HHS R&D EXPENDITURES, FY2019

The Department of Health and Human Services (HHS) sponsors more than $231M in R&D expenditures across the U of I System.

HHS-Supported Projects at UIC

UIC has seven health science colleges that train many of the state’s future healthcare professionals and conduct groundbreaking basic and clinical research.

NATIONAL INSTITUTES OF HEALTH (NIH)

- In 2017, the University of Illinois Cancer Center was awarded $6.75M from NIH to establish a specialized Center of Excellence in minority health and health disparities research. The Center for Health Equity Research (CHER) is investigating how social structures and determinants contribute to the health of marginalized groups.
- In 2016, UIC’s Center for Clinical and Translational Science (CCTS) was awarded a four-year, $17.7M grant from NIH to improve health disparities, particularly among minorities and underserved populations across the life span.
- With funding from NIH, UIC’s School of Public Health leads an Occupational and Environmental Health and Safety Education and Research Center, which addresses occupational safety and health training needs regionally, nationally, and internationally.
- With $9.7M in funding from the National Eye Institute, researchers at UIC will study the impact of chronic eye disease among Latinos. The Study of Latinos “Ojos” will conduct approximately 3,000 eye exams for Latinos living in Chicago and Miami who already are enrolled in the Hispanic Community Health Study/Study of Latinos, the largest ever prospective epidemiological study of the Latino community.
- With a $3M, five-year grant from NIH, researchers are studying the impact of a program designed to educate ER visitors with uncontrolled high blood pressure.

HEALTH RESOURCES AND SERVICES ADMINISTRATION (HRSA)

- A $9.5M grant from HRSA will help UIC and the Illinois Department of Public Health improve maternal outcomes in Illinois. In addition to enabling the launch of a series of new systems-level statewide efforts, the funding will facilitate the design and implementation of a first-of-its-kind, two-generation postpartum clinic and research and training center at UIC.
- UIC is launching a new effort to reduce the health disparities experienced by women and babies living in historically underserved and marginalized communities, thanks to a $4.7M Healthy Start grant from HRSA.
- Mile Square, UI Health’s Federally Qualified Health Centers network, has received several supplemental grants from HRSA aimed at growing and improving mental health and addiction services.
- In 2017, UIC’s College of Social Work was awarded a four-year, $1.9M grant from HRSA to fund an Integrated Evidence-based Behavioral Health Care Social Work Training Program targeting children, adolescents, and transitional age youth in the Chicago metropolitan area.
- UIC received funding from Title VII (nursing workforce development programs) for the Geriatrics Workforce Enhancement Program, Graduate Psychology Education Programs, Health Careers Opportunity Program, Centers of Excellence Program and Primary Care Training and Enhancement Program. Title VII funding also supports the Area Health Education Center Program at UIC.

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CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)

- With $3.75M in research funding from CDC, UIC’s School of Public Health will continue its work as one of only 25 academic institutions in the CDC’s Prevention Research Center network. This network will collectively develop, test and evaluate various public health interventions across the nation.
- With $1.8M in funding from the CDC, UIC is helping young breast cancer survivors navigate post-treatment care and survival. The award is specifically supporting a new University of Illinois Cancer Center program called Young And A Survivor.

AGENCY FOR HEALTHCARE RESEARCH AND QUALITY (AHRQ)

- AHRQ funding supports efforts to obtain evidence and information that will help ensure safe and high-quality healthcare. UIC currently has six active AHRQ awards.

HHS-Supported Projects at Urbana-Champaign

From creating novel diagnostic methods and synthesizing new drugs to conceiving the world’s first engineering-based college of medicine, Urbana harnesses interdisciplinary collaboration to uncover fundamental insights into fighting disease and improving health.

- Researchers at Urbana received funding from the National Cancer Institute to investigate multimodal biomarkers for oropharyngeal cancer, histopathology for cancer prognosis, the impact of cholesterol on breast cancer progression, and early prediction of colorectal liver metastases.
- Urbana continues to train biomedical researchers in innovative approaches. With one NIH T32 grant, the Tissue Microenvironment Training Program is preparing the next generation of interdisciplinary leaders capable of undertaking fundamental research and enabling translational advances. For over fifteen years, NIH has funded the Chemistry-Biology Interface Training Program through a T32 grant to bridge the divide between these disciplines, promoting a common scientific language, sharing advanced tools, and taking a multidisciplinary approach to longstanding issues that compromise public health.
- Urbana is a leader in engineering-based translational research with NIH/NCI funded projects like the Polarization-Sensitive OCT for Assessing Breast Tumor Margins. With partners Carle Foundation Hospital and start-up company Diagnostic Photonics, this intraoperative optical imaging technology finds positive breast tumor margins in real time.
- Urbana’s transdisciplinary, NIDDK-supported Dietary and Microbial Predictors of Childhood Obesity Risk Project will determine how dietary prebiotics influence host-microbe interactions and infant growth trajectory and weight/body composition.
- The NIH Biotechnology Research Center for Macromolecular Modeling and Bioinformatics has been developing leading software for computational biology and molecular simulation and visualization for nearly three decades. Through its evolving programs, comprehensive dissemination, range of collaborative biomedical projects, and extensive training program, the Center serves more than 120,000 biomedical researchers across the nation and in the world.
- Urbana is a partner in the Upper Midwestern Center of Excellence for Vector-borne Diseases, a group that recently received $10M from the CDC to fight diseases spread by insect vectors.

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The U of I System has a longstanding and successful partnership with the National Science Foundation (NSF), the only federal agency charged with funding fundamental research and education across all scientific and engineering disciplines. NSF is the cornerstone of America’s basic research enterprise.

NSF-Supported Projects at Urbana-Champaign

Urbana is routinely leading the nation in NSF awards.

NSF-SUPPORTED INFRASTRUCTURE FOR THE NATION’S RESEARCH COMMUNITY

- **XSEDE**: NSF selected the National Center for Supercomputing Applications (NCSA) at Urbana to lead a five-year, $110M project to expand the Extreme Science and Engineering Discovery Environment, to substantially enhance the productivity of a growing community of scholars, researchers, and engineers through access to advanced digital services that support open research; and coordinate and add significant value to the leading cyberinfrastructure resources funded by the NSF and other agencies.

- NSF awarded NCSA $5M to bring together the Clowder community. Clowder, an open source data management tool based on active curation, was developed at NCSA.

NSF-SUPPORTED RESEARCH TO ADDRESS GRAND CHALLENGES OF OUR TIME

- **POETS**, an Urbana-led Engineering Research Center (ERC), addresses thermal and electrical challenges surrounding mobile electronics and vehicle design.

- **I-MRSEC**, a $15.6M Urbana-led Materials Research Science and Engineering Center (MRSEC), performs fundamental, innovative materials research and supports interdisciplinary education and training of students.

- Under Urbana’s leadership, the Critical Zone Observatory for Intensively Managed Landscapes (IML-CZO), which includes other Big Ten universities, received NSF funding to understand the transformation of the landscape of the Upper Midwest and help stabilize this critical zone.

FOSTERING ENTREPRENEURSHIP & ADVANCING COMMERCIAL APPLICATIONS

- **Innovation Corps (I-Corps)**: Since the Illinois I-Corps Site was established in 2013, 180 teams have participated in this entrepreneurial program and have raised close to $80M in external funding. In 2016, NSF announced a $3.5M Midwest I-Corps node, and Urbana plays a central role.

- **Industry/University Cooperative Research Centers (I/UCRCs)**: Urbana participates in university research to meet industry needs that transfer research results and technological advances to the U.S. marketplace.

- The NSF Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) program is critical to Urbana’s Research Park, particularly its tech incubator EnterpriseWorks. From 2001-2018, NSF awarded 105 SBIR/STTR awards to EnterpriseWorks companies for a total of more than $27 million. Several NSF-funded startup companies have gone on to raise hundreds of millions of dollars in venture capital and private investments.
Faculty Career Development
21 faculty were awarded NSF CAREER awards in 2018, which provide funding to launch research programs for promising early-career faculty.

- Researchers are leading an *Engineering Frontiers and Multidisciplinary Activities* project that applies the science of teamwork to spark research collaborations across disciplines and institutions. The project seeks innovation by engaging a variety of scholars and researchers from the American Indian Higher Education Council, the Hispanic Association of Colleges and Universities, and the National Association for Equal Opportunity in Higher Education.

- Three faculty members will use *Major Research Instrumentation* (MRI) awards from NSF to purchase and develop instruments for cutting-edge advances in battery technology, biomaterials, and deep learning. The NSF allowed three MRI proposals per university and all three of Illinois’ submissions were accepted.

Education and Graduate Training

- With the support of an NSF *Research Traineeship* (NRT) grant, Urbana is beginning a PhD level certificate program that combines materials and data science.

- Also through an NRT grant, Urbana has launched the *Miniature Brain Machinery (MBM) Program*, which combines cognitive and behavior studies with brain cell and tissue biology studies to train the next generation of STEM workforce in advancing discovery.

NSF-Supported Projects at UIC

NSF-supported projects at UIC range from large multi-scale initiatives to individual research grants.

**CAVE2**: NSF supports big data and visualization research at the Electronic Visualization Laboratory (EVL), which is home to CAVE2, a renowned interdisciplinary research laboratory that pioneered the development of the CAVE virtual-reality system.

The *Learning Sciences Research Institute (LSRI)*, a campus-wide, multidisciplinary unit focused on improving instruction and learning, has several faculty who have been successfully funded by the Education and Human Resources Directorate at NSF in areas of STEM education. Two current and one recently completed project are focused on developing the capacity of teachers to engage in instruction and assessment aligned with the vision of multi-dimensional science proficiency represented in the National Research Council’s *Framework for K-12 Science Education and the Next Generation Science Standards*. The three projects span grades 3-12 and involve collaborations with teachers from the Chicago Public Schools and surrounding districts. In addition to developing teacher capacity to design high-quality instruction aligned with the standards, two of the projects include development of free resources designed to support classroom formative assessment practices, which are being widely disseminated via a technology portal.

Researchers at UIC are leading a five-year, $4.7M project funded by NSF to develop and implement a *professional development program for K-8 math educators* that spans across three levels — teacher, school and district.

**Dynamic social-network analysis reveals animal social behaviors**: a computational ecologist is leading an NSF-supported project that uses *IBEIS (Image-Based Ecological Information System)*. The software design takes collections of images from field scientists, tourists, and incidental photographers and analyzes and stores the information to improve management and conservation of animals.

In 2017, UIC received a $1.44M grant from NSF to discover new 2D materials to be used to manufacture better and cheaper batteries.

UIC has 26 active Faculty Early Career Development awards.
DOE-Supported Projects at Urbana-Champaign

The Urbana campus has been one of DOE’s top university funding partners. Urbana is regularly among the top 10 institutions nationwide in annual DOE research expenditures.

DOE OFFICE OF SCIENCE

In 2017, DOE awarded a five-year, $115M Bioenergy Research Center grant — one of four in the U.S. — to Urbana and 20 partner institutions to establish the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI). Using thematic research into feedstock production, conversion, and sustainability, CABBI will provide sustainable, cost-effective biofuels — and bioproducts.

A $10.6M project funded by DOE’s Office of Science, Renewable Oil Generated with Ultra-productive Energycane (ROGUE) uses computer models to guide the engineering of energycane to produce the oil used to create biodiesel and biojet fuel.

Urbana is involved in three of the nation’s 36 DOE-funded Energy Frontier Research Centers.

OFFICE OF CYBERSECURITY, ENERGY SECURITY, & EMERGENCY RESPONSE (CESER)

With support from DOE CESER and DHS’ Security Science & Technology Directorate, the Cyber Resilient Energy Delivery Consortium (CREDC) is conducting cutting-edge research to bolster the resiliency of the nation’s energy delivery systems.

NATIONAL ENERGY TECHNOLOGY LABORATORY (NETL)

The Prairie Research Institute is a global leader in demonstrating technologies for capture and storage of carbon dioxide to balance our nation’s growing energy needs and climate concerns. DOE is funding multiple CarbonSAFE geologic storage projects to define and develop regional carbon storage infrastructure. A post-combustion Carbon Dioxide Capture project enables the commercial-scale capture of CO2 from coal-fired power plants.

ADANCED RESEARCH PROJECTS AGENCY (ARPA-E)

Through its ARPA-E program, DOE awarded a $3.3M grant to a multidisciplinary research team at Urbana to develop a precise system for measuring greenhouse gas emissions from commercial bioenergy crops grown in central Illinois.

Also through ARPA-E funding, the Transportation Energy Resource from Renewable Agriculture (TERRA)/Mobile Energy-Crop Phenotyping Platform (MEPP) is developing a low-cost, autonomous robot that analyzes biofuel crops during the growing season to pinpoint plants with desirable yield and sustainability traits.
THE NEXT GENERATION OF MATERIALS FOR ENERGY
As part of the Manufacturing USA Initiative, Urbana is a Tier 1 member of the DOE-funded REMADE Institute, which focuses on driving down the cost of technologies needed to reuse, recycle, and remanufacture materials such as metals, fibers, polymers, and electronic waste.

Urbana is leading a $2M project for the development of next generation steels aimed at meeting the challenges of hydrogen embrittlement.

DOE NATIONAL NUCLEAR SECURITY ADMINISTRATION (NNSA)
The Center for Exascale Simulation of Plasma-Coupled Combustion (XPACC) has a five-year, $15.7MM grant from the DOE NNSA’s Predictive Science Academic Alliance Program. XPACC is paving the way for cleaner-burning combustors, more reliable and high-performance jet engines, and the development of technologies and workforce to advance extreme-scale computing.

OFFICE OF NUCLEAR ENERGY
The DOE’s Office of Nuclear Energy funds R&D projects, infrastructure upgrade grants, fellowships and scholarships under the Consolidated Innovative Nuclear Research program. DOE-supported nuclear energy research at Illinois includes enterprise risk management, irradiation assistance for stress in weldments, computer code validation for nuclear power plants, advanced structural materials tolerance, and accident-tolerant nuclear fuels.

ADVANCING COMMERCIAL APPLICATIONS
From 2001-2018, DOE awarded 60 Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) awards to EnterpriseWorks companies for a total of nearly $24.7 million.

POISED TO LEAD ON QUANTUM
Urbana launched the Illinois Quantum Information Science and Technology Center to revolutionize computing, communication, security, and measurement and sensing through quantum mechanics. Urbana is a core partner in the Chicago Quantum Exchange along with the University of Chicago, Argonne National Laboratory, and Fermi National Accelerator Laboratory.

DOE-Supported Projects at UIC
With a five-year, $4.2M grant from the DOE Office of Energy Efficiency & Renewable Energy, UIC is helping industrial, commercial, institutional and utility entities evaluate and install highly efficient combined heat and power (CHP) technologies. CHP, also known as cogeneration, is a single system that produces both thermal energy and electricity. CHP has typical operating efficiencies of 65-75% or greater while more conventional and separate systems for electricity and heat operate at approximately 50% efficiency.

UIC and Urbana are partners in the Joint Center for Energy Storage Research (JCESR), a DOE Energy Innovation Hub that was renewed by the Office of Science in 2018 for another 5 years. JCESR is a major research partnership that integrates national laboratories, universities, and private companies with the mission of overcoming scientific and technical barriers and developing breakthrough energy storage technologies for transportation and the electricity grid.

Two UIC physicists are working with a global research team to plan for the recently announced DOE-funded nuclear physics research facility at Brookhaven National Laboratory, which is expected to be a game-changing resource for the international nuclear physics community.
The U of I System is the state’s leading recipient of DOD research funds. The University is prepared to support DOD’s research, development, test and evaluation (RDT&E) portfolio at the highest levels, thanks to the construction of a Sensitive Compartmented Information Facility (SCIF), an enclosed area within Urbana’s Research Park to process classified information.

It is imperative that DOD—even in a constrained funding environment—invests in the foundational science and technologies to confront looming challenges. U of I System research supports current Department-wide research and technology priorities under the 2018 National Defense Strategy, including hypersonics, artificial intelligence, autonomy, next-generation wireless (5G), cybersecurity, and quantum, and explores long-term research questions to anticipate the military’s future needs. The U of I System encourages Congress to support sustained and robust funding for the 6.1, 6.2, and 6.3 science and technology accounts across services.

U.S. Army Research Laboratory

The U of I System has been strengthening its partnership with the Army Research Laboratory (ARL). Both UIC and Urbana are significantly involved in ARL’s Open Campus Initiative, specifically the establishment of ARL Central.

ARL recently launched a Center for UAS Propulsion (CUP) to convene a community of academic, industry, and government partners around technologies for small engine power for next-generation UAS. Urbana is the academic lead for CUP, in close partnership with UIC. Both universities are engaged in multi-disciplinary research to develop next generation multi-fuel engine architecture, novel batteries, advanced materials research, aerospace propulsion, supercomputing aided simulations, advanced control architecture and algorithms, and power optimization.

Both Urbana and UIC were selected to receive awards from ARL through its Internet of Battlefield Things (IoBT) program. Urbana was selected to lead a $25M initiative to develop the scientific foundations of next-generation IoBTs, designed to enable predictive battlefield analytics and services. The IoBTs will connect soldiers with smart technology in armor, radios, weapons and more to give troops a better understanding of battlefield situations and help assess risks.

ARL awarded a grant to UIC in 2016 to develop a set of tools to validate experimental data that simulates diesel engine operating conditions of in-field ignition delays and excessive harmful pre-mixed burning. The Army Research Office (ARO) sponsors diverse projects at Urbana in catalysis, surface science, and engineering the optical properties of materials.

DOD-Supported Projects at Urbana-Champaign

The Defense Advanced Research Projects Agency (DARPA) has funded several cutting-edge U of I projects. For instance:

- Through its KAIROS program, DARPA has provided $12.3M to support an Urbana-led project, named RESIN—Reasoning about Event Schemas for Induction of Knowledge, which seeks to create a framework for the next generation of event understanding systems, with an ambitious goal: being able to provide a comprehensive understanding of evolving situations, events, and trends.
- DARPA is providing $10M for two projects for research on human performance optimization within U.S. war fighters at the Beckman Institute for Advanced Science and Technology.
- Advanced wireless technology to support warfighter communications is a major focus. Researchers are developing new low-power and ultra-compact radio technology to enable communications through soil, rock and water. Another project will empower individuals to exercise better control over the quality of information they are exposed to on social media. At a national level, the work will help fight adversarial propaganda and help maintain integrity of critical information from malicious manipulation. Methods are in development to safeguard the electrical power grid from attacks on its GPS synchronization system.

- Urbana received an $18.7M grant from DARPA to develop a testbed that will enable validation of new technology for faster response and recovery following an attack on the electric grid. The project, called Cyber-Physical Experimentation Environment for RADICS, will leverage expertise, tools and data provided by industry collaborators.

Urbana receives significant funding from the Air Force Office of Scientific Research (AFOSR). In 2015, AFOSR awarded the campus $4.3M to create a national Center of Excellence in Self-healing, Regeneration, and Structural Remodeling. By developing new chemistries and ways to integrate microcapsules, researchers have created polymers that can re-fill minor damage in paints and coatings (self-protecting), change color when undergoing stress (self-reporting), and re-bond cracks or restore electrical conductivity (self-healing).

In DOD’s selection of projects for its FY2019 DOD Multidisciplinary University Research Initiative (MURI), Urbana was a leader or participant in five of the 24 projects that received awards. In 2017, Urbana’s Materials Research Laboratory (MRL) was part of a consortium that was funded under the MURI program for research centered on additive 3D self-assembly of responsive materials.

DOD’s Defense University Research Instrumentation Program (DURIP) supports the purchase of major, state-of-the-art equipment that augments current research institutions’ capabilities or develops new capabilities to perform cutting-edge defense research and

DOD-Supported Projects at UIC

UIC is currently leading a $3M project funded by DARPA to design, develop, and evaluate a system that will identify security vulnerabilities in web software. With a four-year, $5.25M grant from DOD, UIC researchers are leading a multi-site clinical trial to test the efficacy of a stem cell-based treatment for eye injuries. UIC’s Cancer Center has a three-year, $1.17M DOD grant to develop a new therapy to treat triple-negative breast cancer.

In 2018, UIC received a $2.4 million grant from DOD’s Office of Economic Adjustment to support economic research and resiliency in Illinois’ military-connected communities. A three-year grant totaling nearly $1M from the DOD is funding UIC research on the gene SELENOF and its role in the development of prostate cancer among black men. In 2016, the AFOSR awarded a grant to UIC to study heat and carrier transport in electronic devices and their effects in wide bandgap structures including AlGaN.
Urbana has an enduring and dynamic partnership with USDA. The College of Agricultural, Consumer and Environmental Sciences (ACES) at Urbana is home to the Illinois Agricultural Experiment Station, which supports research capacity and education infrastructure in Illinois. Hatch and other related formula funds support capacity for applied science to benefit Illinois in areas such as plant photosynthesis and genetics, soil and water conservation, animal performance, and human nutrition and health strategies. USDA’s Agriculture and Food Research Initiative (AFRI) supports competitive research programs that are essential to the research portfolio in ACES and in other units on the campus.

The National Institute of Food and Agriculture (NIFA) supports University of Illinois Extension, whose network of educators reaches all 102 counties of Illinois with evidence-based outreach and engagement programs in five broad areas: energy and environmental stewardship; food safety and security; economic development and workforce preparedness; family health, financial security, and wellness; and youth development. NIFA provides capacity support to U of I Extension through Smith-Lever 3(b) & (c).

More than $5M in competitive USDA funding to the College of Veterinary Medicine advances agricultural animal health through basic and applied research into disease prevention and through training programs that help producers and veterinarians improve biosecurity and productivity on farms.

USDA-Supported Projects at Urbana-Champaign

AGRICULTURAL WEEDS | Two USDA projects, valued at nearly $1M, focus on waterhemp and Palmer amaranth — two of the most economically damaging agronomic weeds in the U.S. In one project, Illinois scientists are tracking the northward and westward expansion of Palmer amaranth with the goal of designing context-specific management strategies. The other project is aimed at understanding the genes involved in determining the sex of the weeds as a first step towards developing novel genetic control methods.

COVER CROPS | Multiple USDA projects, supported by more than $2.1M, are refining what we know about the conservation practice of cover cropping. Illinois scientists are using satellite imagery to determine suitability and potential benefits of cover crops across the Corn Belt, examining field-level data from over 150,000 acres to quantify profitability of cover crops, and analyzing 35-year datasets to understand soil microbial dynamics under cover crops.

ANIMAL HEALTH | Urbana’s College of Veterinary Medicine has more than $5M in competitive USDA funding to support animal health research. These projects are focused on vaccine development and understanding the pathogenesis and transmission of agricultural animal diseases. For instance:

- Supporting the beef, pork and poultry industries by developing vaccines to fight important viral diseases, actively monitoring for disease threats, and preparing producers and veterinarians to respond in case of a disease outbreak.
- Fighting global hunger with novel approaches to reduce the impact of key livestock parasites.
ANIMAL HEALTH CONTINUED

• Delivering high-quality online learning focused on animal-disease training and other needs of rural veterinary practitioners and students, so these professionals can partner with producers to ensure on-farm biosecurity and increase productivity and efficiency.

FOOD DEHYDRATION | Supported with more than $900,000 in USDA-NIFA funds, Illinois researchers are engineering ultrasonic food dehydration technologies designed to reduce food spoilage and reduce energy consumption. The project leverages resources and expertise from the NSF Industry/University Cooperative Research Center to build industry partnerships and speed adoption.

GUT HEALTH | Scientists are still discovering the significance of the gut microbiome for human health. For example, Illinois researchers are investigating the contributions of the microbiome toward healthy brain development and aging, with $238,000 in support from USDA and nearly $2M from the National Institute on Aging. Another USDA-funded ($120,000) project is examining how the diet, especially avocado consumption, affects microbiome-mediated liver health in obese patients with non-alcoholic fatty liver disease.

POLLINATOR CONSERVATION | A $994,800 USDA project is examining soil as an overlooked aspect of neonicotinoid impacts on bees. Many bees are ground nesters, which puts them in direct contact with contaminated soil. The project aims to quantify the level of exposure in these bees, as well as the potential to tap into soil microbial communities to break down chemical contaminants.

LIVESTOCK FERTILITY | AFRI is supporting a $100,000 project to identify molecular pathways and biomarkers to predict seasonal infertility in male animals resulting from high temperatures. The same team has leveraged $1.1M of NIH funding to discover how sperm viability in the female reproductive tract can lead to improved artificial insemination, better herd management, and reduced use of hormones for synchronizing ovulation.

Impacts of the Illinois SNAP-Ed and EFNEP Investments

University of Illinois Extension and UIC leveraged $15.5M of total investment in Illinois’ 2019 Supplemental Nutrition Assistance Program Education (SNAP-Ed) to improve food access, promote healthy food choices, and help Illinois families save more money. In 2019, Illinois SNAP-Ed worked in 93 counties across 409 cities in Illinois. SNAP-Ed partnered with 1,827 different organizations to deliver educational programming to low-income families and create organizational changes that promote health. This work reached a total of 1.67 million residents with more than 575,000 adults and youth participating in educational programming throughout the state. Children who participated had greater awareness of the importance of having a healthy diet and were more willing to try new foods, and 6 in 10 adults who attended educational sessions said they would make a healthy change that week.

Using the $2.2M Expanded Food and Nutrition Education Program (EFNEP) investment, University of Illinois Extension taught 8,261 low-income Illinois residents to improve eating habits and food-related behaviors through evidence-based peer-education programming. After participating in programs, 92 percent of adults and 83 percent of youth made healthier food choices.

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Pell Grant

Federal student aid expands access for the roughly 89,270 students attending the U of I System. Along with the Direct Loan program, the most important piece of federal aid is the Pell Grant, which provides critical financial aid to low-income students. U of I is also doing its part to make attendance more affordable. For FY 2020, the U of I System is expected to provide more than $240 million in institutional aid to students with grants, scholarships, fellowships and waivers.

PELL DISBURSEMENTS, RECIPIENTS (FY2019 / AY2019-2020):

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GEAR UP & TRIO

Many Pell-eligible students are able to attend U of I through the outreach performed by our GEAR UP and TRIO programs, which work to encourage and support access to higher education for low-income and first-generation students. UIC and Urbana have had remarkable success with their TRIO programs in improving retention and graduation rates.

TITLE VI INTERNATIONAL AND FOREIGN LANGUAGE EDUCATION PROGRAMS

ED funds important international and foreign language research and outreach through the Title VI International and Foreign Language Education programs. Urbana operates four National Resource Centers (NRC): Center for East Asian and Pacific Studies; Russian, East European and Eurasian Center; European Union Center; and Center for Global Studies. These centers, which have more than 500 faculty affiliates, provide students with foreign language skills, support area/international studies teaching and research, and provide professional development and curriculum development for educators at the K-14, graduate, and postsecondary levels.

The Fulbright-Hays program supports international education, research, outreach, and foreign language studies, especially in the less commonly taught languages of U.S. strategic interest. Urbana continues to be named a top producer of U.S. Fulbright Students and Scholars by the State Department’s Bureau of Educational and Cultural Affairs.

TITLE III (INSTITUTIONAL AID)/TITLE V (DEVELOPING INSTITUTIONS)

In 2016, UIC received a five-year, $5.3M grant from ED’s Hispanic-Serving Institutions—Science, Technology, Engineering, or Mathematics (HSI-STEM) and Articulation Programs, to augment UIC’s efforts to increase the number of Latino and low-income students attaining degrees in STEM fields.

INSTITUTE FOR EDUCATION SCIENCES (IES)

The Learning Sciences Research Institute at UIC is directing a major project funded by the U. S. Institute for Education Sciences under its $100M Reading for Understanding initiative. Project Reading, Evidence and Argumentation in Disciplinary Instruction (READI)—a $19M multi-institution collaboration—is creating instructional interventions that provide opportunities for adolescents to engage in evidence-based argumentation using literature, history, and science.

Urbana has two grants from IES to help researchers, postsecondary institutions, and educators better identify and assist students struggling in gateway biology courses.

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National Endowment for the Humanities (NEH)

NEH is the most important source of federal funding for research and scholarship in the humanistic fields, including history, literature, and foreign languages. With a limited federal budget, NEH is able to expand cultural and historical scholarship into K-12 classrooms, sponsor humanistic research and scholarship, and support preservation and exhibition efforts at libraries and museums. Standing Together is an integral part of that initiative, with programs that promote understanding of the military experience and support returning veterans.

In the first 50 years since the founding of the NEH, institutions in the state of Illinois collectively received more funding than those of any other state in the midwest region.

NEH-Supported Projects at Urbana-Champaign

The Illinois Program for Research in the Humanities (IPRH) has been promoting interdisciplinary study in the humanities, arts, and social sciences since 1997. The NEH budget includes crucial support for humanities scholarship that reaches outside the academy to educate and inform the general public—a direction Urbana has also taken through programming at IPRH.

With an NEH grant, an Urbana architecture professor is leading a project to preserve and catalog a collection of architecture student drawings. The drawings are student design projects from 1890 to 1985.

Also with the support of an NEH grant, an Urbana professor is preparing a synoptic edition and English translation that provides critical knowledge about two influential phases of West African history in the 17th and 19th century. This work corrects the historical record and makes documents available to scholars in an accurate, accessible format for the first time.

NEH-Supported Projects at UIC

UIC’s Institute for the Humanities seeks to foster an intellectually vital, interdisciplinary community of scholars. As the hub of humanities scholarship on campus, the Institute provides a forum for intellectual exchange among faculty and students at UIC and other colleges and universities in the region.

In 2018, NEH awarded a $100,000 grant to UIC to establish a series of faculty development workshops to develop “health humanities portraits” for use in medical school curricula. The project will demonstrate the critical role of the humanities in understanding health and healthcare dilemmas and in training physicians.

Also in 2018, UIC’s Museum and Exhibition Studies program, in collaboration with the National Veterans Art Museum, received an $81,000 grant from NEH to establish a two-semester course focusing on war-related art from World War I to the present. The award is part of the NEH’s “Dialogues on the Experience of War,” which supports the study and discussion of humanities-based expressions of war and military service.
NEH-Supported Projects at UIS

Building on its location in the hometown of Abraham Lincoln, the University of Illinois Springfield has recently established a Center for Lincoln Studies that is expected to grow into a national center for scholarship, teaching, and public history centered on Abraham Lincoln’s life, leadership, and legacy. As it reaches full strength, the Center will facilitate research and scholarship by developing curriculum, offering public history interpretation, hosting visiting scholars, engaging broad campus and public audiences, and offering an interdisciplinary learning laboratory for undergraduate and graduate students. In addition to being supported by private gifts, the Center will pursue relevant federal funding opportunities and partnerships at appropriate agencies to support programming, research, publishing and dissemination of materials, hosting of events, and other relevant activities.

National Endowment for the Arts (NEA)

Funding from the NEA has helped ensure that our communities—especially underserved or rural communities—receive support to enhance their cultural, artistic, and innovative opportunities in the arts. The past 10 years have seen nearly $500,000 of awards from the NEA to projects across the U of I System.

NEA-SUPPORTED PROJECTS AT URBANA

The Krannert Center for the Performing Arts—a university-based performing arts complex housed within the College of Fine and Applied Arts—has benefited from NEA funds to advance sustainable creativity through culturally emblematic performances. The Krannert Center also receives support from NEA through Illinois Arts Council, Arts Midwest, and New England Foundation for the Arts.

NEA-SUPPORTED PROJECTS AT UIC

The U.S. Department of State selected UIC to curate the U.S. Pavilion at the 2020 Venice Architecture Biennale. With partial support from NEA, two UIC professors will lead the project, American Framing, which will demonstrate the conditions and consequences of American wood-framed construction, and will complete the 1930s American Palladian–style U.S. Pavilion with a work of ubiquitous domestic architecture.

INSTITUTE FOR MUSEUM AND LIBRARY SCIENCES (IMLS)

In 2018, the Illinois School of Information Sciences at Urbana was awarded a three-year Early Career Development grant from IMLS, under the Laura Bush 21st Century Librarian Program, which supports developing a diverse workforce of librarians to better meet the changing learning and information needs of the American public by enhancing the training and professional development of librarians, developing faculty and library leaders, and recruiting and educating the next generation of librarians.
DHS R&D EXPENDITURES, FY2019

**URBANA-CHAMPAIGN: $3.4 MILLION | UIC: $141,000**

**Science and Technology Directorate (S&T)**

Urbana-Champaign is home to the Critical Infrastructure Resilience Institute (CIRI), a Center of Excellence funded under DHS S&T’s Office of University Programs through a multi-year grant to conduct research, technology transition, and education and workforce development to strengthen the security and resilience of our nation’s critical infrastructures. Such infrastructure includes emergency communications systems, next-generation (5G) telecommunications networks, critical and defense manufacturing, and transportation systems, as well as the supply chains supporting those infrastructures. The Institute’s research has already developed several compelling technologies that are being transitioned to critical infrastructure markets. New this year are research projects exploring the risks to the 5G wireless infrastructure associated with supply chain vulnerabilities, as well as research to identify and address potential cybersecurity risks to our nation’s current 9-1-1 emergency communications and dispatch systems and next-generation 9-1-1 systems. CIRI has also extended its research collaboration with the United States Transportation Command (USTRANSCOM) focused on enhancing USTRANSCOM mission assurance by strengthening the cyber security and resilience of its vast supply chain and the maritime port operations that are so critical to USTRANSCOM’s global mission.

Also with DHS funding, an Urbana professor is researching ways to detect GPS spoofing, where an attacker mimics the authentic signal, causing the receiver to compute a different position or timing solution.

**Federal Emergency Management Agency (FEMA)**

The Illinois State Water Survey (ISWS) at Urbana’s Prairie Research Institute continues to receive grant funding from FEMA through the Risk MAP program to support the Illinois floodplain mapping program. ISWS is a Cooperating Technical Partner and produces flood risk identification maps that assist Illinois communities and citizens in understanding and taking measures to reduce flood risk. The project coordinates with Illinois Extension on extensive outreach to inform the public about flood hazards and alternatives.

FEMA also provides support to the Illinois Fire Service Institute (IFSI), the statutory State Fire Academy for Illinois, which is at Urbana. In addition to providing training on campus, the Institute offers one-day, hands-on classes for fire departments at Regional Training Centers and local fire stations across the state. IFSI is currently engaged with FEMA on studies of firefighter chemical exposure and cardiovascular risk, with a focus on translating findings into actionable strategies that can be disseminated across the U.S.
NASA r&D EXPENDITURES, FY2019

URBANA-CHAMPAIGN: $8.4 MILLION | UIC: $856,000

NASA-Supported Projects at Urbana-Champaign

SPACE

The goal of a Phase II NASA-funded project on Advanced Quantum Communication from the International Space Station (ISS) is to develop a quantum communication demonstration from the ISS to a ground station, as an initial step toward a satellite-based quantum network.

NASA Space Technology Research Fellowships (NSTRF) to students support graduate training in areas of national importance, including drone-based quantum cryptography.

Undergraduates benefit from NASA's CAPSAT project, where we are responsible for one of three payloads on the “cubesat” (a mini-satellite), which launched in fall 2018. Our payload will test techniques to reduce the deleterious effects of background space radiation on single-photon detector noise.

AVIATION

The Urbana campus is a partner in a $9.9M research center for aviation innovation, supported by NASA under its University Leadership Initiative. The goal of this research center is to mature a disruptive airfoil design concept, known as the Slotted Natural Laminar Flow Airfoil, aimed at producing low-drag wing configurations for commercial transport vehicles.

Urbana has been helping to break down technical barriers to hybrid electric propulsion for commercial transport aircraft. Multiple grants from NASA's AATT and LEARN programs (roughly $4M over four years) have supported work on high-power density electrical machines and drives and system level modeling and analyses.

As part of these efforts, the campus has been helping to bring together the broader electrical and aerospace communities. A NASA-supported workshop on Large Electric Machines held in 2016 has now grown into a collaboration between AIAA and IEEE with a joint symposium held in July 2018 in Cincinnati.

NASA has also funded control research to address aviation safety challenges by developing a control reconfiguration architecture to prevent catastrophic crashes, and to integrate UAVs into national airspace systems.

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REMOTE SENSING

Urbana researchers provide critical ongoing support for instruments on NASA's Terra satellite, the flagship of the Earth Observing System, providing data critical for understanding weather, air pollution, food security, the hydrological cycle, radiation budgets, and the link between aerosol pollutants and health problems. These include the Multi-Angle Imaging SpectroRadiometer and the Moderate Resolution Imaging Spectroradiometer, and will include the Multi-Angle Imager for Aerosols instrument, with a nominal launch date of 2021. Urbana is a key site for the ACCESS to Terra Data Fusion Products project, which aims to harmonize use of the 1.2 petabytes of data from instruments on the Terra satellite through the use of a common format and grid, and development of needed software tools and cyberinfrastructure.

NASA funds research in the use of novel sensing technology and satellite data to improve monitoring and predictability of the broader U.S. Midwest carbon budget and food productivity. Awards totaling more than $1.2M focus on the integration of multi-source satellite data with improved land surface modeling to improve monitoring of the carbon budget for the U.S. Corn Belt, and the use of chlorophyll fluorescence measurement to improve crop modeling from both ground and space.

SIGNAL PROCESSING

NASA is funding the development of lithium niobate-based photonic integrated circuits to support widely tunable and highly sensitive microwave and millimeter-wave radiometry. These circuits will improve technology for optical frequency data acquisition in NASA science missions, and have many potential applications in obtaining data to improve our understanding of Earth’s atmosphere and global change.

NASA-Supported Projects at UIC

UIC has a $1.1M, five-year grant from NASA’s Astrobiology Institute to identify biosignatures of life on Titan — Saturn’s largest moon — from either currently living or long-extinct life.

UIC researchers, with funding from NASA, have shown how the bubbles that form on a heated surface create a tiny recoil when they leave it, like the kick from a gun firing blanks. This miniscule force can be harnessed to mix liquid coolant around high-power microelectronics in space or on Earth.

A researcher at UIC received the prestigious NASA Early Career Faculty grant in 2017, and is using the funding to create miniature systems for easy fluidic sampling in space.

NASA has also recently funded a project at UIC to develop a Piezoelectric Instrument for Precision Exploration Sampling (PIPES), a miniaturized liquid sample acquisition and handling system. The PIPES system seeks to fill a gap in NASA's current in-flight sensing capabilities.
The enactment of the Global Food Security Act of 2018 promotes inclusive, agriculture-led economic growth around the world as central to U.S. strategic and economic interests. Feed the Future is an important initiative to achieve national goals. Urbana is a key partner in Feed the Future programs for building higher education and extension capacity, as well as the Feed the Future Innovation Labs.

Under AgReach, Feed the Future programs led by Urbana aim to strengthen extension systems and agricultural higher education in the developing world, building institutions that enable food systems to work for smallholder farmers. Since 2011, nearly $40M of development work has enhanced extension systems in 339 institutions around the world; trained more than 2,900 Extension Officers, subject matter specialists, and policymakers; and improved the services received by more than 12.8 million rural farmers, entrepreneurs, and consumers in developing countries.

agreach.illinois.edu/our-impact

FEED THE FUTURE INNOVATION LABS specifically focus on university-based applied research. In 2018, Urbana received a three-year, $6M grant from USAID to build on its previous $25M investment in the Soybean Innovation Lab (SIL). The project helps African countries build soybean research infrastructure and address protein malnutrition. SIL is the only U.S. entity conducting basic research on soybeans for African settings.

As a partner in the Sustainable Intensification Innovation Lab and the Postharvest Loss Prevention Innovation Lab, the U of I also conducts more than $5M in programs to develop appropriate scale mechanization and postharvest solutions so that smallholders in Africa and South Asia can adopt more sustainable and profitable farm practices.

soybeaninnovationlab.illinois.edu

The Appropriate Scale Mechanization Consortium (ASMC), led by Urbana, is a $4.7M sub award under the Feed the Future Innovation Lab for Collaborative Research on Sustainable Intensification at Kansas State University funded by USAID. The overall objective of ASMC is to develop and deploy appropriate scalable mechanization technologies to enhance sustainable intensification for smallholder farmers in Bangladesh, Burkina Faso, Cambodia, and Ethiopia.

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