.

Photometric stereo effectively turns a flat print into a three-dimensional piece, where raised ink or errant indentations can be seen. The imaging will allow researchers to resolve longstanding questions about the evolution of Gauguin’s techniques. Some of what is discovered will be on display from May 15 through September 4 at University Library.

In addition to internal and external projects, Walton and postdocs Ganio and Johanna Salvant engage in their own research on the history of the color blue, Roman glasswork, and the chemical and physical properties of Vincent Van Gogh’s painting materials, respectively.

“We get our hands dirty, meaning we follow all aspects of the projects, from preparing the samples for analysis, to performing the analysis itself and treating and interpreting the data,” Salvant says. “I also am involved in the writing of a conservation essay on Van Gogh’s three versions of ‘The Bedroom,’ investigating and comparing materials, working process, and color change for an unprecedented exhibition next fall at the Art Institute.”

NU-ACCESS is supported by the Department of Materials Science and Engineering, the Materials Research Science and Engineering Center, and the Office of the Vice President for Research.

“Through Northwestern’s shared facilities, NU-ACCESS has entrance to a suite of characterization instrumentation not typical of a museum, with the added distinction of interaction with Northwestern experts,” says Katherine T. Faber, NU-ACCESS co-director and professor of applied physics and materials science at the California Institute of Technology. “Disseminating our findings among the art, conservation-science, and academic communities is a crucial element of what we do. The center exists to provide answers, and illustrates the value and importance of bringing science to the arts.”
T. David Harris Receives ISEN Early Career Award

T. David Harris, chemistry, has been awarded the 2015 Early Career Investigator Award from the Institute for Sustainability and Energy at Northwestern (ISEN).

Harris’ award-winning proposal revolved around the use of metal-organic frameworks (MOFs) for the isolation and study of reactive chemical species, with the ultimate goal of developing new catalysts, substances that increase the rate of a chemical reaction.

The annual ISEN award honors an early-career tenure-track faculty member working on research addressing significant unmet needs relating to energy production or use. The award will allow Harris to build upon his recent achievements in the characterization of MOFs.

MOFs, tiny crystals composed of metal ions bound by organic linkers, are incredibly porous, much like a sponge. As a gas is introduced inside a MOF, it pushes outward, sticking to the crystal walls. The porosity of the MOFs, make them ideal for storing large quantities of gases like hydrogen and methane, with promising application for high-efficiency, lower-pressure natural gas storage in cars.

“If you take the amount of MOF that weighs about as much as a raisin, you could spread it out to the size of a football field,” says Harris.

But MOFs have one other very important trait that drives Harris’ research — they’re tunable. He can tweak them to have the surface area he wants and can use inorganic chemistry to specialize them.

Art Theory and Practice Drawing Major Attention

A recent list of the Chicago artists most respected by their peers included four faculty members in the Department of Art Theory and Practice.

“Some art programs have a very specific focus, but ours is a general program, and that’s a gift,” says Michael Rakowitz, a conceptual artist who came to Northwestern in 2006. “Each of us has our own focus. It is a very rigorous program that has benefited from everyone’s presence.”

“Small but mighty” is how NewCity described the department in its recent article “50 Chicago Artists’ Artists.” Faculty making the list were Judy Ledgerwood, Iñigo Manglano-Ovalle, Steve Reinke, and Rakowitz.

“We’re not just artists, but also scholars and researchers, and we expect our students to take that approach as well,” says Manglano-Ovalle, department chair. “We don’t want just beautiful objects. We want our students to take their work with us seriously and critically.”

Click here to read more.
McCormick Student Awarded Churchill Scholarship

Northwestern senior Edward Pang has received a Churchill Scholarship from the Winston Churchill Foundation to pursue graduate studies at the University of Cambridge, England.

“I’m still a little in shock, but I’m really excited — what a wonderful opportunity,” says Pang, a materials science and engineering student.

“The opportunities I’ve had at Northwestern really helped make this happen,” he says. “I’ve worked with some amazing faculty members, such as Peter Voorhees and David Dunand, both materials science and engineering, who allowed me to work in their labs and also helped me make important connections, such as with NASA.”

The eighth Churchill Scholar from Northwestern since 2003, Pang received one of 14 scholarships awarded this year. The foundation’s competitive scholarship program offers American citizens of exceptional ability and outstanding achievement the opportunity to pursue graduate studies in engineering, mathematics, or the sciences at Cambridge.

Click here to read more.

Donation Will Create the Roberta Buffett Institute for Global Studies

Social media was abuzz on January 28 as Northwestern President Morton Schapiro announced the largest single gift in University history. The donation by alumna Roberta Buffett Elliott will transform global programming at Northwestern, create the Roberta Buffett Institute for Global Studies, support scholarships for international students, and fund fellowships, travel, interdisciplinary professorships, and research at home and abroad. Mrs. Elliott was greeted with a standing ovation inside Pick-Staiger Concert Hall during an event that included a discussion with Northwestern experts from across disciplines and around the world. Moderated by President Schapiro, the panelists showcased the exciting possibilities for scholarship, research, and experiential learning created by the gift. The panelists, left to right, were Gary Saul Morson, Slavic languages and literatures; Harvey Young, School of Communication; Claudia Leung, a student at the Feinberg School of Medicine; Everette Dennis, dean and CEO of Northwestern University in Qatar; Joel Mokyr, economics; and Beth Shakman Hurd, political science.

Click here to read more.
2014 OR Annual Report Now Online

The Office for Research 2014 Annual Report is now available online as a downloadable PDF.

Inside this issue:
- Read Vice President Jay Walsh’s letter to the community.
- Read feature articles about the creation of the Roberta Buffett Institute for Global Studies and memory research at Northwestern.
- Browse faculty highlights of excellence in research from various fields of study.
- See how Northwestern stacks up among its peer institutions in major awards and recognition.
- See how awards funded and proposals submitted compare to those of previous years.

Click here to access an electronic copy.

Silver Nanowires Show Amazing Potential

What happens when one of the most widely used materials for touchscreens, plasma displays, and flexible electronics becomes too expensive?

Innovation. At Northwestern one effort to find an alternative to indium tin oxide, which boasts high electrical conductivity and optical transparency along with its hefty price tag, is being led by Horacio Espinosa, mechanical engineering.

A potential and more cost-effective alternative to indium tin oxide is a film made with silver nanowires — wires so extremely thin that they are one-dimensional — embedded in flexible polymers.

Espinosa and his team recently investigated the material’s cyclic loading, which is an important part of fatigue analysis because it shows how the material reacts to fluctuating loads of stress.

“These silver nanowires show mechanical properties that are quite unexpected,” Espinosa says. “We had to develop new experimental techniques to be able to measure this novel material property.”

Click here to read more.

Northwestern in Top 10 for Fulbright Scholars

For the ninth consecutive year, Northwestern ranks among the 10 top research institutions that produce Fulbright US Student awards, according to data published in the Feb. 12 edition of The Chronicle of Higher Education.

A near-record 27 Northwestern students or alumni accepted the prestigious award and currently pursue teaching, research, or other projects, which are funded by the nation’s premier international exchange program. An additional two grants were offered but declined.

Northwestern Fulbrighters for the 2014-15 academic year hail from a variety of academic backgrounds, ranging from biomedical engineering and mathematics to journalism and political science. They have been dispatched to 18 different countries, including Brazil, Israel, India, South Korea and Germany.

Click here to read more.

One Book One Northwestern

Claude Steele, author of the 2014-15 One Book One Northwestern selection Whistling Vivaldi: How Stereotypes Affect Us and What We Can Do, spoke to students and faculty on both campuses February 4 about his research involving stereotype threat, a psychological phenomenon he says drives behavior throughout American society.
Online Interaction Shown to Increase Weight Loss

If you want to lose pounds using an online weight management program, don’t be a wallflower. A new Northwestern University study shows that online dieters with high social embeddedness — who logged in regularly, recorded their weigh-ins and ‘friended’ other members — lost more than 8 percent of their body weight in six months.

The less users interacted in the community, the less weight they lost, the study found.

“Our findings suggest that people can do very well at losing weight with minimal professional help when they become centrally connected to others on the same weight loss journey,” says Bonnie Spring, preventive medicine.

The study is the first to use data from an online weight management program to investigate social network variables and reveal which aspects of online social connectedness most strongly promote weight loss.

“There is an almost Facebook-like social network system in this program where people can friend each other and build cliques,” says Luis A.N. Amaral, chemical and biological engineering. “In this case, we found the larger your clique, the better your outcomes.”

Click here to read more.

Northwestern Celebrates Black History Month

Throughout the month of February, the Northwestern community is invited to join in the many programs and activities taking place to celebrate Black History Month.

Among the guest speakers, panel discussions, films, social gatherings, theatrical performances, and literary forums will be Jabulani, the African Students Association’s annual culture show, talking place at 6 p.m. on February 21 at the Louis Room of Norris.

The month’s events will also feature a critical and open discussion about the representation of black women in entertainment. “Hollywood Shuffle: A Critical Discussion of the Representation of Women of Color in Film and Television” is taking place from 7-9 p.m. on February 23 inside Wildcat Room A of Norris.

Two One Book One Northwestern discussions are taking place on February 24 (Chicago campus) and February 25 (Evanston campus).

Click here for a full calendar of Black History Month events.

New Catalyst Uses Light to Convert Nitrogen to Ammonia

Northwestern scientists are the first to develop a catalyst that can perform a remarkable feat found only in nature: take nitrogen from the air and turn it into ammonia under natural conditions. No high temperatures or pressure required.

Driven by light, the new method offers promise for a more environmentally friendly fertilizer. (Ammonia is the critical component in fertilizer.)

“This is a big-deal reaction, turning nitrogen into ammonia under ambient conditions,” says Mercouri G. Kanatzidis, chemistry, who led the research. “Scientists have been fascinated by the biological enzyme nitrogenase, which catalyzes the reaction in nature, for more than 60 years. Now we have created a successful mimic of nature’s process.”

Plants rely on the nitrogen fixation process for nutrition and growth. Nitrogen straight from the atmosphere is inaccessible to plants, so the nutrient must be in a reduced form, such as ammonia.

The work was supported in part by the Argonne-Northwestern Solar Energy Research (ANSER) Center. Click here to read more.
ASRSP and OSR Implement Uniform Guidance Strategy

Four years ago, the Federal Office of Management and Budget (OMB) was directed by President Barack Obama to streamline regulatory requirements as they apply to all recipients of federal funding. The Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards combines, updates, and replaces guidance that was previously contained in eight different OMB circulars. The Uniform Guidance is perceived by many in research administration as the single largest regulatory change in the past 50 years.

Northwestern has developed a strategy that will allow implementation of the Uniform Guidance — which went into effect December 26, 2014 — during the transition from old to new rules.

Over the past year, two University units have taken the lead on this important implementation: Accounting Services for Research and Sponsored Programs (ASRSP) and the Office for Sponsored Research (OSR).

“The goal of implementation is to establish a framework within which the new Uniform Guidance can exist, while utilizing existing systems and resources as much as possible,” says David E. Lynch, executive director of OSR-Chicago. “It is imperative to maintain compliance under both old and new rules and minimize the impact on faculty and staff.”

“It’s important to note that while we have already received a number of awards under the Uniform Guidance framework, federal agencies are still working to incorporate all changes, including an update to the Federal Demonstration Partnership Research Terms and Conditions, which affects the majority of federal awards at the University,” notes Kelly Morrison, associate director of OSR-Evanston. “ASRSP and OSR, collaborating with many other central offices, are committed to continuing to provide training on the Uniform Guidance to the Northwestern community.

The application of the cost principles for charging sponsored programs have mainly remained the same, where costs need to be reasonable, allocable, allowable, and consistently applied.

“We have, however, been focusing on key changes and continue to disseminate information to the research community for topics on the direct charging of administrative and clerical salaries, the purchase of computing devices, cost sharing, subrecipient monitoring, and award close-out,” says Michael Daniels, senior associate controller and executive director for Research Financial Operations.

For more information, please refer to the Uniform Guidance website, which will continue to be revised as new information and implantation updates are available.

Science Café to Feature Technology That Could Change Urban Living

What if a light pole could tell you to watch your step, or a mobile app could provide the safest, most populated route for a late-night walk to the el?

At this month’s Science Café, Charlie Catlett, a senior computer scientist at the US Department of Energy’s Argonne National Laboratory and the University of Chicago, will discuss the technology intended to turn those “what ifs” into reality.

The Array of Things (AoT) is designed to operate as a national instrument for urban science and technology research. This network of hundreds of sophisticated sensing and computational devices is to be piloted in Chicago this year. AoT nodes will be used to sense, process, and publish real-time data on the city’s environment, infrastructure, and activity.

“The project will provide scientific-quality, high-resolution data about the city, from air quality and weather to the density and movement of vehicles,” Catlett says. “Every aspect of the design and operation of the network will also be published, including the specific sensors and all of the software used in order to promote transparency and engage the general public.”

The Science Café presentation will take place from 6:30 to 8 p.m. on Wednesday, February 25, at the Firehouse Grill, 750 Chicago Ave., Evanston. Click here to learn more.

Feb. 25 Brown Bag Will Discuss State of the IRB

The Institutional Review Board (IRB) Office maintains a robust training and outreach program that includes brown bag sessions and other educational opportunities covering a variety of human research-related topics. The next brown bag session will provide an update on the office and will be led by Heather J. Gipson, IRB director. The lunch-time meeting begins at noon on February 25 at the Daniel Hale Williams Auditorium inside the McGaw Pavilion on the Chicago campus.

RSVP to irbtraining@northwestern.edu or via the IRB website events page.
Artist-in-Residence to Perform on Instrument He Created Here

Renowned artist and MacArthur Fellow Walter Jesse Kitundu will complete his Kaplan Institute for the Humanities’ Artist in Residence with a performance on March 9 from 4:39-6:30 p.m. at 640 Lincoln Street in Evanston.

Inspired by his childhood in Tanzania, Kitundu often ties his projects to the world’s natural splendor. His art ranges from wildlife photography to hand-built turntables that interact with natural elements, such as wind, rain, fire, and waves.

Kitundu recently moved to the Chicago area with his wife, Shirin Vossoughi, School of Education and Social Policy.

As an artist in residence, Kitundu participated in colloquia with Kaplan Institute fellows and affiliates while also teaching an art course titled “Exploring Sound and Natural Phenomena.”

The winter 2015 program is cosponsored by art theory and practice and radio, television, and film.

Click here to read more.

IPR Colloquium Series to Feature Jonathan Guryan

Jonathan Guryan, human development and social policy and an Institute for Policy Research (IPR) fellow, will be the featured presenter at next week’s IPR Fay Lomax Cook Monday Colloquium Series.

Guryan’s presentation, “Not Too Late: New Evidence from Chicago on Improving Academic Outcomes for Disadvantaged Youth,” will discuss his collaborative research suggesting a promising approach for helping the most challenged students, who often arrive in high school several years behind their peers.

The colloquium is scheduled from noon to 1 p.m. on Monday, February 23, at Chambers Hall on the Evanston campus. The IPR series takes place on Mondays throughout the year. Speakers are typically IPR fellows or associates discussing their latest policy-relevant research.

Honors

Samer Attar, orthopaedic surgery, was recognized at Northwestern Medicine’s 36th Annual Humanitarian Awards Program for volunteering at a secret hospital in war-torn Syria to treat those injured in the conflict.

The Institute for Sustainability and Energy at Northwestern (ISEN) has announced its fall booster award recipients. They are Scott Barnett and Ramille Shah, both materials science and engineering; Jiaxing Huang, materials science and engineering; Aydin Koray, electrical engineering and computer science; and Magdalena Osburn, Earth and planetary sciences.

James Elliott, physical therapy and human movement sciences, has received the Early Career Investigator Award in Biomechanics from the American Physical Therapy Association. The Award recognizes nationally emerging investigators who have made a substantial contribution over the past one to two years and have demonstrated a history of excellence in scholarship.

Richard Joseph, political science, recently received a Martin Luther King Jr. Social Justice Award from Dartmouth College. Joseph was also awarded a lifetime achievement award by Dartmouth, his alma mater.

June M. Mckoy, preventive medicine: geriatrics, was honored at Northwestern Medicine's 36th Annual Humanitarian Awards Program for her work with numerous community organizations to help Chicago residents in need. She was also recently named a 2015 Impact Center fellow. The year-long program is designed to accelerate leadership development for female executives during pivotal times in their career and to provide support during critical career transitions.

Deborah Tuerkheimer, law, has been elected to the American Law Institute, an esteemed group of judges, lawyers, and legal scholars dedicated to the development of the law. Tuerkheimer is among 26 new members elected this year. She joins more than 10 Northwestern Law faculty already involved with the Institute.
Research Around Campus

A preliminary study by Richard Burt, MD, medicine-immunotherapy and autoimmune diseases, suggests that stem cell transplantation may reverse disability and improve quality of life for patients with relapsing-remitting multiple sclerosis (MS). Read more...

Research lead by Changiz Geula, Cognitive Neurology and Alzheimer's Disease Center, was recently published in the Journal of Neuroscience. The work showed that SuperAgers — individuals older than 80 who have memories that are as sharp as those of healthy people decades younger — have distinctly different looking brains. Read more...

Yonggang Huang, civil and environmental engineering and mechanical engineering, was part of a collaborative team that developed a simple new fabrication technique to create beautiful and complex 3-D micro- and nanostructures with many advantages over 3-D printing. Read more...

A study by Theresa Pape, physical medicine and rehabilitation, has shown that the voices of loved ones telling familiar stories can help awaken the unconscious brain and speed recovery from a coma. Read more...

By manipulating the ordered arrangement of atoms in layered complex oxide materials, James Rondinelli, materials science and engineering, has found a way to control their electronic band gaps, which determine the electrical behavior of the material and how it interacts with light. Read more...

Mary Silber, engineering sciences and applied mathematics, is working to see if forecasting tipping points is possible. Read more...

Research by Jonathan Silverberg, MD, dermatology, has shown that adults who have eczema — a chronic itchy skin disease that often starts in childhood — have higher rates of smoking, drinking alcoholic beverages, and obesity and are less likely to exercise than adults who don't have the disease. The behaviors put them at higher risk of cardiovascular disease. Read more...

Pediatric patients who listened to 30 minutes of music or audio books had a significant reduction in pain after major surgery, according to a new study by Santhanam Suresh, MD, anesthesiology. Read more...

Fred Turek, neurobiology, and student Keith Summa wrote an article published in the February issue of Scientific American on how genes in the liver, pancreas, and other tissues (not just the brain) keep the various parts of the body in sync. Read More...

Research in the News

Emma Adam, School of Education and Social Policy, was featured in the Herald Times for her research showing that lack of sleep is associated with surges in stress hormones, which for teens may predict later mental health problems.

Luis A.N. Amaral, chemical and biological engineering, was featured in the Guardian, Los Angeles Times, and elsewhere for work that revealed a new methodology to explaining the most influential films in history.

Karl Bilimoria, surgery: surgical oncology, was featured by numerous media outlets including the Boston Globe for research showing that infections are the most common cause of hospital readmissions after surgery.

Sourav Chatterjee, Center for Interdisciplinary Exploration and Research in Astrophysics, was featured on Smithsonian.com for his work on Vulcan planets.

Multiple media outlets, including Medical Express, featured the research of David E. Conroy, preventive medicine, on the role of smart phone fitness apps.

Jonathan Guryan, School of Education and Social Policy and an Institute for Policy Research (IPR) fellow, was quoted in the New York Times regarding closing the math gap for boys.

Maryam Kouchaki, management and organizations, was featured in New York Magazine for a study showing that anxious people are more likely to cheat.

Donald Lloyd-Jones, preventive medicine, was quoted on numerous websites, including WebMD, regarding work that showed elevated systolic blood pressure in young people could be a sign of future heart disease.

Emily S. Miller, obstetrics and gynecology, was featured in a US News and World Report story on postpartum anxiety.

Galya Ruffer, director of the Center for Forced Migration Studies at the Roberta Buffett Institute for Global Studies, was featured in the New York Times opinion section regarding the resettling of refugees.

Bonnie Spring, preventive medicine, was featured on NPR for a study showing that even moderate habit changes in adulthood can significantly protect against heart disease later in life.

Research by Teresa K. Woodruff, chief of obstetrics and gynecology-fertility preservation, which led to the discovery that fertilized mammalian eggs release from their surface billions of zinc atoms in “zinc sparks,” was featured as Science Friday’s image of the week. Read more...
Proposal and Award Report: through December

The total amount of award funding received through December was $108.4 million, a 22 percent decrease ($30.6 million) compared with December 2013. The number of awards to date this fiscal year (660) was 6 percent lower than last year at this time.

Through December 2014, the dollar volume of awards from federal agencies reflected a decrease of 25 percent ($24 million). Awards from industrial sponsors were down by 18 percent ($4.9 million). Foundations funding also decreased, down 10 percent ($0.87 million). State of Illinois funding was down 106 percent ($0.2 million).

The dollar volume of proposals submitted through December 2014 was $893.8 million, which was an increase of 4 percent compared with last year. The number of proposals submitted (1,216) was up 13 percent from December 2013.

Through December 2014, the dollar volume of proposals submitted to federal agencies was up 3 percent ($25.8 million), while that to industrial sponsors was up by 35 percent ($8.8 million). Proposal activity to voluntary health organizations was up by 24 percent ($3.8 million).

Click here to access the full report. You will first be brought to the University’s single sign-on access page, where you will then need to provide your NetID and password. From the report launching page, find the appropriate report type and select the desired month.