We are what we repeatedly do, the Greek philosopher Aristotle said, so excellence is not an act, but a habit.

Over the course of the last 150 years, the University of Illinois’ rich legacy of achievement has made it synonymous with excellence and has carved its place as a global leader in education and discovery. As we begin our year-long sesquicentennial recognition, I hope you’ll join us in celebrating these accomplishments throughout our unique and treasured history.

I’ve recognized this University’s excellence since I was a college student, years ago and an ocean away in London. Since taking office last year, I’ve seen it first-hand—in our classrooms and research labs and in the success of our students, faculty, and alumni.

This report provides a look at just a few of the many world-class initiatives at our campuses in Urbana-Champaign, Chicago, and Springfield, and at UI Health and regional sites around the state. These stories reflect the University’s commitment to students, our state, and nation and its key role in driving progress and prosperity.

We hope you enjoy learning about the achievements chronicled in these pages and thank you for your interest in the University of Illinois.

Tim Killeen
President
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hat was an anthem of celebration and anticipation written by the University of Illinois’ first president and sung at the school’s opening exercises in March 1868, after having been formally founded the year before. At the time, the title for the songwriting administrator, John Milton Gregory, was “regent,” and the school based in Champaign County was called the Illinois Industrial University.

The establishment of this budding institution, and 36 others like it across the nation, was initially funded through the sale of land that had been granted by the federal government to states and territories for specific purpose—in this case, to provide practical education in agriculture and the mechanical arts to their respective “industrial classes.”

From the very start, however, the New York-educated Gregory applied a broader interpretation of the Land-Grant College Act to include the classics and liberal arts—much to the chagrin of the industrial education movement hard-liners of the day.

The University of Illinois (as it was renamed in 1885) has only blossomed in size, scope, discovery, and global impact ever since.

In 1896, the University first expanded outside the boundaries of Champaign County when it acquired the Chicago College of Pharmacy (established in 1859), which became the University of Illinois School of Pharmacy, perpetuating the formalized education of what were then called druggists. And in 1913, the College of Physicians and Surgeons of Chicago (established in 1882) became the University of Illinois College of Medicine to address rampant disease and
pathological transmission. Almost 60 years later, the state Legislature voted in 1970 to expand the college to additional sites in Peoria, Rockford, and Urbana to increase the number of trained medical professionals and to increase access to care throughout the state.

During this time, the Urbana-Champaign campus continued to build and expand its core academic and research programs. In 1914 the Smith-Lever Act established a national Cooperative Extension Service for land-grant universities to educate rural Americans about advances in agriculture. Today, the U of I Extension delivers educational programs across the state covering a wide range of topics.

Short-term, post-World War II campuses at Chicago’s Navy Pier and in Galesburg sprang up in response to the explosion of educational access afforded to returning veterans, courtesy of the G.I. Bill. In addition, the Galesburg division was the birthplace of the University’s groundbreaking work in disability resources and educational services.

Thanks to the political will of legendary Chicago Mayor Richard J. Daley, the city celebrated the opening of its own Chicago Circle campus of the University of Illinois in 1965—a feat which Daley considered his greatest accomplishment as mayor. The Circle years ended in 1982 when it and the west medical campus were consolidated as the University of Illinois at Chicago.

In 1995, the 25-year-old Sangamon State University—an innovative, public affairs-oriented school created to be “responsive to the special needs and opportunities of the area,” according to one of its early planners—became the University of Illinois at Springfield and is a highly touted model of liberal arts and online education.

Despite the intertwining pathways that led to the present-day University of Illinois, it is ultimately—and always—the people who breathe life into the institution. The authenticity of the U of I mission is evident in the access it provides to a diverse community, the opportunity it affords to actualize dreams, the excitement of collaborative intellectual and technological discovery, and the pride in making a positive impact on the world.

—Vanessa Faurie
By developing human capital, partnering strategically for research development and talent retention, and assisting entrepreneurs to unleash the full potential of their innovations, the University of Illinois makes a significant impact on the state’s economy.

The University of Illinois contributes $13.9 billion in annual income to the state’s economy through spending by its campuses, employees, and students and the increased earning power of its graduates, according to a University-wide economic impact study released in the fall of 2015.

University operations, student spending, and alumni spending pump $4.60 into the economy for every taxpayer dollar invested and also account for about two percent of the gross state product, according to the study by Idaho-based Economic Modeling Specialists Intl.

“Our campuses, our students, and our alumni are all economic engines for our state,” President Timothy Killeen said. “They supply the highly skilled workforce that is critical to success in the 21st century and the economic jolt that creates new jobs, new businesses, and prosperity.”

The study found that the U of I supports nearly 177,000 jobs in Illinois that would not exist without the University—jobs created by the spending of its campuses, students, and alumni.

The University’s most significant impact—$9.5 billion in annual income—stems from the talents that students develop through their education, which translate into higher career earnings and increased productivity for Illinois businesses. The study found, for example, that the average bachelor’s degree graduate from the U of I will earn $28,800 more annually than a high school graduate, netting about $1.2 million more in career earnings.

For more on U of I’s state economic impact, visit go.uillinois.edu/economic_impact.
Appointed by the governor, members of the University of Illinois Board of Trustees are responsible to the people of Illinois for the proper distribution of funds appropriated by the General Assembly and for the proper administration and governance of the University. The trustees are the final authority of the University.

Trustees serve on a voluntary, non-remunerated basis. They oversee all aspects of the University. In addition to focusing on appropriate governance, trustees advocate for programs and initiatives that support diversity and sustainability on all three campuses.

Trustees meet every two months and hold positions on various committees including the executive committee; academic and student affairs; audit, finance, and facilities; governance, personnel, and ethics; and hospital. The board’s three-member executive committee meets to transact urgent business. Trustees also serve on several external boards, including those of the U of I Alumni Association and U of I Foundation; the Illinois Research Park; and IllinoisVENTURES, LLC.

Three student trustees, one from each campus, are elected by the student body to one year terms; one, designated by the Governor, has a binding vote and two have advisory votes.
EXECUTIVE OFFICERS

Timothy L. Killeen, PhD, President
Michael D. Amiridis, PhD, Chancellor/Vice President, U of I at Chicago
Susan J. Koch, PhD, Chancellor/Vice President, U of I at Springfield
Barbara J. Wilson, PhD, Interim Chancellor/Vice President, U of I at Urbana-Champaign
Thomas R. Bearrows, JD, University Counsel
Thomas P. Hardy, MS, Executive Director for University Relations
Susan M. Kies, EdD, Secretary of the University
Walter K. Knorr, BA, Chief Financial Officer and Vice President
Christophe Pierre, PhD, Vice President for Academic Affairs
Lawrence B. Schook, PhD, Vice President for Research
Lindsay Anderson, JD, Executive Director for Governmental Relations

OFFICERS OF UNIVERSITY-RELATED ORGANIZATIONS

James H. Moore, Jr., MS, President/CEO, University of Illinois Foundation
Loren R. Taylor, MA, President, University of Illinois Alumni Association

UNIVERSITY ADMINISTRATION

The president and senior staff work together to develop strategies and solutions to address educational and administrative challenges across University of Illinois campuses.

University administration (UA) offices and units provide centralized administrative services that are vital to supporting the primary missions of the institution: instruction, research, public service, and economic development.

UA staff are responsible for communicating the variety and excellence of research and other academic endeavors occurring at the University of Illinois to government, corporate, and civic leaders as well as to alumni and other stakeholders.

University services and functions

Academic affairs
Audits
Business and financial services
Ethics and compliance administration
Facilities planning
Government relations
Human resources
Information technology and systems
Planning and budgeting
Research
Technology and economic development
University counsel
University relations
Established in 1867, the University of Illinois at Urbana-Champaign is a world leader in research, teaching, and public engagement. Illinois has tremendous breadth and depth in academics, with more than 150 undergraduate and more than 100 graduate and professional programs. A preeminent faculty propels many academic programs to be ranked among the best in the world. This emphasis on campus-wide academic excellence has built Illinois’ reputation as one of the nation’s premier public universities.

FAST FACTS

Total enrollment (Fall 2015)
45,842

Degrees awarded (2014–2015)
12,456

Operating budget (2014–2015)
$2.04 billion
CHICAGO

c.edu

The University of Illinois at Chicago is a major research university located in the heart of one of the world’s great cities. With more than 29,000 students, UIC is Chicago’s largest university and one of the nation’s most diverse campuses. Its 15 colleges include the nation’s largest college of medicine and six other health sciences colleges. Deeply committed to its urban mission, UIC is a leader in teaching, research, clinical practice, and outreach aimed at eliminating disparities in health, education, and economic opportunity.

FAST FACTS

Total enrollment (Fall 2015)
29,048

Degrees awarded (2014–2015)
6,950

Operating budget (2014–2015)
$2.1 billion

SPRINGFIELD

uis.edu

The University of Illinois at Springfield, located in the state capital, emphasizes a strong liberal arts core, engagement in public affairs, and community outreach. The campus has more than 40 degree-granting programs and is a recognized leader in online education. UIS pairs academic excellence with small class size and substantial student-faculty interaction. With high-quality programs and internships in public affairs, journalism, and government, UIS offers a unique educational experience.

FAST FACTS

Total enrollment (Fall 2015)
5,402

Degrees awarded (2014–2015)
1,509

Operating budget (2014–2015)
$88.8 million
**REGIONAL CAMPUSES**

**ROCKFORD**
Rockford is a regional home to several academic programs from the University of Illinois at Chicago (UIC) that work in partnership with local hospitals and health care organizations to provide medical training and research opportunities for students and health services for area residents. One unique program based in Rockford is the Rural Medical Education (RMED) program.

- UIC College of Medicine
- UIC College of Nursing
- UIC College of Pharmacy
- UIC Crawford Library of the Health Sciences

**PEORIA**
Peoria is home to UIC health science programs and to UIS’ downtown Peoria Center facility. Both bring world-class academic opportunities to the state’s third largest city. Peoria boasts downstate Illinois’ largest medical campus.

- UIC College of Medicine
- UIC College of Nursing
- UIC Library of the Health Sciences
- UIS Peoria Center

**QUAD CITIES**
The Quad Cities area includes the Illinois cities of Moline, East Moline, and Rock Island, and Iowa’s Davenport and Bettendorf. In 1980, the UIC College of Nursing established a regional program the Quad Cities, attracting a majority of its students from 17 surrounding counties.

- UIC College of Nursing
Alumni are a permanent part of the University of Illinois family, and their support of the University of Illinois and the University of Illinois Alumni Association programs, services, and events fosters participation and pride in the institution.

The mission of the UI Alumni Association is to continuously strive to enhance all three campuses by connecting, inspiring, and celebrating its highly diverse, global alumni base in an innovative, disciplined, and measurable manner. Currently the University has more than 690,000 living alumni.

Illinois Connection is the University of Illinois Alumni Association’s legislative advocacy network. Its mission is to gain greater federal and state support for the University of Illinois’ three campuses and their interests.

By increasing awareness and understanding of the University’s positive impact on the state, nation, and world, Illinois Connection advocates help to ensure the U of I’s legacy and longevity. Illinois Connection hopes to reach a goal of 100,000 advocates by 2018.
The University of Illinois is known for academic excellence, with award-winning teachers and scores of undergraduate and graduate programs that are consistently ranked among the best in the world.

If you ask students why they should pursue an internship, many respond that the experience will help them develop real-world skills and will look good on a resume when they are seeking employment after graduation. But for students who are unsure about what career path to follow, an internship can also be a low-risk, short-term experiment to “try on” a career and see if it fits with their interests and strengths.

UIS chemistry student Ashley Bowers always thought she’d become a doctor, but her internship with the U.S. Department of Energy at the Argonne National Laboratory in 2014 fueled her interest in research and steered her towards a career as a scientist. She has since joined the Medical Microbiology Immunology and Cell Biology Department at the SIU School.
of Medicine in Springfield as a research assistant, and spent a summer in the New Chemical Entities Analytical Research and Development Department at AbbVie, a pharmaceutical company. Bowers was chosen as the recipient of the UIS chemistry department’s 2015 Outstanding Undergraduate Research Award for her Argonne work with hybrid polyoxometalate lubricant additives in engine oils.

Marcie Zawislak, English-media student in UIC’s College of Liberal Arts and Sciences, identified her passion for writing early on in her coursework, then enrolled in LAS internship courses to help translate that interest into a career. Through her experience as a public relations intern at Noreen Heron & Associates, she discovered the professional path for her future: “I never knew that PR would encompass all of my interests,” says Zawislak. She learned media relations, marketing, and advertising tactics through her experience. “An internship is a test run to figure out what you are good at so you can run with it.”

“Every single industry in the world needs the things that our students can do,” says Kirstin Wilcox, lecturer and internship coordinator for the Department of English on the Urbana-Champaign campus, “but then it’s on our students to sort of say ‘Well, that’s the thing that’s really cool to me.’”

As an Urbana campus English major, Mylissa Zelechowski says people are quick to judge the value of her future degree. But when she tells them how she’s already used her skills in an internship writing for a video gaming company, “it usually changes their minds,” she says.

Wilcox’s advice to students who are unsure of their destination is to start early and take the time for exploration—through internships, jobs, organizations and interests—to learn more about both their particular strengths and “what the world out there needs.”

Law and the love of animals

In order to get a taste of more than one aspect of law and help make her decision about going to law school, Michelle Aggacid, a criminology, law and justice student at UIC, completed two internships. Through these experiences, at the no-kill animal shelter PAWS Chicago and the Public Defender’s Office, she gained insight on how a legal career could fuel her passion for helping people and animals alike.

Her internships helped Aggacid decide that she does want to go to law school. “I am still interested in animal welfare, but I would also like to work with people that don’t have the help they need.”

Aggacid recognized that enthusiasm for what you do is key to being happy in the career that lies ahead, and an internship can help. To future U of I students, she says: “Get hands-on experience in a field you like to make sure that it is something that you are passionate about.”
An “IDEALL” way to study learning

A new research laboratory that lets scholars study learner interactions with digital technologies in real time while collecting massive amounts of varied data has opened in the College of Education building on the Urbana campus.

State-of-the-art technologies in the Illinois Digital Ecologies and Learning Laboratory (IDEALL) include 360-degree audio and video recording systems that are hard-wired to temporary local data storage devices. Large, adjustable flat-screen TVs with Kinect devices allow researchers to study gesture and movement, and multi-touch tabletop screens facilitate collaborative learning. Ceiling-mounted portable projectors make it possible to display images on the walls and floor to create wraparound or immersive virtual environments.

Fouad Abd El Khalick, associate dean for research in the college, calls the entire IDEALL space a data-collection device. “When learners are interacting with the technology, we can capture all their movements and discussions,” he says. That information is then converted to data for analysis.

Faculty members in disciplines across campus can use IDEALL to pursue research agendas that demonstrate how technology can support learning in classrooms, museums, and other environments. Current projects hosted by the lab are funded by NSF grants that support research by curriculum and instruction professors Emma Mercier, Robb Lindgren, and their collaborators.

Big finance data, bright futures

The world of commodities and futures is rapidly evolving and relies on sophisticated high-speed software and instant access to real-time information gleaned from enormous volumes of data. Students today learn to negotiate this landscape in labs such as the CME Foundation Market Training Lab in UIC’s International Center for Futures and Derivatives. Funding for the lab was provided by the Chicago Mercantile Exchange (CME) Group Foundation.

The lab harnesses software and proprietary real-world data from Bloomberg Terminal, Tick Data, and others sources to simulate a variety of trading scenarios. Software programs allow students to simulate trading in futures markets and monitor profits and losses.

“The center provides us with a whole ecosystem—servers, data, software—the same tools and analysis packages you’d find at a trading firm,” Dale Rosenthal, assistant professor of finance, says.

Students can apply what they’re learning in an environment that simulates the trading room at a big investment firm. “Financial markets need professionals who not only understand theory, but are capable of performing analysis,” says John Miller, clinical assistant professor of finance.

But the lab isn’t just for students planning careers in finance. Futures and derivatives, Miller notes, play significant roles in fields ranging from agriculture to pharmaceuticals to energy.

The College of Business in Urbana has a similar facility, the Margolis Market Information Lab, which houses state-of-the-art electronic sources of financial and business data and software products used globally by industry firms.

UIC Finance professors (l-r) John Miller, Gilbert Bassett, Dale Rosenthal
Serving those who serve, through new veterans center

The U of I has always been a leader in providing opportunities for students with disabilities and in supporting veterans. A new center on the Urbana campus continues to build on that history.

Thanks to a $6 million donation by U of I alumnus Ron Chez, $4 million in state funding, and private donations, the Chez Family Foundation Center for Wounded Veterans in Higher Education assisted its first students this past fall.

Individualized on-site services include transition and academic help, counseling and family services, career and employment assistance, health and life skills services, benefits and outreach services, and peer mentoring. The center also offers 12 residential living units.

Nicholas Osborne, the center’s interim director, says the center hopes to be the nexus point for recovering veterans, an oasis where they can recover, recalibrate, and reintegrate into civilian society.

In addition to disabilities, student veterans can be faced with challenges such as a time-gap in their classroom experience and age differences with their peers.

“The first step is to learn about the campus and community and to rediscover and redevelop skills they have,” Osborne says. “Just the transition from the military to civilian life is challenging. It’s really two different worlds.”

Building better child advocates

When it comes to protecting children in cases of abuse and neglect, having a skilled advocate represents the greatest chance for a better, safer life for those children. Recognizing that classroom skills alone are not sufficient for proper training of these valued professionals, UIS established a Residential Simulation Lab as part of the Child Advocacy Studies (CAST) program.

“Child protection workers are often put into tough encounters,” says Professor Betsy Goulet, specialist in child advocacy and protection and head of the UIS program. “Simulations are a valuable opportunity to step into the role and experience the twists and turns that might occur without the risk that comes with the real thing.”

Training in a small house located on campus allows participants to practice their knowledge and skills in a family home-like environment. Cameras throughout the residence record scenarios based on actual child abuse cases for real time observation and later debriefing. The goal is to increase both confidence and competency and to ultimately improve crisis intervention, investigations, and referral of services for at-risk families.

CAST provides training and a professional certificate program for current child protection investigators in addition to UIS degree-seeking students majoring in fields such as psychology, public administration, social work, and criminal justice.
The University of Illinois has a rich legacy of discovery with world-class faculty who conduct research in areas ranging from the social sciences, arts, and humanities to engineering, business, and agriculture.

**RESEARCH**

**Student engagement leads to discoveries**

Having undergraduate and graduate students actively collaborating on research allows them to build a collegial relationship with a professor, gain practical experience, and build professional confidence. And these young minds bring fresh perspectives and enthusiasm to a project.

Bioengineers at the UIC, led by professor James Patton, developed a mathematical algorithm that can “see” your intention while performing an ordinary action like reaching for a cup even if the action is interrupted.

Justin Horowitz, UIC graduate research assistant and first author of the study, analyzed the movement of research subjects as they reached for an object on a virtual desk, but had their hand pushed in the wrong direction. He was able to develop an advanced mathematical algorithm that analyzed the action and estimated the subject’s intent, even when there was a disturbance and no follow through. The algorithm can predict the way you wanted to move, according to your intention, Horowitz said.

“The computer has extra sensors and processes information so much faster than I can react,” Horowitz said. “We call it a psychic robot.”

Lauren Hollinshead, a UIS biology major, spent a summer extracting tiny, fragile venom sacs from bees and wasps at the UIS Therkildsen Field Station at the Emiquon Preserve in order to analyze a particular enzyme. Her mentor, Stephen Johnson, is an assistant professor of chemistry and a neuropharmacologist who hopes the research will lead to a better understanding of the enzyme’s role in regulating pain and inflammation.

“Dr. Johnson really motivated me to pursue research even more.”

A 15-member team of Urbana campus aerospace engineering students with the Illinois Space Society worked together
to design a satellite architecture that would provide communications coverage for exploration of Mars in the most cost-effective manner possible.

Their design won first prize among eleven universities in a national contest sponsored in part by the Students for the Exploration and Development of Space (SEDS), whose members mentored the teams.

“Our chosen architecture utilizes a build-up approach that uses small satellites to provide initial coverage, with eventual addition of large relay satellites,” said team leader Christopher Lorenz.

The early career experience students gain in working collaboratively through research is one of the many benefits of pursuing an education at a world-class institution like the University of Illinois.

Taking a right turn toward the future

A group of sophomore engineering students on the Urbana-Champaign campus are developing a wearable system of turn signals and brake lights for cyclists and runners. The group, under the auspices of a start-up called Actif that promotes an active lifestyle, is developing a functional and fashionable wearable system for cyclists, runners, or walkers who share the road with vehicles. Using wirelessly controlled LED lights, the bike system is more visible to motorists than hand signals or lights that are mounted below the seat. Runners and walkers would have a similar system in a backpack or jacket. The students have passed the proof-of-concept phase and are working on product development.

“The computer has extra sensors and processes information so much faster than I can react,” Horowicz said. “We call it a psychic robot.”
NYC museum looks to UIS for assist with exhibit

An exhibit at New York City’s American Museum of Natural History invites visitors to look at their bodies as entire ecosystems, full of trillions of microbes such as bacteria, viruses, fungi, and other organisms.

*The Secret World Inside You,* open to the public through mid-August 2016, explores the rapidly evolving science that is revolutionizing how we view human health.

“Our work for the exhibit draws a comparison between the human microbiome of the digestive tract and microbial ecosystems in soil” said Michael Lemke, professor of biology at U of I’s Springfield campus, who helped construct the exhibit. “This can be demonstrated in a column of soil and microbes called a Winogradsky column.”

For over a decade, Lemke has worked with New York scientists on the study of these columns, leading to an invitation to help with the exhibit. Keenan Dungey, UIS associate professor of chemistry, assisted Lemke with building prototypes in Springfield.

“The challenge for us was to scale up,” said Dungey. “Few people have tried to make Winogradsky columns that were six feet tall, so we had to figure out how the chemical gradients would affect the microbial growth.”

Investigating the human microbiome is a very young science. But it’s clear that the effects of the microbiome on its human host are profound and multifaceted—and could play an important role in common health problems like allergies, asthma, obesity, and even anxiety and depression.

Alaskan forest fires contributing to climate change

A new analysis of fire activity in Alaska’s Yukon Flats finds that so many forest fires are occurring there that the area has become a net exporter of carbon to the atmosphere. This is worrisome, Urbana researchers say, because arctic and subarctic boreal forests like those of the Yukon Flats contain roughly one-third of the Earth’s terrestrial carbon stores.

The study by Ryan Kelly, a postdoctoral researcher, and Feng Sheng Hu, professor of plant biology and geology, used fire data from a previous study in which they analyzed charcoal fragments preserved in lake sediments. They found that fire frequency in a 2,000-kilometer swath of Yukon Flats is higher today than at any time in the last 10,000 years.

For the new analysis, the team plugged this previous data into a computer model, which allowed them to study the entire past millennium of carbon cycling.

“Our model confirms our hypothesis that the recent increase in fire frequency in our study region has caused massive carbon losses to the atmosphere,” said Kelly.

“Up to 30 percent of the earth’s terrestrial carbon is in that system. And, simultaneously, this region is warming up faster than any other parts of the world,” said Hu.

“*Our model confirms our hypothesis that the recent increase in fire frequency in our study region has caused massive carbon losses to the atmosphere.*”

Increasing numbers of fires are unbalancing the cycle of carbon capture and release, the researchers report. More carbon dioxide in the atmosphere enhances plant growth, but it also contributes to further climate warming in the higher latitudes, according to Kelly.

The researchers see a troubling trend in which climate warming increases the number of fires, which release more carbon to the atmosphere and enhance warming.
Working the system

Civil courts are where many people meet the legal system, dealing with life-altering issues like foreclosure, bankruptcy, and child custody.

Those people with attorneys—often a small minority—are much more likely to see a better outcome compared to those representing themselves. But according to a new study by Urbana professor of law and sociology Rebecca Sandefur, the difference is significant, even “spectacular.”

More surprising, perhaps, is that lawyers’ deep knowledge of the law explains little of their impact in these kinds of cases. Instead it comes from other kinds of expertise: assisting with relatively simple procedures, as well as navigating the relationships involved in getting things done.

“Lawyers go to law school for three years, they study lots of cases, they learn a lot of law. You would think that that’s what would make a difference,” Sandefur said. “But for this set of problems, what lawyers seem to do that makes a difference is understand how to move paper around, and show up at what office at what time, and phrase things in the magic words that law understands.”

Sandefur’s research was a meta-analysis of 17 previous studies with about 18,000 cases. The evidence suggests that expanding access to attorneys could “radically change the outcomes of adjudicated civil cases.” Financial constraints, however, make that impractical.

Sandefur investigated the impact of nonlawyer advocates. The outcomes for attorneys were better on average, she found, but “the difference (in outcomes) between those specialized workers and attorneys was much smaller than the difference between people on their own and those with attorneys.”

Artificial ribosome created by UIC researcher

Researchers at UIC and Northwestern University have engineered a tethered ribosome that works nearly as well as the authentic cellular component, or organelle, that produces all the proteins and enzymes within the cell.

The engineered ribosome may make the production of new drugs and next-generation biomaterials possible and lead to a better understanding of how ribosomes function.

The artificial ribosome, called Ribo-T, was created in the laboratories of Alexander Mankin, director of the UIC College of Pharmacy’s Center for Biomolecular Sciences, and Northwestern’s Michael Jewett, assistant professor of chemical and biological engineering.

Ribo-T has subunits that don’t separate, a characteristic not shared by authentic ribosome. The human-made ribosome may be able to be manipulated in the laboratory to do things natural ribosomes cannot do. For example, Ribo-T may be able to be tuned to produce unique and functional polymers for exploring ribosome functions or producing designer therapeutics—and perhaps one day even non-biological polymers.

“This is an exciting tool to explore ribosomal functions by experimenting with the most critical parts of the protein synthesis machine, which previously were ‘untouchable,’” Mankin said.

The study was funded by the Defense Advanced Research Projects Agency, the National Science Foundation, and the David and Lucille Packard Foundation Fellowship. Other UIC collaborators include Cedric Orelle, Teresa Szal, and Tanja Florin.
The University of Illinois celebrates its land-grant public service mission by offering programs, services, and activities around the state, from Chicago to Cairo, Danville to Quincy, and beyond.

**Making an impact, one meal at a time**

The U.S. Department of Agriculture estimates that more than 130 billion pounds of the available food supply (retail and consumer) in the U.S. goes uneaten each year. And yet many go hungry every day. What if that food was gathered and made available to those in need?

That’s the mission of members of UIC’s College of Cycling (COC), a student organization promoting cycling and doing good works. COC members coordinate weekly volunteer bike rides to deliver uneaten food from UIC Dining Services to the Pacific Garden Mission. They deliver 30-80 pounds of food each week.

“We’re giving back to the community, and we’re helping UIC expand its reach,” said club president Rafid Rahman, a junior.

(1-r) Richard Perry, Asael Reyes, and Rafid Rahman
In Springfield, UIS students collect canned goods as part of the annual Halloween Trick-or-treat for Canned Goods drive that benefits the Central Illinois Foodbank. In 2015, students collected 9,000 pounds of items. Hy-Vee, a Midwestern grocery firm, matched the donation for a total of 18,000 pounds of food for the foodbank.

Mark Dochterman, director of the UIS Volunteer & Civic Engagement Center, said the UIS drive has been held annually since 2008, but 2015 was the first time UIS partnered with Hy-Vee. More than 150 students participated in the drive.

Dining Services on the Urbana campus has been donating excess food locally for two years through a website that links organizations with surplus food with charitable organizations. The Chicago-based nonprofit, Zero Percent, was founded by an alumnus, Raj Karmani.

In a variety of ways, U of I students and staff are fighting hunger in their campus communities.

Adding a SPARK

UIC student Mitch Granger is the founder of SPARK (Students Providing Acts of Random Kindness), a grassroots initiative to deliver lunches to some of Chicago’s homeless. In 2015, Granger and his colleagues fed 1,000 people. Granger delivers more than food, though. He hopes that conversations with the homeless can lift spirits and provide a connection to others. Future plans include teaming up with other Chicago area universities to show students how SPARK works, expanding the grassroots effort throughout the city.
Department of Justice grant funds innocence reviews

UIS’ Illinois Innocence Project received a $750,000 federal grant to review Illinois cases where DNA testing might change the outcomes for individuals who plead guilty. The grant will also fund the Latino Innocence Initiative designed to address vulnerabilities specific to Latinos.

“Almost 14% of Illinois inmates are Latino who are often wrongfully convicted due to unique barriers involving language, citizenship, and status,” said John Hanlon, executive director of the UIS Illinois Innocence Project.

U.S. Senator Richard Durbin announced the Department of Justice grant on the Springfield campus in October 2015.

The project will initially focus on numerous cases Illinois Innocence Project members had already screened in anticipation of the grant funding. The cases will be further reviewed to determine if the evidence can be tested or retested for DNA and if the likelihood is that the individual is actually innocent of the crime for which he or she was convicted.

As part of the grant, the Illinois Innocence Project will hire several UIS undergraduate students to assist in the screening, review, and evaluation of the cases. The Project reviews over 300 requests for help from Illinois inmates each year and has been instrumental in eight exonerations since 2001.

The Illinois Innocence Project is part of the UIS Center for State Policy and Leadership.

Festivals celebrate cultures

On each U of I campus, festivals celebrate the music, artistry, cuisine, and history of other cultures, providing entertaining and educational experiences for students, staff, and community members.

UIC is one of several host sites for the annual Chicago Latino Music Festival. The 2015 festival featured 24 concerts of Latin American classical and contemporary music over a three-month period. Elbio Barilari, a lecturer in the UIC Department of Music, is co-founder and co-artistic director of the decade-old festival.

“Our mission remains the same—to build bridges from local and international musicians to the mainstream classical community of Chicago,” said Barilari. “You don’t necessarily come to our events because there are Latino musicians involved. You come because we are presenting good music.”

For almost 40 years, UIS has hosted an international festival each fall that showcases the cultures of students as well as community members. Among the countries represented in 2015 were several African and Middle Eastern nations, China, India, Ireland, Peru, and Scotland. The program is organized by UIS students who select a theme for the festival each year.

Japan House on the Urbana campus hosted the first Matsuri festival celebrating Japanese culture during the 2015 summer. The festival featured a taiko drum group, a potter making tea bowls, bonsai and ikebana flower arranging exhibits, and a demonstration of the artistry of Japanese candy making.

These festivals are among the many ways the U of I encourages communities to come together to celebrate arts and culture.
The state of Illinois is a key contributor to the “dead zone” in the Gulf of Mexico, a section of water the size of Connecticut devoid of oxygen that forms every summer. The culprit is millions of pounds of nutrients from farm fields, city streets, and wastewater treatment plants entering the Gulf each year through the Mississippi River system.

The state of Illinois’ Nutrient Loss Reduction Strategy, released during the summer of 2015, is intended to keep those nutrients out of the Mississippi and the Gulf. Government agencies, agricultural producers and commodity groups, scientists, non-profit organizations, and wastewater treatment professionals worked together to create the strategy, which was based on a scientific assessment that used state and federal data to calculate Illinois’ current nutrient losses and determine their sources.

Brian Miller, head of the Illinois Water Resources Center, was a member of the strategy steering committee. Five Urbana faculty from the College of Agricultural, Consumer and Environmental Sciences served on the policy working group.

The assessment uncovered numerous cost-effective practices for reducing nutrient losses. By targeting the most critical areas and building on existing state and industry programs, these practices are expected to ultimately reduce the amount of nutrients reaching Illinois waterways by 45 percent. The plan for wastewater treatment plants builds on existing restrictions and calls for new treatment technology options. Agricultural options include buffer strips, cover crops, and adjusting nitrogen fertilizer practices.

“It is going to take at least one new management practice on every acre of agricultural land to meet the state’s reduction goals,” said Professor Mark David, a biogeochemist and one of the researchers behind the scientific assessment.

UIC architecture school leaves a lasting impression

A kiosk designed by UIC School of Architecture faculty and students for the Chicago Architecture Biennial and displayed in Millennium Park during the 2015 summer has a permanent home in Harold Washington Playlot Park near Lake Shore Drive and East 53rd Street.

The carbon steel structure vault consists of two spaces, one enclosed by screens and doors for use by a vendor, and one open to the air for the public. The design reflects the origin of kiosks as garden pavilions in 13th-century Persia.

“We constructed several study models to investigate different types of surface treatments while considering potential cost, constructability, and serviceability issues,” Busscher said. “I think the most valuable takeaway was learning how these issues are balanced and how they ultimately get resolved through the construction process.”

Eleven of 99 biennial participants hailed from UIC. That number, noted Preissner, speaks to the quality of UIC’s School of Architecture faculty.

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Home to the nation’s largest college of medicine, the University of Illinois educates physicians, nurses, dentists, pharmacists, and other health professionals. At the UI Hospital, in clinics across Chicago, and at regional health education sites across Illinois, the University addresses health care disparities for underserved populations.

Increasing the number of underrepresented minority medical professionals in the U.S. could be part of the solution to closing the health care disparity gap in some predominantly African-American and Latino communities. UIC students and staff are working to inspire and recruit that next generation of professionals.

Medical students from UIC’s Urban Medicine Program are bringing health education and career information to the North Lawndale section of Chicago in partnership with a local church and other area organizations.

Students in the Young Doctors Club work with Lawndale elementary, middle, and high school students, presenting a health science curriculum and introducing them to health science careers. Weekly lessons are supplemented with hands-on activities, real-life applications, educational field trips, and guest lectures.

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“We use a lot of the same outlines for the program as we use in medical school,” said Rebekah Harding, one of the club’s 12 leadership team members and a fourth-year med student. “It’s really neat because it’s kind of a mini medical school for them.”
The UIC Hispanic Center of Excellence has several recruitment programs for both students and parents. Medicina Academy works with Chicago area high schools to support Latino students on their path to health care careers, through assistance in math and science, help with study skills, and networking opportunities. The Latino Health Science Enrichment program is a similar six-week summer academic enrichment program for high school students, and the Academia de Padres Leadership Institute program helps explain the higher education system to parents of Latino high school students interested in pursuing medical careers.

Recruiting future doctors isn’t limited to the Chicago area. At UIC’s Peoria regional campus, medical students run a mentoring and hands-on medical learning program called GUIDES (Guide, Understand, Inform, Drive, Educate and Serve) that serves to encourage low income and minority students to consider becoming physicians.

At a recent pathology lab/operating room simulation event at a local high school, students got the chance to participate in dissecting a pig heart. But more importantly, they had a chance to interact with current medical school students and hear their stories about their experiences.

Early exposure to the field through programs such as these offered at UIC can be the key to getting interested students into the career pipeline.

Educating nurses at six sites around the state

The UIC College of Nursing attracts students from Illinois and around the world. Some of the 1300+ students study and train on the UIC campus. In order to provide more opportunities to individuals interested in a nursing career, the college offers regional programs in Peoria, the Quad Cities, Rockford, Springfield, and Urbana. The six campuses affiliate with local hospitals for training and provide each community with a steady stream of potential employees in this high-demand field. Nursing students in Peoria, for example, are largely from the region and almost 70 percent of the graduates remain in the area to practice. The majority of the students studying in Quad Cities hail from western Illinois and eastern Iowa, and almost 80 percent continue to work in the local area after graduation.
Families with special needs get helping hand

Navigating the world of health care today can be challenging for anyone. When you have a child with a disability, it can be overwhelming.

Thousands of families throughout the state of Illinois with special needs children have access to help from care coordinators with UIC’s Division of Specialized Care for Children (DSCC). With 12 regional offices throughout the state, DSCC offers a number of free services to families and helps connect families with medical providers and resources.

Gavin Jones has a rare neuromuscular abnormality. Gordon Jones, Gavin’s father, appreciates the help he and his family receive from DSCC. “To have an organization that really tries to focus on the family itself, and tries to make the family’s job, even though it’s a difficult one, run more smoothly, that’s what Specialized Care for Children really does,” said Jones.

DSCC care coordinators help with understanding insurance and Medicaid policies, assist keeping appointments and following care instructions, and provide educational information. They also work with schools on ensuring that accommodations are being met for children with special needs.

The division has been assisting families since 1937 and is just one example of services provided to state residents by the University of Illinois.

In October 2015, the Centers for Disease Control (CDC) expanded their Prevention Epicenter network to 11 academic institutions, including the University of Illinois at Chicago, in order to develop a comprehensive strategy to protect health care workers who care for patients with Ebola, pandemic influenza, and other infectious diseases.

The UIC Epicenter for Prevention of Healthcare Associated Infections will study how health care workers can care for these patients without putting themselves at risk or risk transmission of infection between patients. The new epicenter is a collaboration between infectious disease physician researchers from UI Health and the UIC College of Medicine, and occupational health researchers in the UIC School of Public Health. Research will be conducted at the University hospital and two other area hospitals.

“Five to 10 percent of patients admitted to hospitals will develop a healthcare-associated infection, and up to 90,000 deaths a year are attributed to such infections,” said Susan Bleasdale, assistant professor and medical director of infection prevention at UI Health, and one of four UIC co-investigators. The other investigators are Rachael Jones, PhD; Lisa Brosseau, PhD; and Monica Sikka, MD.

Understanding how health care workers can become contaminated “will help us find new ways to prevent the spread of infections,” Bleasdale explains.

Researchers will investigate how infections transmit in the environment, how work practices effect transmission of infection, and how infection-control precautions caregivers use can reduce exposure to pathogens and decrease risk of infection transmission.

UIC will receive $2.2 million in funding from the CDC during the three-year study.
Drug that targets multiple pathways shows promise against disease

Myotonic dystrophy type 1 (DM1), the most common form of muscular dystrophy, afflicts an estimated one in 8,000 people worldwide, and efforts to treat it are in their infancy. But a new study that added new capabilities to an experimental drug agent shows promise for the future.

“We’ve rationally designed something to target multiple pathways, which is contrary to the traditional thinking in medicinal chemistry, where you have one target, one drug,” said Urbana chemistry professor Steven Zimmerman (above, right), who led the research team.

Researchers tethered new biologically active appendages to a compound previously developed in the lab, creating multitarget drugs that are small enough to get easily into cells. In tests, they found that the new compounds have three modes of action that interrupt the disease’s pathology.

The most potent compounds the researchers developed reduce levels of the mutant RNA in cells that replicate the pathology of DM1. The new compounds also reversed two symptoms of the disease in a fruit fly model of DM1.

The redesigned drug creates hope for future treatment for those who suffer from health conditions caused by DM1.

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The University of Illinois stimulates the economy through its research operations and the creation of startup technology companies.

U of I innovation pipeline

University research leads to innovations and technological advances that strengthen local and state economies. The University of Illinois’ robust research enterprise is a significant contributor to economic growth along the breadth and length of the state. From undergraduate students to MacArthur Fellows, members of the University’s research community on three campuses are engaged in creating new knowledge that solves the world’s most pressing challenges.

To advance the U of I’s economic mission, the Office of the Vice President for Research (OVPR) supports research and innovation activities that elevate ideas into sustainable businesses and global solutions. The economic development framework includes activities, initiatives, and priorities that support research and technology commercialization through innovation and creativity, development of human capital and retention, and engagement with private and public partners to elevate the University’s impact.

The University of Illinois channels research through a commercialization pipeline that protects, funds, supports, and launches ideas into businesses and global solutions. The Offices of Technology Management (OTMs), IllinoisVENTURES, EnterpriseWorks, EnterpriseWorks Chicago, and the Research Park connect to form an innovation pipeline that drives increased technology transfer, company formation, and startup success.

In recognition of the U of I’s economic development efforts, the Association of Public and Land–grant Universities (APLU) named the University one of six finalists for its third annual Innovation & Economic Prosperity (IEP) University Awards in 2015. The Innovation award, for which U of I was nominated, honors an institution demonstrating outstanding work in technology transfer, entrepreneurship, and business development. APLU named the U of I as an IEP university in 2014.
Retaining talent

The University of Illinois system attracts the best and brightest students from all corners of the globe. By aligning the University’s research priorities with the needs of industry and allocating resources to compel recent graduates to stay in the Midwest, the U of I helps to grow the regional economy and stem the outflow of talent leaving the state.

The University has made a strategic initiative to retain talent in the Midwest by creating high-tech opportunities for young graduates and connecting students and young alumni with these opportunities.

ThinkChicago is a partnership with industry, government, and not-for-profit organizations to develop unique opportunities to promote Chicago as a nexus for innovation and technology and an attractive place to live, work, and play. Students visit the business headquarters of some of Chicago’s most innovative tech companies, meet industry leaders, attend an exclusive career fair with Chicago-based businesses, and gain free admission to major cultural events and attractions. Collaborators include the city of Chicago, World Business Chicago, Chicago Ideas Week, and 1871. More than 85 U of I students took part in ThinkChicago programs in 2015.

Department of Defense grant supports economic revitalization

The University of Illinois received a $5.5 million grant from the U.S. Department of Defense (DoD) to support economic revitalization in Illinois communities affected by reductions in federal military spending. The two-year grant was awarded by the DoD’s Office of Economic Adjustment (OEA) under a program created to assist military-connected communities as defense spending declines due to federal budget reductions and the wind down of wars in Afghanistan and Iraq. The grant is matched by nearly $775,000 in cash and in-kind contributions from local sources. The data-driven initiative will fund three primary efforts to help communities retool their economies and foster growth despite the changing defense spending landscape.

Innovation thrives at Research Park

The Research Park at the U of I at Urbana-Champaign is a technology hub for corporate research and development operations and startup companies. Established in 2001 to help advance the economic development mission of the University, the 75-acre Research Park has an estimated total annual economic output of $169.5 million.

The facilities provide an environment where technology-based businesses can work with University faculty and students and take advantage of opportunities for collaborative research. The Research Park serves corporations by providing workforce development needs, including a pipeline of tech talent and professional continuing education opportunities. More than 500 students are employed by the park’s 90 companies.

EnterpriseWorks, the incubator, is home to more than 50 startup companies that are commercializing technology. Twenty major corporations have innovation centers located at the Research Park.
Capio Biosciences: Detecting circulating tumor cells

UIC researcher Seungpyo Hong has developed the UiChip™, a new medical device that detects circulating tumor cells (CTCs) commonly found in breast, colon, and prostate cancers. CTCs are cells that escape from solid tumors and travel through the blood to other parts of the body and can be responsible for the metastasis, or the spreading of cancer cells. The ability to detect spontaneous CTCs will give physicians an early indication of the spread of cancer to other areas of the body.

Metastasis that is induced by CTCs is one of the major reasons that cancer can be so fatal. Through his research that focuses on the intersection of materials science, biology, and nanotechnology, Hong and his team designed the UiChip™ and founded a company called Capio Biosciences, Inc. to bring this new technology into hospitals and clinics.

A recipient of a UIC proof-of-concept innovation funding award, Hong has leveraged multiple U of I resources to advance his research, including a Chicago Innovation Mentors team and an EnterpriseWorks Chicago student consulting team.

The Capio Biosciences team recently launched a clinical pilot study through the University of Illinois Cancer Center.

Cell Habitats: Mimicking stem cell activity

Cell Habitats, a startup biotech company, develops microdevices called regenerods. The devices mimic stem cell activity, leading to regeneration of normal healthy tissue. The company’s early focus is on heart tissue.

“We are making microstructures of the right shape and stiffness with the right growth factor to boost natural cardiac repair,” said Brenda Russell, UIC professor emerita of physiology and biophysics and co-founder of Cell Habitats.

Russell serves as Cell Habitats chief science officer, concentrating her work in the lab. She has conducted trials of the technology on mice and hopes to raise funds for studies using large animal models, the next step before human clinical trials.

Russell is a believer in the assistance provided by the U of I Offices of Technology Management. The OTMs on the Urbana and Chicago campuses evaluate, protect, market, and license the University’s intellectual property.

“The OTM is really good at screening the idea to see if it’s really a new idea and if it’s something that might be commercial and practical,” Russell said. “The most important thing is to file the patent to protect the intellectual property.”

Tejal Desai, professor of bioengineering and therapeutic sciences at the University of California, San Francisco, and Paul Goldspink, an associate professor of physiology at the Medical College of Wisconsin, are the other co-founders of the firm.

National Institutes of Health grants helped fund the science behind Cell Habitats.
Vanquish Oncology: Personalized cancer drugs

The University of Illinois is revolutionizing cancer research and drug discovery faster than ever before. Through collaboration with the University of Illinois Cancer Center—which strives to reduce the burden of cancer through research, education, outreach, prevention, detection, and treatment—researchers have been able to move forward with drug discovery and clinical trials at a rapid pace, leading to an increased number of significant health discoveries.

Vanquish Oncology Inc. is a U of I drug development startup company focused on targeting unexploited molecular defects in cancer cells to create trailblazing, personalized therapeutics for unmet or underserved cancer markets. Paul Hergenrother, professor of chemistry on the Urbana-Champaign campus, and Ted Tarasow of Level 5 Partners founded the company.

One new drug, PAC-1, has the unique capability of reducing tumor volume. Because it penetrates the blood-brain barrier, the drug has the potential for treatment of brain tumors. Currently, there is no other comparable drug on the market.

The company provides an excellent model of interdisciplinary collaboration between academic units and cross-campus collaboration between the Urbana and Chicago campuses. The drug was developed on the Urbana campus and Timothy Fan, a veterinarian and professor, conducted clinical trials on pet dogs with cancer at the U of I Veterinary Teaching Hospital. Alex Lyubimov, director of UIC’s Toxicology Research Laboratory, coordinated the toxicology work. The Phase 1 human clinical trial will take place at the U of I Cancer Center in Chicago.

PhotoniCare: Improving diagnosis of ear infections

Two Urbana researchers have developed a new technology that helps physicians to better diagnose and manage ear infections. Stephen Boppart, a professor in the Department of Electrical and Computer Engineering, and Ryan Shelton’s startup company, PhotoniCare Inc., moves this new technology, the CLEARVIEW™ otoscope, from the laboratory to the marketplace.

The current technology used to diagnose ear infections is an otoscope, which simply provides a picture of the eardrum surface. PhotoniCare’s technology allows physicians to look through the eardrum to directly visualize the infection in the middle ear. This new information could improve decision-making for the use of antibiotics and surgery, resulting in improved outcomes for children with this common disease.

“Starting a company in the University of Illinois ecosystem, and particularly in Urbana-Champaign, continues to be a really terrific experience,” said Shelton. “Support through affordable resources, access to expertise and mentorship, and top-notch facilities is exactly what early-stage companies need.”

In addition to reaping the business benefits of a growing technology startup, the team takes pride knowing they are impacting the quality of healthcare for both physicians and patients. And for Shelton, it’s not all about business and biomedical applications: “I love working with kids. Some of the most fun I’ve had has been designing entertainment into our device to keep the attention of the children during an exam to make the physicians’ jobs easier.”
The total operating budget* for the University of Illinois is $5.64 billion.

**Where Does the Money Come From?**

- **20.1%** Student Tuition and Fees
- **19.9%** State Payments on Behalf
- **11.9%** State Revenues
- **13.5%** Earnings, misc. (e.g., hospital and medical services plans)
- **13.3%** US Grants and Contracts/Federal Appropriations
- **12.6%** Auxiliary and Departmental Operations (e.g., bookstores, housing)
- **12.6%** Auxiliary and Independent Enterprises
- **10.3%** Academic Support
- **9.8%** Instructional and Departmental Research
- **9.6%** Extension and Public Service
- **6.8%** Administration and General
- **6.0%** Physical Plant
- **5.6%** Student Aid
- **5.9%** Institutional Funds
- **2.8%** Private Gifts
- **2.7%** Student Services

**How Is the Money Spent?**

- **19.9%** Instructional and Departmental Research
- **16.7%** Separately Budgeted Research
- **12.6%** Hospital Operations
- **9.8%** Auxiliary and Independent Enterprises
- **9.6%** Extension and Public Service
- **6.8%** Administration and General
- **6.0%** Physical Plant
- **5.6%** Student Aid
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*Includes $1.12 billion in payments made on behalf of the University for employee benefits and $36.9 million for the Academic Facilities Maintenance Fund Assessment (AFMFA).

Numbers from 2014–2015. 2015–2016 data not available because state budget was not finalized at time of printing.