

A bright sun in a blue sky with wispy clouds.

Graduate Studies

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**All featured stories in this publication originally appeared on drexel.edu.*

Change does not happen in a vacuum...

Real progress requires a community of thinkers, each applying their knowledge and experience to further an idea. By bringing together a collection of strong and knowledgeable minds, a compelling singular concept can take on new life, pushing it beyond anticipated results.

No matter what your drive may be — whether it be to build or expand upon your previous coursework, advance the trajectory of your current career, or prepare to shift into a new profession or field — Drexel’s graduate community can help you achieve your goals. We provide the resources, opportunity, and expertise to help you leverage your successes and use them as a foundation upon which you can build.

Drexel has a lot to offer you — but you, too, have a lot to offer our community. Your experiences thus far have inspired personal viewpoints and opinions, fresh perspectives, and real-world wisdom that can prove immensely valuable to those around you.

Innovation takes on many forms: the inspiration of conceptual theories and new ideas, the exploration of unconsidered applications, and the development of individuals as thinkers and achievers. Drexel’s graduate programs present an environment that will not only push you but will allow you to inspire those around you. This is a community of emerging thought leaders, intent on making an impact in all areas of this changing world.

We invite you to join us.

cre•a•tiv•i•ty

A Creative Approach to Teaching Creativity, Interdisciplinary Teamwork for Graduate Students

“Creativity is

seeing what everyone

else has seen and

The course technically carries the “CHEM T580” title, but chemistry isn’t even referenced until halfway through today’s lecture.

This course is taught by a chemistry professor. It’s hosted in a room with a poster featuring the chemical compound for caffeine on the wall behind the coffee machine. But there’s more discussion of Michael Jordan’s practice habits and having “a-ha” moments in the shower than there is about chemistry.

That’s because this course is titled “Creative Interdisciplinary Team Research: Principles and Practice,” and aimed at providing graduate students from all across the University with the opportunity to learn how to develop new, useful, and high-quality ideas while also working within interdisciplinary teams. Maybe “AS-I T480” — the Arts & Sciences Interdisciplinary Study title the course also carries — is a bit more accurate.

Fraser Fleming, PhD, head of the chemistry department in the College of Arts and Sciences, teaches the course. “We started the class because we realized that, actually, the core of graduate education is developing people’s creativity,” says Fleming. “But in graduate education, I’ve never heard of anybody talking about creativity directly unless it’s part of their research.”

Fleming started the class alongside social psychologist Paul Gondek, PhD, an adjunct teaching professor in both the College of Arts and Sciences and the LeBow College of Business — a partnership itself connected to the classes’ additional aim of giving graduate students exposure to working in interdisciplinary teams.

“Exposure to people who think differently, from other disciplines, will help them when they leave because it’s likely that when they finish their degrees and go off to whatever is next, they’re going to find themselves on a team with people that don’t share the same education they have,” Gondek says.

The structure of the class promotes both creativity and teamwork. Today, the class is reviewing chapters from “Zig Zag: The Surprising Path to Greater Creativity” by Keith Sawyer alongside Fleming’s prepared lecture. He presents the quote, “Creativity is seeing what everyone else has seen and thinking what no one else has thought,” once said by Hungarian physiologist Albert Szent-Györgyi, though it is regularly misattributed to Albert Einstein.

“I find this very helpful as a working definition, and I’m going to suggest that you keep this as well because it’s very accessible, it’s catchy, and it’s easy to understand,” Fleming says.

He then prompts the class to relay one creative technique that they will each implement in their life from here on out. Answers range from thinking of the future and asking questions to keeping a writing instrument in the bathroom to capture those shower ideas. Concurrently, a sign-up sheet is being passed around for students to claim a forthcoming day where they will lecture for half of the class — these presentation opportunities all building up to mid-term and final team presentations worth a combined 40 percent of their final grade.

Gondek and Fleming agree that a rubric- and peer evaluation-driven approach to the class is needed.

“Having a course on creativity and then asking that people would take a standardized exam doesn’t seem like it really fits with what we try to accomplish,” Fleming says.

Gondek and Fleming launched a graduate minor in creative interdisciplinary research in the College of Arts and Sciences for which this course is required. They will also introduce a second course called “Enhancing the Creativity of a Major Research Idea.” The professors also plan to submit a proposal to the Innovations in Graduate Education Program at the National Science Foundation in order to gain funding to track the influence of the courses. His continued work on the proposal also earned Gondek the title of visiting research professor in the chemistry department, even though he hasn’t studied chemistry since his own undergraduate days.

Though they don’t yet have the metrics to prove it, Gondek and Fleming believe this graduate minor will help set these Drexel students apart from their peers when it comes to their future job search.

To continue reading this article and to find additional stories that highlight the unique elements of Drexel’s graduate experience, visit drexel.edu/grad/stories.

The Next Generation of Leadership Begins Here

Since its founding in 1891, Drexel has focused on providing students with an education that integrates knowledge and experience, uniquely preparing them to succeed in the real world. Our graduate programs take this concept even further, helping students to develop specialized academic paths that leverage their individual accomplishments and speak directly to their needs and personal goals.

Our focus on interdisciplinary academics will allow you to not only choose a singular area of study from within the University’s more than 120 graduate programs and associated minors, but will also afford you the opportunity to take classes and explore subjects outside of your specialization and collaborate with experts from a wide variety of fields through research endeavors, special projects, and more.

We recognize that as a graduate student, you are in search of a transformational experience that considers and integrates where you are, what you’ve done, and what you hope to accomplish. Whether you choose to study on campus or online, decide to take classes full-time or part-time, or are interested in anything from a certificate to a post-baccalaureate program or a PhD, Drexel’s graduate studies will provide the knowledge, resources, and skill development you’ll need to excel.

thinking what

no one else has thought”

Albert Szent-Györgyi, physiologist

Follow Wherever Ambition Leads

Forward thinking is the key to future success. But how does one develop as a forward thinker?

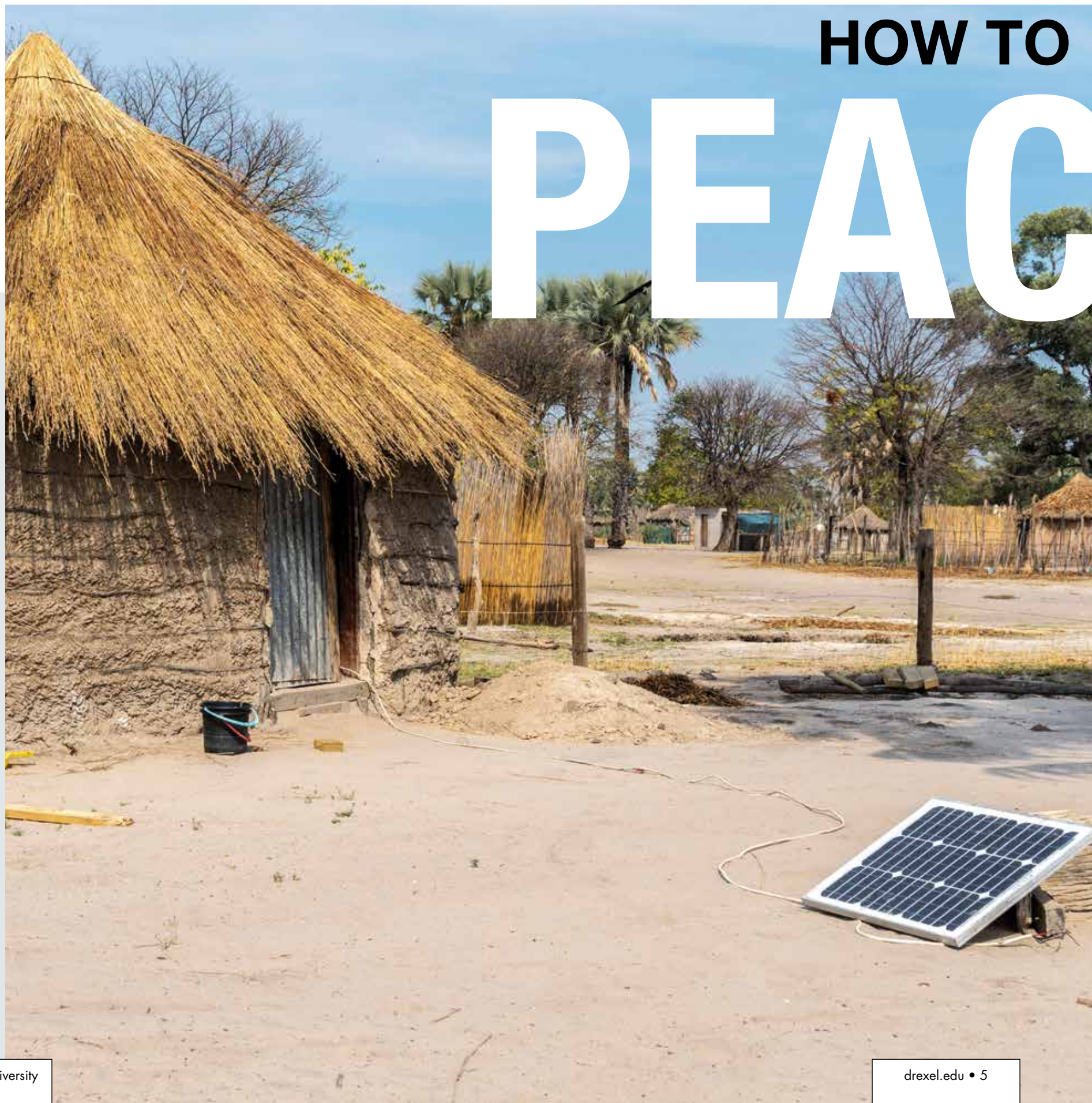
To truly prepare for success in an ever-changing world, one must be willing to push beyond what they know and dispel the reassuring comfort of what has worked in the past. No matter what their area of expertise may be, the next generation of leadership must be willing to consider and embrace new information, experiences, and applications to inspire progress.

Drexel's graduate programs are focused on opening doors and breaking down barriers, both in terms of access to knowledge and opportunities to explore how you can put your learning to use. By pressing the prescribed boundaries of the typical collegiate path, our students are able to better understand the reasoning and principles behind the theories and practices, allowing them to accomplish more.

TEACHING ENGINEERS

HOW TO BUILD

PEACE



When it comes to answering tough questions like “How do we supply electricity to a village without exacerbating tensions with their neighbors?” or “How can installing a water system in a disputed territory lead to greater cooperation?” or “Why is a pipeline being built there?,” PeaceTech Lab and Drexel University think engineers could play an important role at the government agencies, companies, and relief organizations responsible for these decisions. The University and PeaceTech Lab, a nonprofit organization headquartered at the U.S. Institute of Peace in Washington, D.C., have created a master’s degree for engineers who want to contribute to the prevention of crises around the world.

The degree, called “Peace Engineering,” is a two-year master of science and a one-year online certificate with the goal of preparing engineers to work with relief organizations and corporations that operate in conflict zones.

“This is a program for engineers who want to have a direct impact on people’s lives,” said Joseph Hughes, PhD, a professor in Drexel’s College of Engineering and director of the Peace Engineering program. “By learning about the underlying causes of conflict and approaching these issues from an engineer’s perspective, ‘peace engineers’ are better equipped to plot out viable solutions that can help solve these complex problems without creating more of them.”

Why Do Engineers Make Good Peace Builders?

According to Hughes, engineers are particularly well equipped to address issues of complexity because their education trains them to break a problem into its parts, or systems, and resolve it by calculating the outcome that would result by adjusting the systems in different ways.

Peace Engineering

Peace builders from PeaceTech Lab are working with Drexel to teach engineering students about conflict management.

Drexel University and PeaceTech Lab view this approach as complementary to the peacebuilding field. “Conflict is a symptom of complex human dynamics — today’s conflicts require a different kind of strategy and a different kind of specialized knowledge,” explained PeaceTech Lab President and CEO Sheldon Himelfarb. This demand for specialized knowledge is why the partnership with Drexel came to fruition.

Drexel University and PeaceTech Lab’s partnership began with a pair of introductory courses for engineering undergraduates interested in peacebuilding and a co-op

program through which Drexel students supported PeaceTech Lab’s efforts to bring technology into conflict resolution on projects ranging from Central America to right here in Philadelphia. The master’s program builds on the success of these opportunities.

Building a Peace Engineer

PeaceTech Lab recognizes that society has reached a point where technology is tied to many of the systems that comprise conflict — and, as such, it is part of the solution. Partnering with engineers who already understand the way to address a problem and have the means to calculate the impact of using technology to affect the systems brings efficiency, new ideas, and solutions to the fore.

“The peacebuilding field can benefit from the skills that engineers possess,” said Althea Middleton-Detzner, director of PeaceTech Lab’s Peacebuilding Engineers Program. “Complex problems that involve human and conflict dynamics require cross-disciplinary expertise to resolve. We need engineers who understand these complex conflict and post-conflict environments, and who can speak to non-engineers. Likewise, we need social scientists who can understand engineering

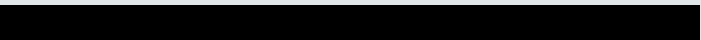
thinking and the value it brings to the peacebuilding field.”

Middleton-Detzner, who helped build the Peace Engineering curriculum, developed courses that introduce engineers to skills like active listening, negotiation and mediation, cross-cultural communication, and conflict analysis in order to prepare them to work and communicate with anyone from diplomats and CEOs to relief workers and community leaders.

Peace Engineering

Peace engineers use their technological expertise to help develop sustainable solutions to resolve conflict.

The master’s track also includes courses on theories of conflict management, risk assessment, systems analysis, and community-based design, which are intended to reorient the way engineers approach a problem. For engineers working on international projects in areas where there is a crisis, it can be stressful to learn these approaches on the job.



By connecting the dots, we are able to see a larger picture and grow exponentially on both intellectual and professional levels. But know that it is not only you who will benefit; as an active member of this collective of thought and exploration, your knowledge, insights, and perspectives will help guide the trajectory of the students and faculty around you. Here, learning is a constant and ongoing conversation between inquisitive individuals, each striving to move the needle forward.

“You get thrown into this situation, but the context is so different that the textbook learning might not be applicable,” said Hughes, who experienced engineering in a conflict zone firsthand when he worked in Angola in 2003, following its civil war. “I realized that I could do everything right from an engineering perspective but still mess so many things up for these people — it became paralyzing. That’s why we need leaders in the field who can understand all the destabilizing forces that come into play.”

To prepare engineers for leadership under these conditions, instructors from PeaceTech Lab and more than 20 faculty members from across the University will teach courses that present a combination of case studies, classroom and online lectures, and simulation exercises. In addition, part

of the program includes an experiential education opportunity at PeaceTech Lab or other international organizations, where students gain experience in the peacebuilding field before they graduate.

Where Do Peace Engineers Work?

Bernard Amadei, PhD, a visiting professor from the University of Colorado and founder of Engineers Without Borders in the U.S., has seen engineering education evolve over the last few decades to include more opportunities for students to learn in humanitarian outreach settings. Amadei, who helped create the Peace Engineering master’s, sees it as the next step toward officially recognizing the experiences of engineering students and acknowledging the demand for their unique skill set in the workforce.

“There’s a real demand for young engineers with these experiences of working with other groups of people from around the world. I’ve seen that demand grow since the start of Engineers Without Borders — companies are scooping them right up,” Amadei said. “It makes sense, if you think about how many companies are global today. There is a real value to being able to hire someone who has already been trained to work with diverse groups of people to deal with complex issues.”

Hughes suggests that, in addition to supporting efforts like those of PeaceTech Lab and non-governmental relief organizations, Peace Engineering graduates would be in demand for positions

at international companies working in conflict areas as well as the financial institutions backing projects there. Having engineers on the ground to assess and address the situation removes a great deal of uncertainty and allows these companies to better understand the risk of starting a project in a conflict zone.

“There is a lot of money not being invested in these places because there is so much uncertainty. Engineers can help assess and manage the risk if they have this training in conflict resolution,” Hughes said. “We need more people who can understand if these decisions are going to help solve a problem — or cause an even bigger one.”

To find this and similar stories that showcase the exciting collaborative work at Drexel, visit drexel.edu/grad/stories.



EXAMINATION AND EXPLORATION

As an R1-designated research institution, Drexel prides itself on cutting-edge research and the exploration of intellectual curiosity to discover new possibilities. As one of only 130 colleges and universities — and just 34 private institutions — to be granted R1 classification, the importance of research endeavors at Drexel is mirrored only by the financial and technological support they receive and the groundbreaking outputs they achieve.

Our Dragons not only learn and explore alongside other aspiring student researchers, but they are also closely mentored by their instructors and supporting faculty, even working with them side by side as they advance their own projects. Under direct guidance from leaders on the front lines of discovery, your work will help us continue to direct the trends and initiatives

that are shaping global progress. The University’s spirit of collaboration thrives among our labs and facilities, allowing for multidisciplinary solutions addressing large-scale questions to emerge and take flight.

This atmosphere of innovation produces extraordinary results, allowing our work to push further and inspire a significant impact in the world around us. Consistently named as one of the Most Innovative Schools in the United States by *U.S. News and World Report*, the University is a hotbed for new inventions, patent awards, and the development of groundbreaking application and implementation strategies to guide the advancements of the future.

Psyche and the City

On a recent day on the job, one of Hakim Pitts’s coworkers became concerned about a man who seemed a little disturbed.

The man “wasn’t doing so well,” the coworker told Pitts, who is an outreach and enrollment specialist for a walk-in health clinic inside a North Philadelphia ShopRite. “He may need someone to talk to.”

The man wasn’t a patient — he was standing around outside the building — but Pitts walked outside to speak to him anyway. The man was a veteran, it turned out. He told Pitts he didn’t feel well and when Pitts pressed him, he admitted to feeling suicidal.

Pitts then asked the man a crucial question: “Do you have a suicide plan?”

Not everyone would be so direct. But Pitts had been coached to ask that

question through the city’s “Mental Health First Aid” training program, part of an ambitious citywide initiative to educate citizens and city workers about the signs and symptoms of mental illness and provide them with tools to help those in need get treatment.

The program was adopted by the Philadelphia Department of Behavioral Health and Intellectual disAbility Services in partnership with Drexel University’s School of Public Health, which is in the midst of an evaluation study of its effectiveness. Philadelphia’s goal is to train 10,000 individuals — ranging from ordinary citizens to public health workers to law enforcement officers and school police — within the first two years.

Longer term, the city’s goal is to train 100,000 — making Philadelphia’s the largest rollout of the program in the United States.

Pitts eventually determined that the man needed an intervention, so he phoned the Department of Behavioral Health and Intellectual disAbility Services and a “mobile emergency team” quickly arrived. The team, which has the authority to make an involuntary commitment if necessary, offered the man help and resources and saw him on his way.

Before the man left, Pitts gave him his phone number. “If you’re feeling bad like that again,” Pitts told him, “you can come back here and talk to me.”

Reflecting on his training, Pitts recalls it opened his eyes to how common mental health challenges are, especially in the African-American community he grew up in. The knowledge was “inspiring,” he says.

“Growing up, I often thought I was alone,” he says. “Mental health isn’t something that’s discussed.”

Fear and Loathing | Most people would hesitate to approach a troubled stranger, much less ask probing personal questions.

Though mental illness touches almost everybody — roughly one in five Americans suffers a form of it at some point in their lives — the subject often percolates to public attention only when it’s too late, in the aftermath of a tragic shooting or a high-profile suicide.

Reducing the stigma surrounding the subject is one of the biggest challenges in the health care field, says Arthur Evans, who previously led the city’s Department of Behavioral Health and Intellectual disAbility Services and administers the Mental Health First Aid program. Many people view the mentally ill as

dangerous, hard to talk to, or as being responsible for their condition. Stigma deters people experiencing a mental health crisis from seeking treatment, and two-thirds suffer in silence, according to the National Alliance on Mental Illness.

In recent years, a growing number of public agencies have turned to Mental Health First Aid and programs like it to educate their employees and the public about mental health issues.

“In [wealthy] communities, you can really focus on the aspects of the condition specific to a person’s illness. But in Philadelphia, you not only have to deal with that, but you often also have to think about basic needs: Does the person have a place to stay? Do they have the basics that they need for living?”

— Arthur Evans

As the name suggests, the idea at the heart of the Mental Health First Aid training program is to train people to respond to someone experiencing a mental health problem or a crisis — an individual contemplating suicide or a friend in the throes of depression — with immediate assistance, just as they would a choking or burn victim.

“If someone has a heart attack, there are 10 people there to provide CPR,” says Evans. “If someone starts to exhibit psychiatric signs, people typically go the other way.” First developed in 2000 in Australia, the Mental Health First Aid program was brought to the United States in 2008 by the

National Council for Committee Behavioral Health, and it has since been implemented around the country.

No U.S. city has committed to it as thoroughly as Philadelphia. Since the city’s kickoff in 2012, Philadelphia has overseen between 25 and 30 trainings per month — nearly one a day — and trained roughly 5,000 people, already half the city’s stated goal.

More than 200 people have undergone a weeklong program to become instructors, who in turn train more “First Aiders.” Among the first to take the course were Philadelphia School District security officers. All new recruits to the Philadelphia police and fire departments are getting the training this year as well. Instructors are also fanning out to organizational hubs such as the Red Cross, the Philadelphia Department of Human Services, hospitals, universities, and others.

The trainings, Evans says, “show people, ‘OK: Here are the illnesses, here are the symptoms, here are the treatment options, here are the self-help groups’ ... so that when people start to show signs, there are other people in their communities who know how to respond.”

But despite the program’s wide adoption around the country, minimal data has been collected to measure its impact.

How are participants applying what they learned at work, at home, in their neighborhoods and congregations? To what extent is it likely to translate into action and better public health?

That’s where Drexel’s Nancy Epstein comes in.

Does it Work? | As principal investigator of the evaluation study, Drexel School of Public Health Professor Nancy Epstein is looking at the impact of the program on people’s behavior and attitudes with the goal of determining whether it results in the kind of prevention and early intervention that allow individuals to get help before their problems escalate into addiction, self-harm, or violence. Epstein and her team have begun conducting online surveys of First Aiders both three and six months after they’ve undergone the training, in addition to telephone interviews.

“There’s a lot to learn,” says Epstein. “Philadelphia is doing something that’s happening already in many places across

the country, at the state level, at the national level, even internationally. In any publicly funded program, it’s really important to have an evaluation, to know what’s happening.”

The study is unfinished and still too much in its beginning stages to draw broad conclusions, says Epstein. However, early results indicate that the program has — at least as reported by those who’ve taken it — made a difference, sometimes a profound one, among its participants.

After surveying more than 300 First Aiders, Epstein says that what she’s found so far “is really striking.”

“Without fail, every person I’ve interviewed said [the training] was making a difference

in their lives — that they had gained valuable skills that they were using,” she says.

A high percentage of the people responding to the surveys so far (which have an impressive 27 percent response rate) reported using what they’d learned in the time since the training. At three months following the training, more than 67 percent say they’ve used Mental Health First Aid very often. At six months, 34 percent reported using it six or more times. Significantly, the Drexel team has also documented a 30 percent decline in attitudes of stigma.

To read the rest of this story, along with others detailing how Drexel’s graduate community is making an impact within a variety of fields related to health and medicine, visit drexel.edu/grad/stories.

AN UNWAVERING IDEAL

Drexel holds a strong commitment to the neighborhoods and communities that surround us. We are proud of our deep connection to the city of Philadelphia and recognize that as engaged citizens, we have a responsibility to give back to the city that supports us — and beyond.

As a University, we strive to be among the most civically engaged in the nation and work to integrate service into all aspects of our academic model. This not only includes the sharing of knowledge and the development of community-enriching projects, but also direct service participation and impactful volunteer initiatives. Through Community-Based Learning (CBL) courses, Drexel presents an intersection of academics and service with direct, for-credit coursework. Our partnerships with philanthropic organizations and non-profits here at home and across the globe allow students to learn firsthand how to build collaborative alliances and see up close how their efforts can lift those around them.

As we look to the future, our Dragons believe in using the opportunities afforded to them to assist those in need, whether it be through education, improved access to health care, or community advocacy. By leveraging our resources and position as a pillar of the higher education community, this University is focused on doing all that we can to ensure all individuals are able to live and grow in an atmosphere of dignity and respect that promotes opportunity, equality, and prosperity.

ROUGHLY ONE IN 5 Americans suffer some form of mental illness at some point in their lives

3 AT 3 MONTHS following the training, more than 67 percent say they've used Mental Health First Aid very often

Mental Health First Aid teaches participants a five-step approach known as ALGEE.
A: Assess for risk of suicide or harm
L: Listen non-judgmentally
G: Give reassurance and information
E: Encourage professional help
E: Encourage self-help or support

Discover a Network of Resources

As a graduate student, we know your time is of the utmost value and importance. You're looking to make the most of every moment and maximize every opportunity — but to do so, you're going to need a bit of assistance.

Whether you choose to study on campus or online, you'll have direct access to a large number of organizations here to help support and guide you along the way, including the Center for Learning and Academic Success Services (CLASS), the Graduate Student Association (GSA), the International Student Association, and more than 30 active graduate student organizations, just to name a few.

Finding the groups and organizations that will meet your needs is much easier than it seems. You just have to know where to begin.

ART AT THE NANOSCALE

Scientists typically view materials under an electron microscope to understand how they work at very small scales — like, say, at the atomic level or at the nanoscale, with one nanometer equaling one billionth of a meter. But seen through the microscope lens, these materials can look quite artistic, even if that's not the reason why they were being viewed in the first place.

These microscopic images are often colorized (electron microscopes show them in gray-scale) and edited with photo editing software to emphasize the unique features captured in ways the human eye could never make out. Plus, the scientists colorize their images — not for their research, but to show the beauty within their research to a different, wider audience.

This field of scientific art — or artistic science — is known at Drexel as NanoArtography, a stylized portmanteau that combines “nano” with “art” and “photography.” The name was coined by a Drexel University student, and the competition itself was created at Drexel. The University is known as a giant in the nanomaterial research field as the birthplace of the MXene, a two-dimensional (2D) material that could lead to advances in everything from kidney transplants to functional fabrics to energy storage. But as much as Drexel is known for its materials research, it is also known for promoting the art of nanomaterials, having hosted a prestigious international NanoArtography photo contest since 2016.

Ariana Levitt, Drexel University

Some of those award-winning images have been put on public display in exhibits from The Drexel Collection, the University's flagship collection of art. NanoArtography, displayed in the Rinchliffe Gallery, demonstrated how closely science and art are intertwined, especially at an institution like Drexel.

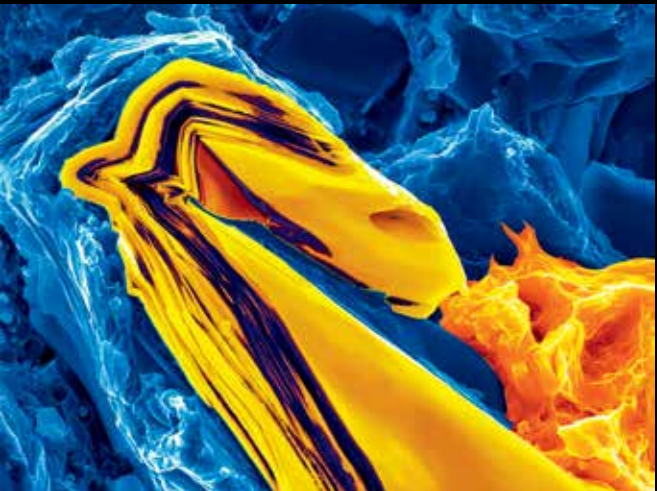
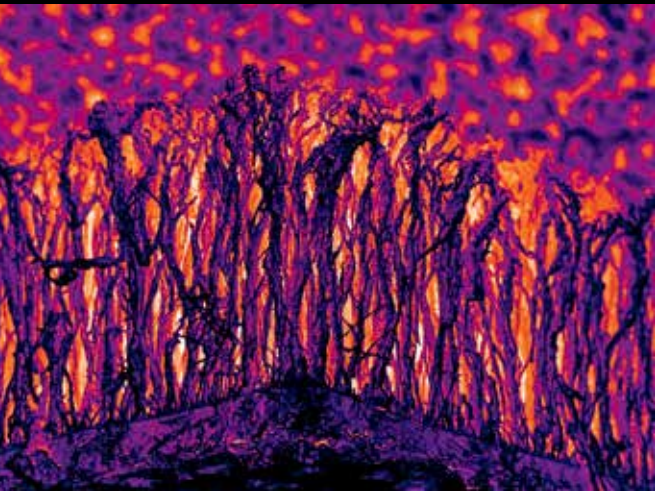
"I want this show to make people aware that we have such strengths in nanomaterials at Drexel, and that engineering is not just about solving equations," said Babak Anasori, PhD '14, a former research assistant professor in the College of Engineering who created and runs the A.J. Drexel Nanomaterials Institute NanoArtography Competition. "Some people might not know that much about engineering, and materials science, in particular. With this show, we can have students with different backgrounds interested in our research and I hope they will be more eager to learn about our field."

Anasori was a materials science and engineering doctoral candidate in Drexel's Department of Materials Science and Engineering when an electron microscope image he created of a titanium-based MXene was recognized and awarded in the scientific field (it won the People's Choice award in the National Science Foundation's International Science & Engineering Visualization Challenge) as well as in the mainstream media, appearing in National Geographic

and on MSNBC. Inspired by how his art and science was received, he started Drexel's annual NanoArtography contest, which is run through the A.J. Drexel Nanomaterials Institute and is open to students and researchers from across the country and around the world.

"Such competitions exist in the scientific community that promote presenting science as art," said Anasori. "But usually the art is only shared in scientific fields, and the judges are scientists. The NanoArtography competition is shared online and can be accessed by anyone. And I created a panel of judges of both scientists and artists, so there's real art and scientific expertise being used to choose the winners. Plus, the public can choose a 'people's choice' winner by voting on their favorite picture."

Every year of the competition has garnered over 100 submissions, and researchers from over 20 different countries, from Mexico to India to Germany to Australia, submitted images of their research last year to illustrate what they are studying — and showcase its beauty. The students and researchers were judged on submissions that were visually intriguing and stunning, and also told a story about the research being conducted.



Left: Min Pack, Drexel University
Right: Babak Anasori, Drexel University

"This is really exciting for me because when I started the NanoArtography competition, I was excited about having this international competition that everyone can participate in," said Anasori. "I didn't envision displaying the pieces in an art gallery only within three years of starting the competition. I'm thankful to The Drexel Collection for putting this show together."

Anasori and Lynn Clouser, director of The Drexel Collection, worked together to choose images that would both broaden the public's understanding of the world at the atomic level and connect various art movements and features in the scientific images. NanoArtography shows how everything from pop art to Impressionism to iconography can be linked to the atomic images. At a time when art is being created by algorithms and artificial intelligence (as described in a recent *New York Times* article), NanoArtography calls into question what art truly is and how it can be created and defined.

"The Drexel Collection was founded in 1891 with the intention of being a teaching tool for the then-Drexel Institute of Art, Science and Industry to show students examples of good design in craftsmanship," said Clouser. "Today, the Collection regularly offers so many different opportunities to partner with departments across campus and I love that with this show, instead of students learning about good design from the Collection, the Collection — and hopefully the rest of the Drexel community — is learning about new materials from the College of Engineering."

To find this and similar stories that showcase the exciting collaborative work at Drexel, visit drexel.edu/grad/stories.

A GATEWAY TO SUCCESS

From the moment you officially become a Dragon, you'll find the Graduate College to be one of your greatest resources. As a central administrative unit under the Office of the Provost, the Graduate College oversees all graduate programs across the University and works in close collaboration with our deans, associate deans, program directors, professional staff, and faculty advisors to ensure the success of our students.

The Graduate College also partners with University offices, the GSA, and our student organizations to develop academic, cultural, and social programming to ensure the Drexel graduate experience is a fulfilling one and that all of your needs are met. From student advocacy to applying for a fellowship, training as a Teaching Assistant to exploring an accelerated degree program, the Graduate College should be your first stop when looking to find direction to informational resources able to address your individual circumstances.

A FULLY PREPARED DIRECTION

A graduate education is truly an investment in your future, and it is important to take advantage of all information available to you and to thoughtfully manage your financial steps. Drexel Central, your one stop for the Offices of the Bursar, Financial Aid, and Registrar, assists you in making informed decisions regarding all matters of financing relating to your academic plan. If you have any questions regarding tuition rates, potential financial aid opportunities, or University billing procedures, Drexel Central will ensure you have all of the necessary resources to develop a corresponding plan to meet your individual needs and circumstances.



The Story of No. 9349298

It can take an inventor years to receive an official U.S. patent, usually represented by a seven-digit number. But the full story behind most patents is much longer, and the process can be daunting. Thomas R. Kline School of Law Professor Karl Okamoto learned this the hard way when, on a lark, he filed a patent application for an online learning system inspired by Drexel’s “learn by doing” co-op model of education. Through modern technology, Okamoto’s system is changing how students and employees learn, and this is the story of how it came to be.

Professor Okamoto didn’t want to be a talking head. Not when it came to his business law course, a fundamental introductory course for law students. The traditional lecture-style class wasn’t working — Okamoto’s students were proving time and time again that they were not retaining the material, like how to draft contracts or how to explain liability to clients. If only they could learn by doing, Okamoto thought.

That spark of an idea happened in 2010. Now, Okamoto’s insight is the foundation of a young edtech company with a patented online learning system and a growing client roster that includes Comcast Corp., Wal-Mart Stores Inc., Domino’s Pizza, and others.

A team of determined alumni helped make it happen.

The interactive system, called Practice, allows students or employees to record short videos of themselves performing an assigned skill live. Their performance is then evaluated by peers and coaches to help them improve.

One of the earliest members of Okamoto’s team to buy in to the concept was Emily Foote ’10, a

IN APPRECIATION OF THOSE WHO SERVED

Annually recognized as a Military Friendly School, the University offers a number of specialized services to specifically support our thriving veteran student population. As a proud Yellow Ribbon participant, we are able to offer all of the benefits of the Post-9/11 GI Bill, including full tuition and University fees for an unlimited number of eligible veterans pursuing full- and part-time graduate, doctoral, and professional programs, either on campus or online. We also host a number of community-building activities and events, including a Student-veteran Welcome Week Orientation and BBQ Reception, the Memorial Day Primer, and Veterans Appreciation Month celebrations — all open to our student-veterans and their families.

AN ALLIANCE OF EXPERTISE

At Drexel, you’ll find that there are support services available to help you through all situations and challenges you may encounter. In addition to the resources already mentioned, you’ll also be paired with a trained academic advisor specifically chosen by your college for your program, who will be there to help you develop and maintain a trajectory of success. Other bodies you may find useful include the Fellowship Office, the Center for Teaching and Learning, the Office of Global Engagement and Education Abroad, and the Office of Postdoctoral Affairs and Professional Development.

former law student of Okamoto’s who experienced this model of interactive learning firsthand in Okamoto’s class. “Instead of simply listening to a lecture, I actually experienced the skills,” she says. “As a result, my engagement level was high, my competency grew, and my confidence grew. Overall, it was an incredibly powerful learning experience.”

“When you’re being recorded, you have to put so much more into it than you would if you were just a passive recipient in a lecture hall,” says Okamoto. “We were getting a lot more effort out of students than if we were just calling on them in class.”

Okamoto received more than \$1 million in National Science Foundation funding to develop the system. To commercialize it, he and Foote launched the startup Practice XYZ, which has offices in Philadelphia and San Francisco.

They began drafting a patent application in 2013 but hit a roadblock in 2014 when a Supreme Court ruling suddenly made it much harder to secure patents related to online learning.

Their applications were rejected twice, says Steve Rocci (BS electrical engineering ’77), a senior partner at Philadelphia-based BakerHostetler and Kline School advisory board member, who led a team of Drexel Co-op students in working on the patent application. The team included alumna Laura Gordon ’14, who drafted the original application.

Still, the team pressed on.

In 2016, Viantinna Campana Bordas ’16 stepped in and made compelling arguments that prompted the U.S. Patent and Trademark Office to reconsider and grant the patent, Rocci

explains — proof that Practice was on to something special.

“The standards by which you had to convince the Patent Office of the novelty and innovativeness of your code was very high,” Okamoto says.

“It’s not just software where you’re uploading videos and getting feedback,” says Foote. “There’s a teaching methodology behind it. The patent is a validation that the methodology is powerful. It confirms what the company has always been about: helping our clients deliver powerful learning experiences.”

To find this and similar stories that showcase the exciting collaborative work at Drexel, visit drexel.edu/grad/stories.

THE BUILDING OF A PROFESSIONAL PATH

The Steinbright Career Development Center, one of the largest and most respected career services teams in the country, provides tremendous value to our graduate student population as they prepare to advance as professionals.

Through career counseling, job skill workshops, one-on-one advising sessions, and more, this dedicated team of career services experts provides students with the tools, knowledge, and guidance necessary to construct successful professional trajectories in the modern workplace.

Steinbright also connects our Dragons with Drexel’s constantly growing network of employers, agencies, and industry leaders from across the globe, often serving as the initial point of contact for students interested in cooperative education or post-graduate job placement opportunities. The center also hosts annual career fairs that are among the largest of their kind in the region, along with online job search boards for graduating students and recent alums.

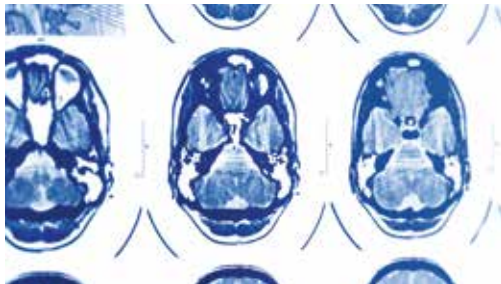
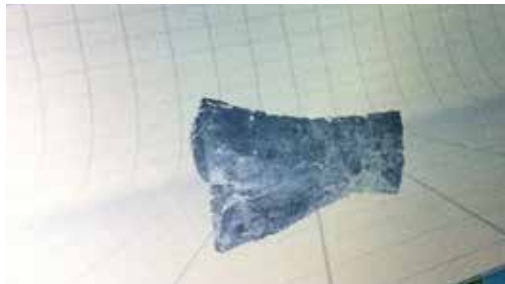
Drexel Introduces Repository of
Virtual Reality Content to Enhance Online Education

VIRTUAL

Consider All That You Could Achieve

Drexel is composed of 15 colleges and schools that serve our graduate community, each focusing on a particular concentration or area of study. These bodies operate in conjunction and partnership with one another to facilitate the sharing of knowledge and ideas that makes our model so effective. This intensive level of collaboration also works to ensure our offerings remain responsive to the emerging trends and expectations of the modern world — and the workspaces within it.

The University is composed of three campuses, located in the University City, Center City, and Queen Lane areas of Philadelphia, Pennsylvania, and holds partnerships with respected learning institutions across the region, including the Academy of Natural Sciences of Drexel University. In addition, we utilize the latest technology and virtual tools to serve our ever-expanding online learning population, providing a meaningful and robust graduate experience to learners across the country and around the globe.



REALITY

New digital enhancements will take online education to new and far more expansive heights at Drexel University. VRtifacts+, a first of its kind repository created by Drexel University Online, will empower faculty and instructional designers to seamlessly incorporate 250,000 augmented, virtual, and mixed reality learning objects across a wealth of disciplines into the University's online coursework. Students will be able to access and explore

the virtual objects on any device, from smartphones and laptops to VR glasses and trackpads.

The repository will be available to faculty through Drexel's Blackboard interface and includes 3-D objects and 360-degree panoramas in addition to virtual and mixed reality images. Instructors can search for terms like "heart diagram" and download the images they want to use in their courses.

"Given the repository's size and scope, we will have the capacity to develop and pilot ever more powerful approaches for delivering Drexel's state-of-the-art curriculum within its Blackboard Learn platform," said Stephanie Sutcliffe, director of Learning Technology.

Drexel knows how difficult it is for busy faculty to keep up with constantly evolving digital technologies. The University has spent over two years researching "pockets of innovation" in technology-enhanced education worldwide, which has produced more than 100 case studies. In conducting this research, University leaders began brainstorming ideas around further capitalizing on its findings and came up with the VRtifacts+ repository.

Students are becoming quite adept at using a wide range of digital tools to connect, collaborate, and construct knowledge on their own – which is why they have come to expect the same flexibility and sophistication in their academic settings. Knowing how

other institutions are effectively using "reality" technologies, the team began to see where Drexel might expand upon that success by creating an easily searchable repository of robust AVR learning objects.

To accomplish this goal, Drexel joined forces with 3Dream Studios and mapped out a multi-year development project. In addition to the repository, this project will eventually leverage such other technologies as artificial intelligence, machine learning, and blockchain to fully enhance the virtual learning experience at Drexel. This innovative initiative will add tremendous value to the academic investment for online students of all ages, abilities, and learning preferences, an aspiration shared by faculty members as well.

"Drexel has long been a leader in innovation and technology in the online arena working to deliver high-quality educational content," said Karyn Holt, PhD, former director of Online Quality at the College of Nursing and Health Professions. "VRtifacts+ will push our virtual walls even further, offering expanded experiential opportunities for learning. Humans learn through experiences. From that perspective, it is truly a strategic investment in our University's future, as online and blended education continues to build."

To find this and similar stories that showcase the exciting collaborative work at Drexel, visit drexel.edu/grad/stories.



College of Arts and Sciences

School of Biomedical Engineering, Science and Health Systems

Graduate School of Biomedical Sciences and Professional Studies

LeBow College of Business

College of Computing & Informatics

School of Economics

School of Education

Colleges and Schools

College of Engineering

Charles D. Close School of Entrepreneurship

Thomas R. Kline School of Law

Westphal College of Media Arts & Design

College of Medicine

College of Nursing and Health Professions

Goodwin College of Professional Studies

Dornsife School of Public Health



Relish This!

Will People Eat Relish Made from ‘Waste’ Ingredients?

Drexel Study Finds They May Even Prefer It.

A new Drexel University study found strong potential for consumer acceptance of a new category of foods created from discarded ingredients.

The joint research, led by three Drexel professors, Jonathan Deutsch, PhD, professor of culinary arts and food science, Hasan Ayaz, PhD, associate research professor in the School of Biomedical Engineering, and Rajneesh Suri, PhD, professor in the LeBow College of Business — along with three graduate students, Siddharth Bhatt, Jeonggyu Lee, and Ben Fulton — sought to find out if foods made from surplus ingredients — termed value-added surplus products (VASP) — that would have been otherwise wasted can be a promising solution to food insecurity if appropriately marketed to consumers.

“There is an economic, environmental, and cultural argument for keeping food, when possible, as food and not trash,” said Deutsch, who has created “upcycled” products with the Drexel Food Lab in the past. “Converting surplus foods into value-added products will feed people, create opportunities for employment and entrepreneurship, and lower the environmental impact of wasted resources.”

Rescued Relish

Rescued Relish is an anything-goes condiment made from excess produce that Philabundance, a Philadelphia anti-hunger organization, can’t move. The relish is modeled on a Pennsylvania Dutch chowchow recipe — a tangy mix of sweet, spicy, and sour flavors.

American households are estimated to collectively throw away 80 billion pounds of food each year. Many ingredients are also discarded during the manufacturing process and perfectly edible produce deemed “ugly” doesn’t make it to grocery displays. This all seems to amount to a careless waste when more than 42 million Americans experience food insecurity.

But the big question has been this: Will consumers accept products made from ingredients that were destined for the garbage? Would a person actually eat — and pay for — a granola bar made from spent brewing grains or a relish made from vegetables unfit for the supermarket?

While the macroeconomic benefits of value-added surplus products seem clear, the trash-adjacent quality could make people reluctant to consume such products. Drexel researchers decided to decipher the consumers’ decision-making process to help come up with appropriate communication for these products.

The researchers conducted a series of tests as a first attempt to understand a consumer’s decision-making process with respect to this new food category, value-added surplus foods. They examined three product cues for value-added surplus products: product description, label, and benefit (to self or others).

In the first study, participants were presented with three food categories:

- **Conventional**
- **Organic**
- **Value-added surplus food**

Study participants were presented four different foods using these descriptions. Participants felt that value-added surplus products were more helpful to the environment than conventional foods, but less helpful when compared to organic foods. The results demonstrated that participants clearly identified value-added foods as a unique category with unique perception, separate from organic and conventional categories.

Next, researchers tested nine product labels to brand value-added surplus products: Upcycled, recycled, upscaled, rescaled, reprocessed, reclaimed, up-processed, resorted, and rescued. “Upcycled” was observed the most preferred label, followed by reprocessed.

For the final test, the researchers looked into whether a product’s benefit for self or others factored into their feelings. It turned out that participants affirmed that consuming value-added products will generate greater benefits to others than themselves.

The positive findings of this study are of value to sustainability advocates, food marketers, and scholars. By exploring consumer acceptance of and potentially a preference for value-added surplus products, this research marks some of the first attempts to empirically examine a consumer’s evaluation process for this novel food category. Most importantly, researchers have begun to evaluate how to efficiently present value-added surplus products as a novel category of food to consumers so that it may contribute some relief to the global food crisis.

“Value-added surplus foods may be perceived closer to organic foods as a category, encouraging the possibility of promoting such foods as a new category offering benefits to society.”

Not only that, but selling these foods could also prove lucrative.

“Depending upon how you communicate such products, they might also be able to fetch a price premium, like those afforded to organic foods,” Suri explained.

Those interested can read the study, “From food waste to value-added surplus products (VASP): Consumer acceptance of a novel food product category,” published in the *Journal of Consumer Behavior*.

To find this and similar stories that showcase the exciting collaborative work at Drexel, visit drexel.edu/grad/stories.



A UNIVERSITY BUILT TO INSPIRE

Drexel provides access to state-of-the-art laboratories and facilities, enabling students to take advantage of the latest technologies, resources, and equipment while exploring emerging concepts and practices.

As each exist within individual specializations and expertise, they provide an almost limitless scope of capabilities. These range from the technology focused, including the Center for Visual Decision Informatics and the RePlay Gaming Lab; and the scientific, including the Joseph R. Lynch Observatory and the Bossone Research Enterprise Center; to the business focused, including the Institute for Strategic Leadership and the Center for Business Analytics; and the medical, including the AgeWell Collaboratory and the Center for Interprofessional Clinical Simulation and Practice.

By placing students within these cutting-edge environments, we are able to provide unparalleled professional experiences and on-the-job training while illustrating the results that can be achieved through analytical thinking and collaborative learning.

Become a Part of Something Special

Our Dragons are quick to realize that the University's focus on developing a strong community extends far beyond our classrooms, research collaborations, and support services. This atmosphere of unity and partnership is a major component of who we are and the basis for the camaraderie we share.

With a wide variety of activities and clubs, graduate-specific housing options, student organizations to meet any interest, and hundreds of programs and events for graduate students each year, there are a multitude of ways to connect with fellow students, faculty, and professional staff across academic disciplines and organizations. From research symposiums, academic panels, guest lecturers, and workshops to the Graduate Student Lounge in Main Building and cheering on our Dragons as they compete across 18 Division I men's and women's sports teams, you'll have the chance to build a personal network of individuals that share your passions.



A Partnership with Purpose

WORKING TOGETHER TO PREPARE THE LEADERS OF TOMORROW

The development of special education leaders able to assess and address the needs of students within complex urban environments is a challenge faced by schools and districts across the country. Recognizing this, Drexel University and the School District of Philadelphia (SDP) continue to partner in exploring new and effective methods to increase the number of leaders equipped to help guide special education students within the district to positive and successful outcomes.

Leveraging their respective resources and expertise, Drexel’s School of Education and the SDP created the Philadelphia Special Education Leaders of Tomorrow (PSELT) project, a hybrid approach to professional development that builds on the success of Drexel’s Urban Special Education Leaders of Tomorrow (USELT) program — a doctoral program at Drexel for special education leaders from Philadelphia and Washington, D.C. Officially launched in January of 2018, this 18-month project provided a cohort of 25 aspiring SDP educators with the

training and professional development needed to grow as specialists equipped to meet the needs of students with disabilities within the district.

Selected from an initial pool of more than 80 applicants, this cohort was composed of SDP classroom teachers, speech and language therapists, hearing therapists, school psychologists, and special education liaisons that have direct interaction with student populations requiring specialized services. Led by faculty and instructors at Drexel, project

participants undertook an intensive curriculum consisting of online courses, internships, and monthly evening sessions, along with over 750 hours of practical application work. Subject specializations included leadership and program development, assessment and instructional leadership, special education law and compliance, and collaboration with stakeholders. The end result was the successful development of a cohort of SDP educators versed in the best practices of special education, ready to lead the district to future success.

A CITY THAT EMBRACES IMAGINATION

Philadelphia is a town we hold dear to our hearts — a place that lifts and supports us in all that we do. This city is a talent magnet for leaders of industry, science, medicine, education, and the arts. It serves as home to Fortune 500 companies, trailblazing technology laboratories, influential teaching hospitals, trend-setting culinary establishments, and so much more.

Since its birth, Philadelphia has embraced innovation and new thinking — today, it provides unlimited opportunities to grow as a professional, a researcher, or as an individual. We view this great city as the University’s extended campus, allowing our students to develop enhanced skills through cooperative education experiences and other unique opportunities to learn directly from the visionaries shaping the landscape of tomorrow.

With our close proximity to 30th Street Station, we sit right next door to one of the largest transportation hubs in the Northeast, allowing us to connect with almost all points of interest across the nation. No matter what your field may be, regardless of the type of knowledge you seek, this is a place that will allow you to follow wherever your path may lead.

AN ENVIRONMENT THAT WELCOMES ALL

Philadelphia is the nation’s sixth largest city, drawing talent and learners from around the globe. As an influential pillar of the nation’s first and only World Heritage City, we strongly support and welcome all visitors, inviting them to benefit from and contribute new ideas to our collaborative conversation of discovery.

The University itself is home to over 5,000 international students, faculty, and professional staff, each offering viewpoints and perspectives that enrich our methodologies and approaches to learning. Their voices allow us to widen our perspective and challenge us to consider our role within the larger global community. But more importantly, Drexel is a place where people from all over the world come to develop as leaders, connect with one another, and grow as individuals.



Although the project’s long-term intended outcomes are expected to be realized over the next one to three years, it has already yielded dramatic results: 24 of the 25 participants successfully completed the program and have earned Special Education Leadership certificates, along with Collaborative Special Education Law and Process certificates. Even more so, six participants have already been promoted to leadership roles within the district, bolstered by knowledge of best practices and applications gained through the PSELT curriculum.

“The School of Education at Drexel is a natural fit for this endeavor,” said Janet Sloan, EdD, Drexel associate clinical professor and Special Education and Applied Behavior Analysis program director. “The USELT program demonstrates that Drexel University has the expertise and the infrastructure to prepare special education leaders for complex urban environments.”

Through impactful programs such as PSELT and USELT, the partnership between Drexel and the Philadelphia

School District continues to produce dramatic results for district educators and their students. Together, they are building the instructional knowledge and practicum needed to ensure that the needs of all Philadelphia students are met and that each child is positioned to succeed.

To find this and similar stories that showcase the exciting collaborative work at Drexel, visit drexel.edu/grad/stories.

Embark on a Journey as Unique as You Are

You are ready to leverage your knowledge and experience, motivated and inspired to achieve ambitious goals. Drexel’s graduate programs will prepare you to further develop your skill set, maximize your opportunities, and push beyond expectations. This is a collaborative community that is shaping the future.

The next step is to check out our campus or visit us online and see firsthand everything that Drexel has to offer. We have a variety of visit opportunities designed to fit within your busy schedule.

OPEN HOUSES

At our on-campus and virtual open houses, you’ll discover the benefits of a graduate degree from Drexel; learn more about our programs and application requirements; meet with admissions, college, and school representatives; and more.

Learn about our Graduate Open Houses and other visit opportunities at drexel.edu/grad/events.

Interested in taking a closer look at Drexel, but can’t make it to one of our events? Don’t worry — we have numerous online resources to provide a glimpse of what you’ll find here.

STORIES, TOURS, AND MORE

On our Graduate Stories page, you’ll find engaging and informative pieces that give a sense of what it’s like to be a Drexel Dragon, from research and collaboration opportunities to the unique benefits afforded by our academic model. You can also check out a virtual tour that will allow you to explore campus, some of our labs and facilities, and even a few of our surrounding neighborhoods.

Learn more about the Drexel graduate experience at drexel.edu/grad/stories.

The next generation of leadership begins here.

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**AMBITION
CAN'T
WAIT**